

Iridaceae

of southern Africa

Peter Goldblatt & John C. Manning

Strelitzia 42





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STRELITZIA

This series has replaced *Memoirs of the Botanical Survey of South Africa* and *Annals of the Kirstenbosch Botanic Gardens,* which SANBI inherited from its predecessor organisations.

The plant genus *Strelitzia* occurs naturally in the eastern parts of southern Africa. It comprises three arborescent species, known as wild bananas, and two acaulescent species, known as crane flowers or bird-of-paradise flowers. The logo of the South African National Biodiversity Institute is partly based on the striking inflorescence of *Strelitzia reginae*, a native of the Eastern Cape and KwaZulu-Natal that has become a garden favourite worldwide. It symbolises the commitment of the Institute to champion the exploration, conservation, sustainable use, appreciation and enjoyment of South Africa's exceptionally rich biodiversity for all people.

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Preface

This significant work is the first complete account of the Iridaceae in southern Africa to have appeared for over a century, and consolidates our knowledge of this diverse and important family. It comprises a full taxonomic account of the Iridaceae for all of southern Africa, including South Africa, Botswana, Lesotho, Namibia and Eswatini. It is presented in a formal botanical way, with a description of the family, plus identification keys and descriptions of the four subfamilies that occur in southern Africa. Subfamily Aristeoideae comprises only the African and Madagascan genus *Aristea*; Nivenioideae includes the three shrubby genera *Klattia, Nivenia* and *Witsenia*, all endemic to the Western Cape, South Africa; Crocoideae, with 28 genera, is the most diverse; and Iridoideae includes just four genera. We provide identification keys and descriptions to the genera (including subgenera, sections and series) in each subfamily and keys to the species and infraspecific taxa. The bulk of the treatment is devoted to accounts of the species, including brief narratives about relationships. Geographic ranges and ecology are described, supplemented by distribution maps. Full nomenclature and synonymy for all names applying to southern African taxa are provided.

Iridaceae include an estimated 70 genera and perhaps 2 160 species worldwide. Southern Africa, with 36 genera and 1 210 species, or slightly more than half the family, is a major centre of diversity for Iridaceae. Most of the southern African species are restricted to the subcontinent, with by far the greatest number found in the winter-rainfall belt in the southwest of the region but with an important secondary centre along the Drakensberg Escarpment of KwaZulu-Natal and Lesotho.

Moraea, with 209 species in southern Africa out of a total of 230, is the largest genus in the region, followed by *Gladiolus*, with 169 species in southern Africa out of a total of 272 species. This is nearly as many as *Iris*, the largest genus of Iridaceae, with an estimated 275 species. The southern African Iridaceae include several more unusually large genera, notably *Geissorhiza* with 104 species, *Ixia* with 100 species, *Babiana* with 93 species and *Hesperantha* with 87 species. At the opposite pole are the monospecific genera *Afrocrocus*, *Devia*, *Duthiastrum*, *Melasphaerula*, *Pillansia* and *Schizorhiza*.

The taxonomy presented here is the result of revisionary and pollination studies begun in 1970 and continued until 2016, at which time all the southern African genera had been reviewed or fully revised, often in light of molecular phylogenetic research. Major changes to traditional generic circumscriptions that were implemented during this period include the reduction of *Anomalesia* and *Homoglossum* in *Gladiolus* in 1989, and the inclusion of *Galaxia, Gynandriris, Hexaglottis* and *Homeria* in *Moraea* in 2000. The genus *Lapeirousia*, in contrast, has recently been restricted in its circumscription, with the remaining species segregated among the genera *Afrosolen*, *Codonorhiza* and *Schizorhiza*. We also include a refined, phylogeny-based classification for Crocoideae.

The publication of this work represents the culmination of well over two and a half centuries of taxonomic study of this remarkable plant family in southern Africa. The taxonomic paradigms under which the accounts of the genera and species were produced have changed markedly over that time. The advent of cladistic methods represented a watershed in our interpretation of morphological characters, and the development of DNA-based phylogenetic study has introduced an era of unprecedented understanding of evolutionary relationhsips. These advances are reflected in the taxonomy that we present here, representing the first unified treatment for the family in southern Africa in over a century.

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We are indebted to Nicole Meyer for her meticulous editing of the manuscript, and to Hannelie Snyman for developing and generating the distribution maps for the species. We also thank many of our colleagues who helped us with field work, library resources and often complex nomenclatural questions: in particular we are grateful to Roy Gereau, Anne-Lise Fourie, Ingrid Nänni, Lendon Porter, Mary Stiffler and Jan Vlok. Most of the field work was funded through grants awarded to us from the US National Science Foundation and the National Geographic Society. We are especially indebted to Peter Raven for his endless encouragement, and to Elizabeth Parker and the Mapula Trust for their ongoing and unstinting support. Thanks are due also to Yolande Steenkamp for the final editing, and Elizma Fouché for her inspired design and layout.

Nomenclatural novelties published in this volume

Antholyza burchellii N.E.Br., *syn. nov.* = **Tritoniopsis triticea** *(Burm.f.) Goldblatt*
Aristea angolensis subsp. *pulchella* N.E.Br. ex Weim., *syn. nov.* = **A. flexicaulis** *Baker*
Aristea racemosa var. *inflata* Weim., *syn. nov.* = **A. racemosa** *Baker*
Aristea sect. **Fimbriatae** *Goldblatt & J.C.Manning, sect. nov.*
Bobartia indica var. *minor* G.J.Lewis, *syn. nov.* = **B. indica** L.
Bobartia longicyma subsp. *microflora* Strid, *syn. nov.* = **B. longicyma** Gillett
Bobartia sect. **Gladiatae** *J.C.Manning & Goldblatt, sect. nov.*
Bobartia sect. **Paniculatae** *J.C.Manning & Goldblatt, sect. nov.*
Bobartia vlokii *Goldblatt & J.C.Manning, sp. nov.*
Exohebea caledonensis R.C.Foster, *syn. nov.* = **Tritoniopsis unguicularis** *(Lam.) G.J.Lewis*
Ferraria atrata G.Lodd., *syn. nov.* = **F. crispa** *Burman*
Ferraria ser. **Macroscyphae** (Baker) *Goldblatt & J.C.Manning, stat. nov.*
Ferraria ser. **Subdivaricatae** *Goldblatt & J.C.Manning, ser. nov.*
Ferraria ser. **Uncinatae** *Goldblatt & J.C.Manning, ser. nov.*
Geissorhiza adriaanii *Goldblatt & J.C.Manning, sp. nov.*
Gladiolus cygneus Ingram, *syn. nov.* = **G. longicollis** *Baker* subsp. **longicollis**
Hebea angusta L.Bolus, *syn. nov.* = **Tritoniopsis parviflora** *(Jacq.) G.J.Lewis*
Hebea lata var. *longibracteata* L.Bolus, *syn. nov.* = **Tritoniopsis lata** *(L.Bolus) G.J.Lewis*
Hesperantha mtamvunae *Goldblatt & J.C.Manning, sp. nov.*
Ixia scillaris subsp. **lata** *Goldblatt & J.C.Manning, nom. nov.* pro *I. scillaris* subsp. *latifolia* Goldblatt & J.C.Manning, *nom. illeg.*
Ixia ser. **Angustisiphon** *Goldblatt & J.C.Manning, ser. nov.*
Ixia ser. **Brevitubae** *Goldblatt & J.C.Manning, ser. nov.*
Ixia ser. **Capillares** *Goldblatt & J.C.Manning, ser. nov.*
Ixia ser. **Dichone**, *Goldblatt & J.C.Manning, ser. nov.*
Ixia ser. **Fucatae** *Goldblatt & J.C.Manning, ser. nov.*
Ixia ser. **Hyalis** *(Baker) Goldblatt & J.C.Manning, stat. nov.*
Ixia ser. **Morphixia** *Goldblatt & J.C.Manning, ser. nov.*
Ixia ser. **Paucifolieae** *Goldblatt & J.C.Manning, ser. nov.*
Ixia ser. **Rapunculoides** *Goldblatt & J.C.Manning, ser. nov.*
Moraea brevistyla subsp. **papillosa** *Goldblatt & J.C.Manning, subsp. nov.*
Moraea macrocarpa subsp. **virginea** *Goldblatt & J.C.Manning, subsp. nov.*
Moraea subg. **Acaules** *(Baker) Goldblatt J.C.Manning, stat. nov.*
Romulea ×intermedia Bég., *syn. nov.* = **R. cruciata** *(Jacq.) Bég.*
Romulea atrandra var. *esterhuyseniae* M.P.de Vos, *syn. nov.* = **R. atrandra** *G.J.Lewis*
Romulea atrandra var. *lewisiae* M.P.de Vos, *syn. nov.* = **R. atrandra** *G.J.Lewis*
Romulea aurea Klatt, *syn. nov.* = **R. tortuosa** *(Licht. ex Roem. & Schult.) Baker*
Romulea bulbocodioides var. *ambigua* Bég., *syn. nov.* = **R. hirsuta** *(Steud. ex Klatt) Baker*
Romulea bulbocodioides var. *minor* Bég., *syn. nov.* = **R. flava** *(Lam.) M.P.de Vos*
Romulea bulbocodioides var. *viridiflora* Bég., *syn. nov.* = **R. flava** *(Lam.) M.P.de Vos*
Romulea cruciata var. *hirsuta* Bég., *syn. nov.* = **R. flava** *(Lam.) M.P.de Vos*
Romulea elegans Klatt, *syn. nov.* = **R. rosea** *(L.) Eckl.*
Romulea framesii L.Bolus, *syn. nov.* = **R. hirsuta** *(Steud. ex Klatt) Baker*
Romulea fuscomontana *J.C.Manning & Goldblatt* sp. nov.
Romulea klattii Bég., *syn. nov.* = **R. hirsuta** *(Steud. ex Klatt) Baker*
Romulea longituba var. *alticola* B.L.Burtt, *syn. nov.* = **R. macowanii** *Baker*
Romulea macowanii var. *oreophila* M.P.de Vos, *syn. nov.* = **R. macowanii** *Baker*
Romulea muirii N.E.Br., *syn. nov.* = **R. rosea** *(L.) Eckl.*
Romulea obscura var. *blanda* M.P.de Vos, *syn. nov.* = **R. obscura** *Klatt*
Romulea obscura var. *campestris* M.P.de Vos, *syn. nov.* = **R. obscura** *Klatt*
Romulea obscura var. *subtestacea* M.P.de Vos, *syn. nov.* = **R. obscura** *Klatt*
Romulea papyracea Wolley-Dod, *syn. nov.* = **R. obscura** *Klatt*
Romulea rosea var. *zeyheri* Baker, *syn. nov.* = **R. hirsuta** *(Steud. ex Klatt) Baker*
Romulea sanisensis *(M.P.de Vos) J.C.Manning & Goldblatt, stat. nov.*

Romulea sect. **Autumnales** *(M.P.de Vos) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Aggregatae** *(M.P.de Vos) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Alticolae** *J.C.Manning & Goldblatt*, *ser. nov.*
Romulea ser. **Amoenae** *(M.P.de Vos) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Atrandrae** *(M.P.de Vos) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Autumnales** *(M.P.de Vos) J.C.Manning & Goldblatt*, *ser. nov.*
Romulea ser. **Ciliatae** *(M.P. de Vos) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Hirsutae** *(Bég.) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Hirtae** *(Bég.) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Lomurea** *(M.P.de Vos) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Minutiflorae** *(M.P.de Vos) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Namaquanae** *J.C.Manning & Goldblatt*, *ser. nov.*
Romulea ser. **Pratenses** *(M.P.de Vos) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Roseae** *(Bég.) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Tetragonae** *J.C.Manning & Goldblatt*, *ser. nov.*
Romulea ser. **Tortuosae** *(Bég.) J.C.Manning & Goldblatt*, *stat. nov.*
Romulea ser. **Tubiformes** *J.C.Manning & Goldblatt*, *ser. nov.*
Romulea setifolia var. *aggregata* M.P.de Vos, *syn. nov.* = **R. setifolia** *N.E.Br.*
Romulea setifolia var. *belviderica* M.P.de Vos, *syn. nov.* = **R. setifolia** *N.E.Br.*
Romulea setifolia var. *ceresiana* M.P.de Vos, *syn. nov.* = **R. setifolia** *N.E.Br.*
Romulea subsect. *Campestres* M.P.de Vos, *syn. nov.* = **R.** ser. **Roseae** *(Bég.) J.C.Manning & Goldblatt*
Romulea subsect. *Cruciatae* M.P.de Vos, *syn. nov.* = **R.** ser. **Roseae** *(Bég.) J.C.Manning & Goldblatt*
Romulea subsect. *Longitubae* M.P.de Vos, *syn. nov.* = **R.** ser. **Tortuosae** *(Bég.) J.C.Manning & Goldblatt*
Romulea tetragona var. *flavandra* M.P.de Vos, *syn. nov.* = **R. tetragona** *M.P.de Vos*
Romulea torta Baker, *syn. nov.* = **R. hirsuta** *(Steud. ex Klatt) Baker*
Romulea torta var. *dissecta* M.P.de Vos, *syn. nov.* = **R. hirsuta** *(Steud. ex Klatt) Baker*
Romulea tortilis Baker, *syn. nov.* = **R. hirsuta** *(Steud. ex Klatt) Baker*
Romulea tortuosa subsp. *depauperata* M.P.de Vos, *syn. nov.* = **R. tortuosa** *(Licht. ex Roem. & Schult.) Baker*
Subtribe **Radinosiphoninae** *Goldblatt & J.C.Manning*, *subtr. nov.*
Tritonia capensis var. *major* Ker Gawl., *syn. nov.* = **T. flabellifolia** *(D.Delaroche) G.J.Lewis*
Tritonia cooperi subsp. *quadrialata* M.P.de Vos, syn. nov. = **T. cooperi** *(Baker) Klatt*
Tritonia disticha subsp. *rubrolucens* (R.C.Foster) M.P.de Vos, *syn. nov.* = **T. disticha** *(Klatt) Baker*
Tritonia flabellifolia var. *thomasiae* M.P.de Vos, *syn. nov.* = **T. flabellifolia** *(D.Delaroche) G. J.Lewis*
Tritonia nervosa Baker, *syn. nov.* = **Tritoniopsis ramosa** *(Eckl. ex Klatt) G.J.Lewis*
Tritonia pallida subsp. *tayloriae* (L.Bolus) M.P.de Vos, *syn. nov.* = **T. pallida** *Ker Gawl.*
Tritonia sect. **Deserticola** *J.C.Manning & Goldblatt*, *sect. nov.*
Tritonia sect. **Pallidae** *J.C.Manning & Goldblatt*, *sect. nov.*
Tritonia sect. **Pseudopectinatae** *J.C.Manning & Goldblatt*, *sect. nov.*
Tritonia sect. **Subteretifoliae** *J.C.Manning & Goldblatt*, *sect. nov.*
Tritonia unguiculata Baker, *syn. nov.* = **Tritoniopsis ramosa** *(Eckl. ex Klatt) G.J.Lewis*
Tritoniopsis apiculata var. *minor* G.J.Lewis, *syn. nov.* = **T. revoluta** *(Burm.f.) Goldblatt*
Tritoniopsis pulchella var. *alpina* G.J.Lewis, *syn. nov.* = **T. lata** *(L.Bolus) G.J.Lewis*
Tritoniopsis ramosa var. *robusta* G.J.Lewis, *syn. nov.* = **T. ramosa** *(Eckl. ex Klatt) G.J.Lewis*
Tritoniopsis sect. **Aristatae** *J.C.Manning & Goldblatt*, *sect. nov.*
Watsonia sect. **Neuberia** *(Eckl. ex Baker) Goldblatt & J.C.Manning*, *stat. nov.*
Watsonia ser. **Angustae** *(Goldblatt) Goldblatt & J.C.Manning*, *stat. nov.*
Watsonia ser. **Brevibractea** *(Goldblatt) Goldblatt & Manning*, *stat. nov.*
Watsonia ser. **Grandibractea** *(Goldblatt) Goldblatt & Manning*, *stat. nov.*

Abstract

This is the first complete taxonomic treatment for Iridaceae in southern Africa (including Botswana, Lesotho, Namibia, South Africa and Eswatini) since the publication of J.G. Baker's account in *Flora capensis* (1896). It treats a total of 1 210 species in 36 genera, classified in the four subfamilies **Aristeoideae** (*Aristea* 46 spp.), **Nivenioideae** (*Nivenia* 11 spp., *Klattia* 3 spp. and *Witsenia* 1 sp.), **Crocoideae** tribe Tritoniopsideae (*Tritoniopsis* 23 spp.), tribe Watsonieae (*Watsonia* 53 spp., *Pillansia* 1 sp., *Thereianthus* 11 spp., *Micranthus* 7 spp., *Codonorhiza* 7 spp., *Schizorhiza* 1 sp., *Lapeirousia* 27 spp. and *Afrosolen* 11 spp.) and tribe Ixieae subtribes Gladiolinae (*Gladiolus* 169 spp.), Melasphaerulinae (*Melasphaerula* 1 sp.), Freesiinae (*Xenoscapa* 3 spp., *Freesia* 16 spp., *Crocosmia* 7 spp. and *Devia* 1 sp.), Hesperanthinae (*Geissorhiza* 104 spp. and *Hesperantha* 87 spp.), Tritoniinae (*Babiana* 93 spp., *Chasmanthe* 3 spp., *Sparaxis* 16 spp., *Duthiastrum* 1 sp., *Dierama* 37 spp., *Tritonia* 30 spp. and *Ixia* 100 spp.), subtribe Radinosiphoninae (*Radinosiphon* 2 spp.) and Crocinae (*Romulea* 84 spp., *Afrocrocus* 1 sp. and *Syringodea* 7 spp.), and **Iridoideae** (*Dietes* 5 spp., *Bobartia* 17 spp., *Ferraria* 15 spp. and *Moraea* 209 spp.). A revised, phylogeny-based tribal and subtribal classification is presented here for Crocoideae, correlating with corm ontogeny and seed characteristics. Keys are provided to subfamilies, tribes and genera (and in the case of larger genera to subgenera or sections) as well as to species and infraspececific taxa. Each species is fully described with complete nomenclature, geographic range and a distribution map. Genera are illustrated with line drawings, and nearly half of the species are illustrated with colour photographs. Four new species are described, **Bobartia vlokii** *Goldblatt & J.C.Manning,* **Geissorhiza adriaanii** *Goldblatt & J.C.Manning,* **Hesperantha mtamvunae** *Goldblatt & J.C.Manning* and **Romulea fuscomontana** *J.C.Manning & Goldblatt*, and a number of names are synonymised.

Keywords: classification; Flora; new species; nomenclature; synonymy; taxonomy

Introduction

The family Iridaceae is almost worldwide in distribution, and numbers some 2 250–2 300 species divided among six subfamilies. Southern Africa, comprising the subcontinent south of the Cunene–Limpopo axis (i.e. Botswana, Lesotho, Namibia, South Africa and Eswatini), is a major centre of radiation, accounting for slightly more than half the family, or 1 210 species in 36 genera. This represents nearly a threefold increase in the number of species that were recognised in the last comprehensive treatment of the family in southern Africa by Baker (1896), in which 428 species were listed. The circumscription of several genera has also altered substantially since then, with just 22 of the 32 genera accepted by Baker (1896) still recognised. This is largely a result of the realisation of the influence that pollination systems have on floral morphology (Goldblatt & Manning 2006), and of the role that cladistic and phylogenetic techniques have played in improving our understanding of relationships among the species and genera (Goldblatt & Manning 2008).

Almost all of the southern African species and most of the genera are endemic to the subcontinent, with just a few shared with adjacent tropical Africa and Madagascar. Crocoideae, with 866 species in the region, is the largest subfamily. Centred in the winter-rainfall area in the southwest, it includes 32 genera, of which *Gladiolus* L. and *Romulea* Maratti are shared with western Eurasia while a third, *Crocus* L., is restricted to North Africa and Eurasia. Iridoideae, with 246 southern African species in four genera, also occurs in Eurasia and the Americas, and includes the Eurasian and North American genus *Iris* L., as well as the largely African genus *Moraea* Miller. Aristeoideae, comprising only the single genus *Aristea* Aiton, is likewise centred in southern Africa, where 46 species are recorded, a few of them shared with tropical Africa, while several more occur in Madagascar. Subfamily Nivenioideae, with three genera and 15 species, is restricted to the Cape Floristic Region of South Africa and includes the shrubby members of the family, representing a remarkable growth form for Iridaceae.

All Crocoideae and most Iridoideae are seasonal geophytes with underground storage organs, termed corms, formed by modified, highly contracted stems. The corms of Crocoideae differ in anatomy and ontogeny from those of Iridoideae, and the two types have evolved independently from ancestors with rhizomatous rootstocks. *Dietes* Salisb. ex Klatt and *Bobartia* L. (Iridoideae) and *Aristea* (Aristeoideae) are evergreen herbs, as are a few species of *Watsonia* Miller and *Tritoniopsis* L.Bolus (Crocoideae). The remaining species of Crocoideae and Iridoideae are deciduous herbs that retreat underground in the dry season. In contrast, species of Nivenioideae are evergreen shrubs with multiple branches produced from a large, woody, fire-restistant underground stem termed a caudex.

Leaves of most Iridaceae are oriented fan-wise in a single plane with the blades usually upright and unifacial (isobilateral), i.e. with both sides anatomically and morphologically identical. The margins of these leaves sometimes show marked anatomical developments, often thickened but sometimes raised into broad wings, and the midveins may also be strongly raised, rendering the leaf cross-shaped in section. These elaborations are most common in some of the winter-rainfall lineages, especially *Geissorhiza* Ker Gawl., *Gladiolus* and *Tritonia* Ker Gawl. In contrast, the leaves of *Crocus, Moraea* and *Syringodea* Hook.f. are secondarily bifacial and often channelled, with the upper and lower faces dissimilar. The ecophysiological aspects of these various foliar elaborations remain to be explored.

Flowers of Iridaceae are often their most striking feature, and have largely informed previous understandings of relationships within the family. Floral morphology varies greatly, often within a single genus, and we have only recently appreciated that much of this variation represents adaptations for a wide range of insect and bird pollinators. Indeed, the majority of species of Iridaceae are specialised for pollination by one or a few classes of pollinators, some of which are unusually well developed in southern Africa. The pollination biology of the family in the subcontinent is relatively well studied, and recorded pollinators include female pollen-collecting bees, large-bodied, long-tongued apid and anthophorine bees, short-tongued oil-collecting bees, long-proboscid flies, short-proboscid dung, game and muscid flies, settling and hovering moths, butterflies, hopliine beetles, and sunbirds. Some important insights have emerged through combining our understanding of evolutionary relationships among species with our knowledge of their pollination biology. These include evidence that the evolution of the zygomorphic flower in Crocoideae represents a key innovation that has accellerated the variety of pollination systems that such flowers can exploit compared with radially symmetrical forms (Goldblatt & Manning, 2006).

REFERENCES

BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.

GOLDBLATT, P. & MANNING, J. 2006. Radiation of pollination systems in the Iridaceae of sub-Saharan Africa. *Annals of Botany* 97: 317–344.

GOLDBLATT, P. & MANNING, J.C. 2008. *The Iris Family: natural history and classification*. Timber Press, Oregon.

IRIDACEAE Jussieu

Perennial evergreen or deciduous herbs, rarely annuals or shrubs with anomalous secondary growth. *Rootstock* a rhizome, bulb, corm, or a woody caudex when shrubs. *Leaves* basal and cauline, sometimes lower 2 or 3 without blades, sheathing base of stem and reaching shortly above ground (thus cataphylls), mostly in two opposed ranks, bases usually overlapping and clasping the one above, sheaths of foliage leaves open or closed, usually contemporary with flowers, occasionally produced later, rarely already dry at flowering, occasionally leaves of flowering stem with reduced to entirely sheathing blades, then foliage leaves sometimes produced from separate shoots; blades either unifacial and oriented edgewise to stem, parallel-veined, with or without distinct central vein, plane or pleated or occasionally oval to round in section; or bifacial and oriented with adaxial surface facing stem, then channelled to flat and usually without median vein; margins plane or sometimes undulate to crisped, sometimes thickened and fibrotic or raised into wings at right angles to surface. *Flowering stems* aerial or subterranean, simple or branched, round in section or compressed, then often angled or winged. *Inflorescence* either composed of umbellate monochasial cymes (rhipidia) enclosed in opposed leafy to dry bracts (spathes) with flowers usually pedicellate, sometimes sessile, each flower within a rhipidium subtended by one bract; or flowers sessile, subtended by a pair of opposed bracts and arranged in a spike, or solitary. *Flowers* bisexual, with a petaloid perianth of 2 whorls of 3 tepals each, rarely inner whorl reduced or lacking, radially or bilaterally symmetric and then usually bilabiate, variously coloured, often with contrasting markings; fugacious or long-lasting; scented or unscented; tepals usually large and showy, free or united below in a tube, whorls equal or unequal, when zygomorphic the posterior tepal usually largest and inclined to hooded, lower 3 often smallest and with contrasting markings (nectar guides); tube when present straight or curved, cylindric or funnel- to trumpet-shaped. *Stamens* 3 (2 in Australian *Diplarrena*), opposite outer tepals, arising at base of outer tepals or within floral tube, symmetrically disposed or unilateral and arcuate or sometimes declinate; filaments filiform, free or partly to completely united; anthers 2-thecous, usually extrorse and splitting longitudinally, occasionally splitting laterally or at apex or base. *Ovary* inferior (superior in Australian *Isophysis*), 3-locular with axile placentation (rarely 1-locular with parietal placentation); ovules anatropous or campylotropous, many to few, in 2 rows (rarely 1 row) per locule; style filiform, 3-branched or 3-lobed, style branches either filiform (sometimes very short) to distally expanded, sometimes each divided in upper half and stigmatic towards apices, or branches thickened or flattened and petaloid, stigmas then abaxial below apices. *Fruit* a loculicidal capsule, rarely indehiscent, firm to cartilaginous, occasionally woody, xerochastic or rarely hygrochastic. *Seeds* globose to angular or discoid, sometimes broadly winged, usually dry, rarely seed coat fleshy or an aril present, rugulose or smooth, shiny or matte; endosperm hard, with reserves of hemicellulose, oil and protein; embryo small. *Pollen grains* monosulcate, trisulcate, disulculate, zonasulculate, dizonasulculate, spiraperturate or inaperturate, operculate or not, exine reticulate to areolate, micropunctate, or perforate-scabrate.

Key to subfamilies

1a Plants evergreen shrubs with woody aerial stems; rootstock a woody caudex; individual flowers sessile, the tepals united in a well-developed tube; flowers lasting at least two days . . . . . 2. NIVENIOIDEAE

1b Plants perennial, either with herbaceous aerial stems or acaulescent, sometimes evergreen; rootstock a rhizome or corm; individual flowers stalked or sessile, the tepals free, basally connate, or united in a tube; flowers variously long-lived or lasting < 1 day and deliquescing on fading:

2a Flowers sessile and subtended by a pair of opposed bracts, usually arranged in a spike or solitary on branches; tepals always united in a tube below; flowers lasting at least 2 days; style dividing into filiform branches, rarely simple; rootstock a corm producing roots from the base; pollen grains usually with perforate scabrate exine, rarely exine reticulate, aperture usually with operculum unless zonasulculate; nectaries present, septal. 3. CROCOIDEAE

2b Flowers usually pedicellate or sometimes sessile, in umbellate clusters (rhipidia) enclosed by a pair of opposed leafy bracts (spathes), rarely solitary on the peduncles or plants acaulescent but then style either dividing below the anthers into tangentially compressed, petal-like branches or dividing below or above the base of the anthers and obscurely 3-lobed apically, the lobes entire or fringed; tepals free to basally connate, or united in an extended tube; flowers lasting < 1 day or 2 or more days; rootstock a rhizome or a corm rooting from the apical bud; pollen grains usually with reticulate or microreticulate exine, rarely rugulate or areolate, aperture usually without an operculum; nectaries septal or perigonal or oil glands present:

3a Rhipidia (at least the terminal) united in pairs (binate); style notched or divided apically into 3 lobes, occasionally forming filiform branches; nectaries rarely present, then perigonal . . . . . 1. ARISTEOIDEAE

3b Rhipidia never united in pairs; style dividing below level of anthers into 3 branches, these either filiform and extending between the stamens, or thickened or flattened and lying opposite the stamens, each usually terminating in paired appendages (style crests); nectaries or oil glands when present perigonal. . . . . 4. IRIDOIDEAE

1. Subfamily **ARISTEOIDEAE**

Aristeoideae *Vines*, A student's text-book of botany: 569 (1895). Type: *Aristea* Aiton

Evergreen perennials with a creeping or ± erect rhizome. *Leaves* unifacial, without a midrib, several, basal and cauline. *Inflorescence units* binate rhipidia enclosed in paired, opposed leafy or dry spathes, often many units per flowering stem. *Flowers* fugaceous, lasting single day, radially symmetric, without nectaries or with perigonal nectaries (only *Aristea spiralis*); tepals united basally, spreading. *Stamens* with the filaments free; anthers loculicidal and extrorse or porose (Madagascan species); pollen grains variable, most commonly monosulcate, zonasulculate, or dizonasulculate, exine reticulate, microreticulate, or rugulate, exine masses covering apertures in subg. *Eucapsulares*. *Ovary* inferior; style slender, dividing into 3 entire or fringed lobes or apically 3-notched. *Capsules* ± woody, ovoid, prismatic and 3-lobed, or oblong with locules compressed into narrow radial wings. *Seeds* angular, triangular-columnar, or lamellate. *Basic chromosome number x* = 16.

Genera 1, species ± 58: sub-Saharan Africa and Madagascar, 46 in southern Africa.

1. **Aristea**

Aristea *Aiton*, Hortus kewensis: 67 (1789), conserved name; Weimarck: 1–140 (1940). Type: *A. africana* (L.f.) Hoffmanns.

Cleanthe Salisb. ex Benth. & Hook.f.: 684, 701 (1883). Type: *C. melaleuca* [Thunb.] Salisb. ex Pax = *Aristea lugens* (L.f.) Steud.

Revisionary accounts: Weimarck (1940); Goldblatt & Manning: 137–144 (1997a), 357–365 (1997b).

From the Greek, *arista*, an awn, a dry, acute-tipped bract-like structure, as in the dry, fringed spathes and bracts of the type species, *Aristea africana*.

Evergreen herbs with short to long rhizomes or aerial stolons (*A. singularis*). *Stems* rounded to compressed and 2-angled or 2-winged, simple or few- to many-branched. *Leaves* sword-shaped to linear or terete, in two ranks, crowded basally, usually with a few progressively smaller leaves above; without marginal vein or subepidermal sclerenchyma, marginal epidermal cells thickened, columnar. *Inflorescence* simple or compound, composed of one or more binate rhipidia (flower-clusters in 2 series, unless reduced to 1 flower); lateral clusters stalked or sessile; spathes enclosing flowers green, rust-coloured, or partly to entirely membranous or dry and papery, margins entire, irregularly torn, or fringed; floral bracts (within spathes) similar but usually smaller, forked apically, often 2-keeled. *Flowers* actinomorphic, upright or half to fully nodding, mostly fugaceous, lasting a single day (rarely 2 days), pedicellate or often subsessile, perianth twisting spirally on fading, persisting on ovary, usually dark blue, sometimes pale blue, white, mauve, or pink, occasionally with contrasting markings, scentless; with nectar from perigonal nectaries only in *A. spiralis*; tepals basally connate for 0.5–2.0(3.0) mm, subequal, or outer tepals shorter, always narrower than inner, oblanceolate to obovate, usually spreading horizontally, sometimes ascending. *Stamens* free; filaments filiform (unequal in *A. inaequalis*); anthers oblong to linear. *Ovary* top-shaped, triangular-columnar or oblong, with ovules opposite in 2 rows or alternating, forming a single row; style filiform, eccentric, either minutely 3-notched or divided into spreading, ± subentire or deeply fringed stigmatic lobes. *Capsules* ovoid to oblong or cylindric, rounded in section or shallowly to deeply 3-lobed, or broadly 3-winged, subsessile or stalked, remains of perianth persisting on developing capsule. *Seeds* rounded to angular (prismatic), shortly cylindric, triangular-columnar, or radially compressed and lamellate, with foveate sculpturing or smooth, many per locule or only 1 or 2. *Pollen grains* monosulcate, trisulcate, disulculate, zonasulculate or spiraperturate, sometimes exine covering aperture, exine reticulate to microreticulate or rugose. *Basic chromosome number x* = 16.

Species ± 58: 46 in southern Africa and most diverse there; extending through tropical Africa to Senegal and Ethiopia in the north, 8 in Madagascar; most frequent in well-watered highlands in grassland, rocky outcrops, or marshes; in the southern African winter-rainfall zone often montane and in rocky sandstone habitats, frequently flowering in mass after fires.



ARISTEA. A. ecklonii: A, flowering plant. ***A. torulosa***: B, inflorescence; C, flower; D, stigma. ***A. abyssinica***: E, fruiting plant.

Displaying relatively modest variation in floral structure, species of *Aristea* vary remarkably in their pollen grains and in their fruit and seed morphology. Pollen grains in subg. *Eucapsulares* are mostly inaperturate or have exine covering the apertures rendering them difficult to identify, and the exine is usually rugose to rugulose; in subg. *Aristea* pollen grains are either monosulcate (rarely zonasulculate) or spiraperturate; in subg. *Pseudaristea* pollen grains are dizonasulculate with reticulate exine. Capsules and seeds vary from ovoid-ellipsoid to cylindric-3-lobed (subg. *Eucapsulares*) to broadly radially winged (sect. *Racemosae*). Seeds are prismatic to subglobose in many members of subg. *Eucapsulares*, cylindric or cylindric-triangular in subg. *Pseudaristea,* and flattened and lamellate in most members of subg. *Aristea.* The variation in fruit and seed structure is largely congruous with pollen variation and forms the basis for the current infrageneric taxonomy, which recognises three subgenera. This corresponds broadly with preliminary molecular data.

Floral morphology in *Aristea* is conservative, most species having blue flowers with the tepals united only basally, and yellow anthers. The flowers last a single morning, deliquescing after midday. No nectar is produced and pollination is by pollen-collecting female bees. Only species of subg. *Pseudaristea* depart from this pattern, having blue to white or pink flowers, often with dark markings or sometimes dark brown to almost black outer tepals, as in *A. lugens*. Pollination of most these species is by hopliine beetles that use the flowers for assembly and mating. Flowers of *A. spiralis* are unique in the genus in secreting nectar from perigonal nectaries and are recorded as being pollinated by long-proboscid flies.

Key to subgenera

Note: only well developed basal leaves should be examined; the cauline leaves are usually smaller and grade into bracts subtending branches. Measure leaf width at about the middle of a leaf. A hand lens is essential for examining spathe and bract characters, as well as seed features, including presence of marginal papillae and surface sculpturing. Individual inflorescence units (binate rhipidia) are referred to simply as flower clusters.

1a Capsules elongate, leathery to ± woody when dry, 20–70 mm long, tardily dehiscent; ovary on pedicels 5–18(–25) mm long, cylindric-trigonous or cylindric-triangular, 8–17(–22) mm long; style dividing into three spreading lobes, each deeply fringed; pollen grains with 2 ring-like apertures (dizonasulculate) . . . . . subg. 2. *Pseudaristea*

1b Capsules not as above, dehiscent in upper half, 3.5–50.0 mm long; ovary subsessile or on short pedicels, usually < 4 mm long, obovoid, often shallowly 3-lobed; style either minutely 3-notched at apex or dividing into three spreading, entire or shallowly fringed lobes; pollen grains various, not dizonasulculate (except some *A. zeyheri*):

2a Capsules short to relatively long, 8–15(–25) mm, with 3 radial, usually narrow wings; seeds compressed radially, flattened and lamellate (except *A. singularis*); style either minutely 3-notched at apex or dividing into three spreading, entire or shallowly fringed lobes . . . . . subg. 3. *Aristea*

2b Capsules short to elongate, usually 4–35(–50) mm, shallowly to deeply 3-lobed but lobes not forming wings; seeds columnar with flattened ends, rounded or angular; style dividing into three spreading, entire or shallowly fringed lobes . . . . . subg. 1. *Eucapsulares*

Keys to species

1. Subg. *Eucapsulares*

1a Plants robust with leaves 15–25 mm wide; stems mostly 800–1 200 mm high; plants of southwestern Western Cape . . . . . 1. *A. latifolia*

1b Plants small to relatively robust with leaves 1.5–15.0 mm wide; stems variously 150–1 200 mm high; plants of eastern southern Africa:

2a Plants with flowering stem of 1 extended internode without leaves or with a short subterminal leaf below uppermost flower cluster:

3a Plants small, 80–150(–250) mm high, and flowering stem leafless; pedicels 10–15 mm long in flower, up to 20 mm long in fruit. . . . . 18. *A. nana*

3b Plants small to moderate in size, (80–)120–300 mm high, and flowering stem always with subterminal leaf; pedicels vestigial or up to 2 mm long in flower, up to 2 mm long in fruit:

4a Spathes rust-brown, 15–22 mm long; capsules 8–12 mm long . . . . . 17. *A. anceps*

4b Spathes green to ± dry and dull-translucent, 6–11 mm long; capsules 4–8 mm long. . . . . 16. *A. abyssinica*

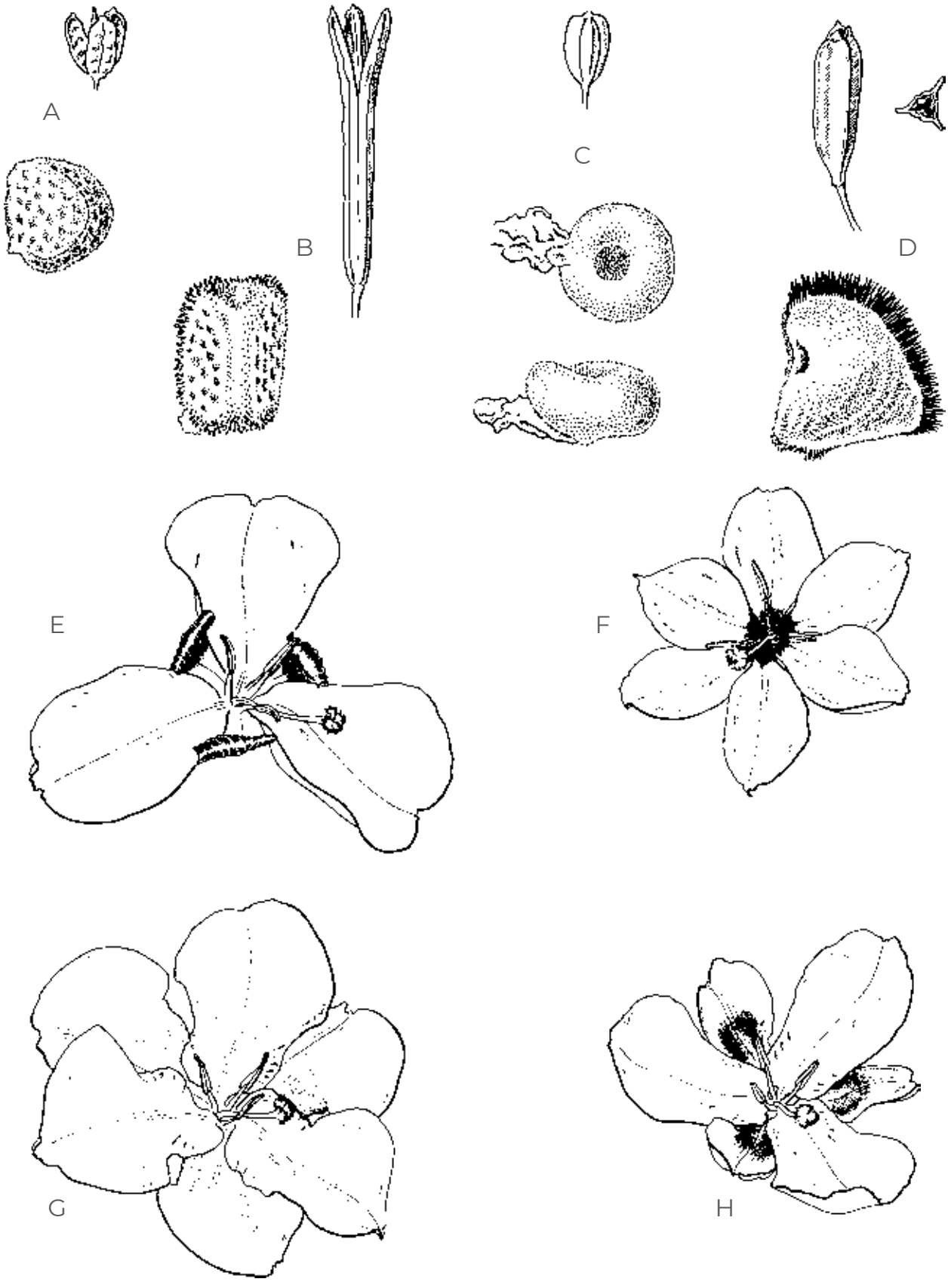
2b Plants not as above, with flowering stem of at least 2 internodes and bearing one or more cauline leaves but lacking a foliage leaf below the first flower cluster:

5a Ovary conspicuously papillose; capsules warty, usually wider than long, 3.5–4.0 × 4.0–4.5 mm; stems flattened and broadly 2-winged . . . . . 11. *A. platycaulis*

5b Ovary smooth; capsules smooth, usually ± as wide as long or longer than wide; stems rounded to elliptic in section or flattened and winged:

6a Capsules elongate, at least 12 mm and up to 50 mm long:

7a Capsules 35–50 mm long, indehiscent . . . . . 15. *A. ensifolia*



ARISTEA. A. anceps: A, dehisced capsule and seed. ***A. cistiflora***: B, dehisced capsule and seed. ***A. singularis***: C, capsule and seed top view and side view. ***A. rigidifolia***: D, capsule and seed. ***A. lugens***: E, flower. ***A. cantharophila***: F, flower. ***A. biflora***: G, flower. ***A. teretifolia***: H, flower.

7b Capsules 12–30 mm long, splitting from apex:
8a Flower clusters several, > 6; tepals 8–10 mm long . . . . . 12. *A. ecklonii*
8a Flower clusters few, mostly 1–4(5); tepals 9–18 mm long:
9a Tepals 16–18 mm long . . . . . 13. *A. elliptica*
9b Tepals 9–11 mm long . . . . . 14. *A. pusilla*
6b Capsules relatively short, 4–10 mm long:
10a Flowers small, with tepals ± 6 mm long; capsules globose and 3-lobed, ± 4 mm long . . . . . 4. *A. parviflora*
10b Flowers medium-sized, tepals 8–14 mm long; capsules ovoid to oblong in outline and often 3-lobed, mostly 5–9 mm long:
11a Stem compressed and winged, 5–10 mm wide; several-branched . . . . . 2. *A. compressa*
11b Stem compressed and elliptic in section, with or without narrow wings (rarely ± terete); simple to several-branched:
12a Stems mostly 3- to several-branched in upper half with branching subdivaricate; plants turning black with age or when dry; spathes with solid dark centre and broad translucent margins broad:
13a Plants 700–1 200 mm high; branches often bearing at least one lateral flower cluster; flowers large, with inner tepals 9–12 mm long . . . . . 10. *A. flexicaulis*
13b Plants up to 500 mm high; branches mostly each bearing a single terminal flower cluster; flowers relatively small with inner tepals 9–10 mm long . . . . . 9. *A. majubensis*
12b Stems simple or 1- to few-branched with branches ascending to suberect; spathes green below, membranous distally with broad, translucent margins feathered dark in centre and not drying black:
14a Flower clusters with 8 or more flowers; sessile lateral flower clusters each usually subtended by a prominent green bract, becoming dry brown from the tips:
15a Leaves 10–16 mm wide; plants 700–950 mm high . . . . . 8. *A. grandis*
15b Leaves 4–9 mm wide; plants 200–650 mm high. . . . . 7. *A. galpinii*
14b Flower clusters with (2)4(6) flowers; sessile lateral flower clusters small, sometimes subtended by a prominent bract:
16a Spathes when alive green below and dry-membranous distally, becoming dry and rust-brown entirely . . . . . 6. *A. schizolaena*
16a Spathes when alive green to grey-green with broad membranous margins:
17a Flower clusters mostly 2 to 6 per stem, the lowermost sometimes shortly stalked; stem 120–300 mm high, strongly compressed, 2(3)-angled below first flower cluster. . . . . 5. *A. montana*
17b Flower clusters at least 3 and usually many per stem; stem usually 300–700 mm high, weakly compressed and angled below first flower cluster . . . . . 3. *A. torulosa*

Subg. 2. *Pseudaristea*

1a Stems broadly winged above first flower cluster (or uppermost leaf if lateral flower clusters lacking); filaments short, 8–10 mm long, or much longer than anthers and 24–26 mm long; flowers nodding (facing to side) . . . 21. *A. spiralis*
1b Stems not broadly winged above first flower cluster or uppermost leaf; filaments short, as long as or not much longer than anthers, 3.0–6.5 mm long; flowers either nodding (facing to side) or upright:
2a Outer tepals differentiated from inner, smaller in size and each either with dark basal or distal marking or with a pair of large transparent windows in lower half:
3a Outer tepals dark brown or ± black in upper half and nearly symmetric about the midline; inner tepals ± twice as long as outer . . . . . 27. *A. lugens*
3b Outer tepals concolorous with inner tepals in upper half and asymmetric about midline; inner tepals slightly longer than outer, not twice as long:
4a Outer tepals not darkly coloured below, with paired translucent windows of membranous tissue above base; leaves linear, (2–)3–6 mm wide. . . . . 25. *A. biflora*
4b Outer tepals each with small to large, dark bronze-brown mark near base:
5a Leaves terete or linear, 1–2 mm diam. . . . . 24. *A. teretifolia*
5b Leaves linear, mostly 2.5–3.0 mm wide . . . . . 23. *A. cistiflora*
2b Outer tepals ± same size or slightly smaller than inner and similarly coloured:
6a Tepals white to cream-coloured or lilac to light mauve:
7a Tepals dark purple or greenish black at base, flower thus with dark central eye. . . . . 22. *A. cantharophila*
7b Tepals uniformly white or pale blue but outer tepals blackish outside . . . . . 26. *A. nigrescens*
6b Tepals light to dark blue, pale greenish yellow at base:
8a Flowers upright, dark blue, darker at base of tepals; leaves oval in section, with rounded, undifferentiated margins; capsule lobes strongly angular. . . . . 19. *A. pauciflora*
8b Flowers suberect or nodding (facing to side), pale or deep blue; leaves narrowly elliptic in section, with acute, translucent margins; capsule lobes rounded. . . . . 20. *A. simplex*

Subg. 3. *Aristea*

1a Plants forming diffuse tufts, producing aerial stolons rooting at nodes; flower clusters and flowers pendent; capsules 3-lobed, containing 1(2) seeds per locule; seeds compressed-elliptic with deeply sunken chalaza (doughnut-like), with funicle forming a pale fleshy body (sect. *Singulares*). . . . . 39. *A. singularis*
1b Plants not as above, growing in tufts or singly but without aerial stolons; flower clusters ± upright and flowers upright to nodding; capsules with prominent, narrow radial wings; seeds radially compressed, lamellate:

2a Plants often large, 150 to > 1 000 mm tall; style obscurely 3-notched at apex (lobed in *A. zeyheri*); spathes entire or irregularly torn with age (never regularly fringed when young); pollen grains usually with single elliptic aperture (sometimes with 2 ring-like apertures in *A. zeyheri*) (sect. *Racemosae*):
3a Leaves terete to elliptic in transverse section and 1–3 mm wide, without differentiated translucent margins; capsules oblong in outline, at least twice as long as wide:
4a Plants robust, usually 600–1 300 mm high; capsules (20–)25–33 mm long; bracts subtending flower clusters and branches narrowly lanceolate, not attenuate-cuspidate . . . . . 37. *A. rigidifolia*
4b Plants relatively small, 120–150(–400) mm high; capsules 10–25 mm long:
5a Leaves usually elliptic in section, 2–3 mm wide; flower clusters each subtended by a prominent green bract keeled above and often folded in lower midline, and at least those subtending lower flower clusters exceeding spathes . . . . . 33. *A. juncifolia*
5b Leaves terete; lower flower clusters not subtended by a prominent green bract:
6a Flower clusters several; spathes and floral bracts dry, usually rust-brown, transparent toward margins, 15–24 mm long; capsules 10–15 mm long . . . . . 36. *A. racemosa*
6b Flower clusters usually 1 or 2(3), lateral clusters sessile; spathes and floral bracts green, drying blackish, with narrow transparent margins, 20–25 mm long; capsules (16–)22–28 mm long . . . . . 38. *A. zeyheri*
3b Leaves ± plane or slightly elliptic in section, with acute, translucent margins (drying hyaline), larger basal leaves (2–)3–12 mm wide; capsules broadly ovate to oblong, ± as long as to > twice as long as wide:
7a Spathes and floral bracts lanceolate and acuminate, dark green to brown in centre with wide transparent margins, glabrous; capsules 8–12 mm long, slightly longer than to almost twice as long as wide:
8a Flower clusters crowded in upper ⅓ of stem, largely or completely concealing main axis; stamens equal . . . . . 30. *A. capitata*
8b Flower clusters laxly arranged on long branches with lower branches diverging; stamens unequal, lower (anterior) filament ± 2 mm longer than upper two filaments . . . . . 31. *A. inaequalis*
7b Spathes and floral bracts broadly ovate/obovate, glabrous or lightly hairy to scabrid; capsules 7–30 mm long:
9a Plants small, 200–400 mm high; lower leaves 2–3 mm wide; flowering stems dichotomously branched and all flower clusters stalked . . . . . 35. *A. rupicola*
9b Plants taller, (500–)800–1 500 mm high; lower leaves (3–)4–12 mm wide; flowering stems unequally branched and some upper flower clusters sessile:
10a Lower leaves (7–)12–25 mm wide:
11a Flower clusters laxly arranged on branched stem; spathes usually finely hairy to scabrid; capsules 14–30 mm long; seeds 2 to 5 per locule . . . . . 28. *A. bakeri*
11b Flower clusters crowded in upper half of stem; spathes glabrous; capsules 11–14 mm long; seeds 2 per locule . . . . . 29. *A. rufobracteata*
10b Lower leaves 3–6 mm wide:
12a Plants 600–1 300 mm high, usually branched and with sessile and stalked flower clusters; spathes (10–)12–16(–18) mm long; capsules 8–10 mm long . . . . . 34. *A. bracteata*
12b Plants moderate-sized, 300–600 mm high, usually all lateral flower clusters sessile; spathes 7–14 mm long; capsules 14–18 mm long . . . . . 32. *A. cuspidata*
2b Plants often small, 120–1 000 mm high; style dividing into 3 discrete lobes, these entire to slightly undulate or shallowly fringed; inflorescence spathes entire, irregularly torn with age, or regularly fringed when young; pollen grains with 3-lobed aperture or 3 confluent apertures (sect. *Aristea*):
13a Spathes and bracts regularly fringed:
14a Capsules 12–15 mm long . . . . . 40. *A. fimbriata*
14b Capsules ± 8 mm long:
15a Spathes fringed up to half their length, usually silvery-translucent (rarely fading rust-coloured at tips); plants mostly 100–150 mm high; leaves mostly 2–3 mm wide . . . . . 45. *A. africana*
15b Spathes fringed for < ⅓ their length, always rust-brown at tips; plants mostly 200–400 mm high; leaves mostly 3–5 mm wide . . . . . 46. *A. recisa*
13b Spathes entire or becoming torn with age:
16a Spathes leathery, green to brown with narrow translucent margins:
17a Stem usually dichotomously 3- to 6-branched, stem usually ± terete to elliptic in section; tepals 14–18 mm long . . . . . 39. *A. dichotoma*
17b Stem often simple or unevenly 1- to 3-branched, stem flattened and winged; tepals 10–14 mm long . . . . . 42. *A. glauca*
16b Spathes and bracts silvery-translucent with narrow green to brown keels:
18a Plants up to 250 mm high; flower clusters 15–20 mm long . . . . . 43. *A. oligocephala*
18a Plants up to 1 000 mm high; flower clusters 10–12 mm long . . . . . 44. *A. palustris*

Subg. 1. **Eucapsulares**

Subg. **Eucapsulares** (*Goldblatt*) *Goldblatt* in Novon 22: 416 (2013). *Aristea* sect. *Eucapsulares* Goldblatt in Goldblatt & Le Thomas: 228 (1992), as a new name for *A.* sect. *Euaristea* Pax: 152 (1888), invalid name. Type: *A. angolensis* Baker [lecto., designated by Goldblatt in Goldblatt & Le Thomas: 228 (1992)].

Plants often large and stems usually several- to many-branched. *Flower clusters* mostly several-flowered; spathes green or becoming dry from tips. *Flowers* always fugaceous, deep to pale blue, lasting one morning. *Stamens* always equal; anthers porose in 4 species of Madagascar. *Style* 3-lobed apically, margins usually undulate. *Capsules* short and ovoid to ovoid-trigonous or elongate-trigonous. *Seeds* ovoid to angular-prismatic or shortly cylindric. *Pollen grains* occasionally shed as tetrads, mostly zonasulculate with aperture concealed by exine masses, or sulcate with broad, smooth aperture, exine rugulate, rarely reticulate.

Species ±32: sub-Saharan Africa and Madagascar.

Sect. 1. **Latifoliae** *Goldblatt* in Goldblatt et al. in Botanical Journal of the Linnean Society 144: 64 (2004). Type: *Aristea latifolia* G.J.Lewis

Plants large, up to 1 m high, leaves broad, firm textured, stem multi-branched. *Flower clusters* many in compound pseudopanicle, terminal, multiflowered. *Flowers* blue; tepals connate at base, subequal. *Style* 3-lobed. *Capsules* ovoid. *Seeds* angular-prismatic. *Pollen grains* monosulcate, exine reticulate.

Species 1: higher mountains of southwestern Western Cape, South Africa.

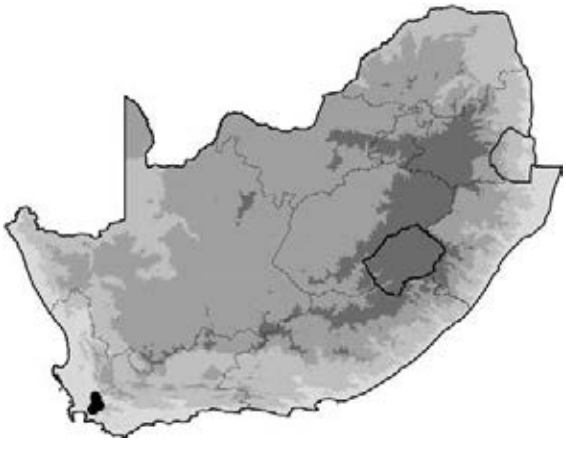
1. **Aristea latifolia** *G.J.Lewis* in Annals of the South African Museum 40: 9 (1952). Type: South Africa, [Western Cape], Wemmershoek Peak, gully in west side, 4 000–5 000 ft [1 200–1 500 m], *Lewis s.n. SAM57345* (SAM, holo.).

Plants mostly 800–1 200 mm high. *Stem* weakly compressed, ovoid in section, usually several-branched in upper half. *Leaves* several, broad, ½ to ⅔ as long as stem, 15–25 mm wide, firm, fibrous, margins hyaline, acute. *Flower clusters* several per stem in lax pseudopanicle, each (2)6- to 8-flowered; spathes 7–9 mm long, lanceolate, bracts pale grey or brown, papery, becoming torn with age. *Flowers* on pedicels 5–7(–9) mm long, deep blue; tepals subequal, ± 12 mm long, spreading. *Filaments* ± 5 mm long; anthers ± 4 mm long. *Style* ± 8 mm long, terminating in three, short, entire stigmatic lobes. *Capsules* ovoid, shallowly 3-lobed, 8–9 mm long, on pedicels 5–9 mm long. *Seeds* angular-prismatic, ± 2 mm diam., surface sculpturing unknown. *Flowering time*: November to early January.

Distribution and ecology: a local endemic of Western Cape, South Africa, from Bain's Kloof to the Hottentots Holland Mtns; in shady kloofs and gullies, 500–1 800 m altitude, usually near streams.

Diagnosis: a tall plant, the flowering stem usually exceeding 1 m in height, *Aristea latifolia* has broad leaves 15–25 mm wide and a multibranched stem. This, together with ovoid, multi-seeded capsules and prismatic seeds, makes the species easy to recognise among the Western Cape members of the genus.

Although restricted to the higher mountains of the southwestern corner of the winter-rainfall region, *A. latifolia* is most closely related to the eastern, southern and tropical African species of subg. *Eucapsulares*, with which the capsules and seeds closely accord. The sulcate pollen grains of *A. latifolia* do not conform to the derived, sulculate type with exine-covered apertures typical of the subgenus but are monosulcate with a broad, elliptic aperture. Vegetatively, plants most closely resemble *A. bakeri* and *A. capitata* (subg. *Aristea*), but the capsules and seeds are quite different. The presence of pollen and capsules and seeds of the ancestral type suggest that *A. latifolia* is a relict of the ancestral stock of the genus, hence its placement as the first species in this account. Molecular studies confirm this interpretation in retrieving it as sister to the remaining species of the genus. The geographic disjunction at subgeneric level of *A. latifolia* has few parallel examples in the flowering plants of the southwestern Cape.



Distribution of ***Aristea latifolia***.

Sect. 2. **Cladocarpae** *Weim.* in Acta Universitatis Lundensis, ser. 2, 36(1): 48 (1940). Type: *Aristea cladocarpa* Baker

Sect. *Trilobatae* Weim.: 49 (1940). Type: *Aristea platycaulis* Baker

Sect. *Eucapsulares* Goldblatt in Goldblatt & Le Thomas: 228 (1992), as a new name for *Aristea* sect. *Euaristea* Pax: 152 (1888), invalid name. Type: *A. angolensis* Baker, lecto., designated by Goldblatt in Goldblatt & Le Thomas: 228 (1992).

Plants small to moderate in size, up to 1 m high, leaves broad, firm- or soft-textured, stem usually several- to many-branched. *Flower clusters* many in compound pseudopanicle, terminal, multiflowered. *Flowers* blue; tepals connate at base, subequal. *Style* 3-lobed. *Capsules* ovoid. *Seeds* angular-prismatic. *Pollen grains* rarely monosulcate, exine reticulate.

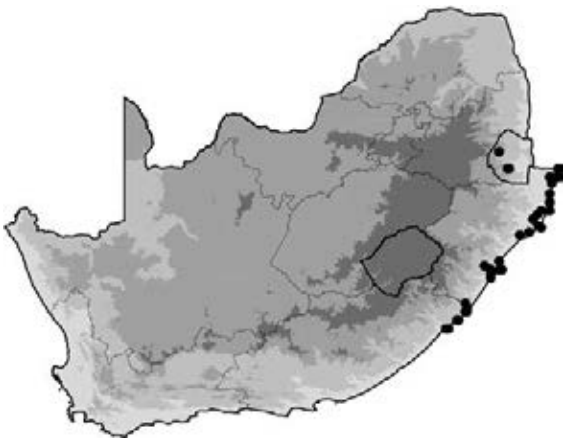
Species ± 23; 12 spp. in southern Africa: extending through eastern southern Africa as far south as Albertinia, also in tropical Africa and Madagascar.

2. **Aristea compressa** *Buching. ex Baker* in Journal of the Linnean Society, Botany 16: 111 (1877); Weim.: 14 (1940, including *A. parviflora*). Type: South Africa, [KwaZulu-Natal], forest margins near Umlaas River, 1840, *Krauss 358* (K, holo.; MO, iso. [2 sheets]).

Aristea gerrardii Weim.: 17 (1940); Vincent: 240 (1985). Type: South Africa, [KwaZulu-Natal], without precise locality or date, *Gerrard 393* (K, holo.; P, iso.).

[*Aristea compressa* Buching. in Krauss: 309 (1845), invalid name without description.]

Plants 300–750 mm long. *Stem* flattened almost to apex, narrowly winged, several- to many-branched (one order), but never dichotomously, bearing sessile and stalked flower clusters. *Leaves* narrowly sword-shaped to linear, leathery, sometimes weakly pleated, mostly 8–12 mm wide, ± ½ as long as stem. *Flower clusters* many, sessile and stalked, each 2- to 4-flowered; spathes and bracts lanceolate, mostly 5–8 mm long, green or brown in midline, transparent in upper half, becoming torn. *Flowers* blue, outer tepals 8.5–11 × 3.5–3.5 mm, inner 9.5–11 × 5–7 mm. *Filaments* 2.5–4.5 mm long; anthers 1.8–2.5 mm long. *Ovary* on short pedicel 1–2 mm long; style ± 5 mm long, broadly 3-lobed, reaching middle or apex of anthers and slightly deflexed. *Capsules* ovoid, ± 5 × 4 mm long, mostly ± sessile. *Seeds* angular-prismatic, sculpturing foveate. *Flowering time*: mainy September to mid-January.



Distribution of ***Aristea compressa***.

Distribution and ecology: mainly coastal eastern South Africa and Mozambique, extending from Port St Johns in Eastern Cape to Pebane in coastal northern Mozambique, also locally inland, as at Drummond (KwaZulu-Natal) and Mbabane (Eswatini); mainly on coastal flats, often in marshy habitats, and locally inland in areas with sandstone or quartzite substrates.

Diagnosis: the branched flowering stem and numerous flower clusters suggest that *Aristea compressa* is related to *A. flexicaulis* and the two species may sometimes be confused. The flattened stem with a pronounced main axis, straight, stiff lateral branches, soft-textured leaves 8–12 mm wide and the shorter spathes and bracts less than 9 mm long separate it from the taller, round-stemmed *A. flexicaulis*. The stems of *A. compressa* are flattened with the longer axis twice as long as the short axis and more-or-less winged. Although a second species, *A. gerrardii*, was recognised by Weimarck (1940) and Vincent (1985) it hardly differs from *A. compressa* and the two have been united.

3. **Aristea torulosa** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 382 (1882); Weim.: 27 (1940). Type: South Africa, [Eastern Cape], between 'Gekau und Bashee', Dec. 1832, *J.F. Drège 4558* (B, holo. [photo at K]; P, iso.).

Aristea torulosa var. *monostachya* Baker: 49 (1896). Type: South Africa, [KwaZulu-Natal], without precise locality, *Buchanan s.n.* (K, holo.).

Aristea affinis N.E.Br.: 192 (1931). Type: South Africa, [Mpumalanga, as Transvaal], upper Moodies, near Barberton, grassy slopes, *Galpin 1209* (K, holo.; BOL, PRE, SAM, iso.).

Aristea congesta N.E.Br.: 192 (1931). Type: South Africa, [Eastern Cape], between Msikaba and Mtentu rivers, Dec. 1832, *J.F. Drège 4559* (B [not seen], P, syn.).

Aristea curvata N.E.Br.: 193 (1931). Type: South Africa, [Limpopo], Houtbosch, *Rehmann 5770* (K, holo.).

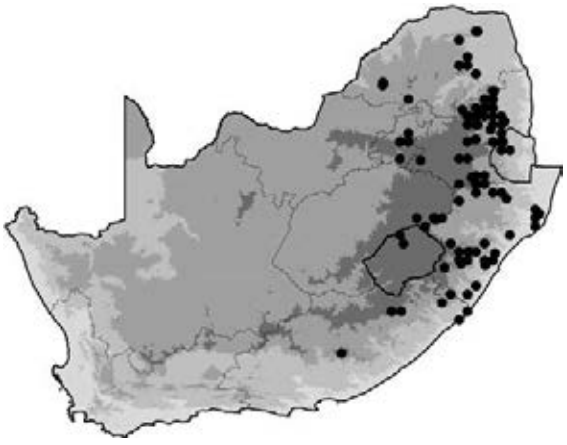
Aristea gracilis N.E.Br.: 193 (1931). Type: South Africa, [Mpumalanga, as Eastern Transvaal], Lydenburg, Spitzkop Gold Mine, *Wilms 1420* (K, holo.; P, iso.).

Aristea woodii N.E.Br.: 192 (1931); Weim.: 28 (1940); Vincent: 225 (1985). Type: South Africa, [KwaZulu-Natal], Inanda, *J.M. Wood 751* (K, holo.; BOL, NH, NU, SAM, iso.).

Plants 300–700 mm high. *Stem* lightly compressed, more so below, simple or with 1 or 2(4) slender branches at lower nodes of synflorescence, with few to several sessile lateral flower clusters in upper half. *Leaves* mostly basal, linear to narrowly lanceolate or falcate, 3–7 mm wide, ± $^1/_3$ to $^1/_2$ as long as stem, firm-textured, cauline leaves smaller, sometimes entirely sheathing. *Flower clusters* several per axis in lax or rarely crowded spicate arrangement, each mostly 4- to 6-flowered (rarely 8-flowered), lower flower clusters often subtended by a prominent bract-like spathe 9–12 mm long; spathes and bracts green becoming dry and brown below, pale membranous above feathered with brown, lacerate with age. *Flowers* pale to deep blue, ± sessile; tepals obovate, 10–14 mm long, outer slightly smaller than inner. *Filaments* suberect, ± 3 mm long; anthers 2.0–2.5 mm long. *Style* 5–6 mm long, with deltoid apical lobes. *Capsules* ellipsoid-ovoid and 3-lobed, 5–6(–7) mm long, ± sessile (or on pedicels up to 2 mm long). *Seeds* angular-prismatic, foveate-reticulate. *Flowering time*: December to February.

Distribution and ecology: widespread in eastern southern Africa, extending from northern Limpopo through eastern Gauteng, Mpumalanga, eastern Free State, KwaZulu-Natal and Eastern Cape as far south as the Amathole Mtns, and also in Lesotho, Eswatini and eastern Zimbabwe; in montane or coastal grassland or sometimes in marshy grassland, mostly 1 200–2 000 m altitude but at lower elevations near the coast.

Diagnosis: *Aristea torulosa* is recognised primarily by the distinctive spathes and bracts, these dark green below edged reddish brown and grading unevenly into broad translucent margins darker along the veins thus giving them a feathered appearance. The pale edges of the spathes and bracts become torn and irregularly fringed with age. The spathes are fairly large, especially those of the lower flower clusters. The flowering stem bears several sessile lateral flower clusters and is often unbranched or the lower fertile nodes may bear one or more, short erect branches. It broadly resembles the Eastern Cape *A. schizolaena* in its unbranched or few-branched stem with several sessile lateral flower clusters, but *A. schizolaena* has uniformly rusty brown spathes and bracts that are often somewhat longer than those of *A. torulosa*. Particularly robust plants from the Graskop and Sabie areas of Mpumalanga stand out in their height, up to 700 mm, with up to 6 or 8 large flowers in the upper flower clusters.



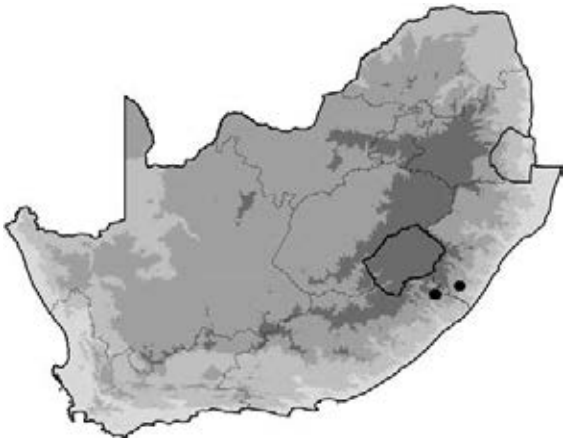
Distribution of ***Aristea torulosa***.

The type of *Aristea congesta* from the Transkei [Eastern Cape] corresponds closely to that of *A. torulosa* in its bracts and spathes but is unusual in its congested axis, and may represent plants collected in early flowering, before the floral axis has fully elongated. Weimarck regarded *A. curvata* as a synonym of *A. schizolaena*, but the type, from Woodbush in Limpopo, is better referred to *A. torulosa*, which extends from central Eastern Cape to Limpopo. *Aristea schizolaena* is not recorded north of Cala and Baziya in Eastern Cape. The synonyms *A. affinis* and *A. curvata* represent plants with unusually long bracts subtending the lower flower clusters, the latter also with falcate leaves. Specimens of the type of *A. gracilis* are unusually slender but hardly different from those of *A. torulosa* var. *monostachya* and *A. woodii*.

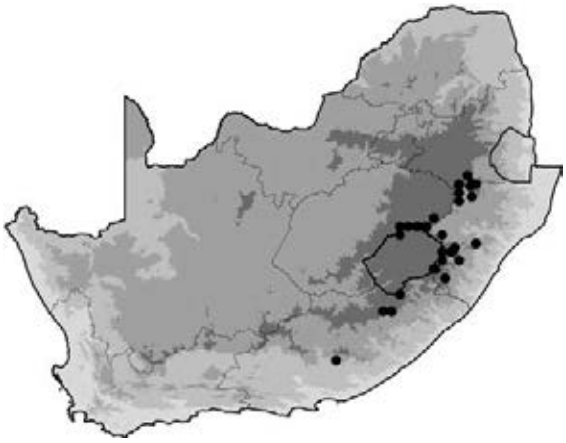
4. **Aristea parviflora** *Baker* in Bulletin of Miscellaneous Information Kew 1906: 25 (1906); Goldblatt & Manning: 209 (2013). Type: South Africa, [Eastern Cape], Insizwe [Ntsizwa] Mtns, 28 Jan. 1895, *Krook in Herb. Penther 556* (K, holo.)

Plants 400–600 mm high. *Stem* slightly compressed, oval in section, with low raised angles decurrent on cauline leaves, repeatedly branched (one or two orders), main axis remaining dominant, branches ascending. *Leaves* ± linear, leathery, basal ± ½ as long as stem, mostly 4–6 mm wide, cauline leaves progressively shorter above. *Flower clusters* many in false panicle, sessile or stalked, each (1)2- to 4-flowered; spathes and bracts ovate to lanceolate, mostly 3.5–4.5 mm long, evidently translucent membranous with brown keels and shading brown near bases, becoming torn with age. *Flowers* blue, ± sessile; tepals ± 6 mm long. *Filaments* ± 2.5 mm long; anthers ± 1.5 mm long. *Style* unknown. *Capsules* globose, ± 4 mm diam., sessile. *Seeds* unknown. *Flowering time*: January and February, probably also March.

Distribution and ecology: a narrow endemic known only from the Ntsizwa and Mt Ayliff ranges of the southern Drakensberg near Kokstad and Clydesdale in Eastern Cape and adjacent KwaZulu-Natal, South Africa; evidently occurring on the margins of forest and bush.



Distribution of ***Aristea parviflora***.



Distribution of ***Aristea montana***.

Diagnosis: *Aristea parviflora* has well-branched stems (one or two orders of branching) and the smallest flowers in the genus, the tepals ± 6 mm long and the flower thus ± 12 mm diam., and correspondingly short filaments, ± 2.5 mm long. The globose capsules up to 4 mm long are also distinctive. It was included in *A. compressa* by both Weimarck (1940) and Vincent (1985), but the stems are only slightly compressed with narrow raised angles whereas the stems of *A. compressa* are flattened and ± winged with the wider axis twice as long as the narrow axis. The tepals of *A. compressa* are 10–11 mm long, filaments 3.5–4.0 mm long, and the capsules are ovoid and ± 5 mm long. Despite its past association with *A. compressa, A. parviflora* is probably more closely related to the larger flowered *A. torulosa*.

5. **Aristea montana** *Baker* in Flora capensis 6: 49 (1896); Weim.: 25 (1940); Vincent: 223 (1985). Type: South Africa, [KwaZulu-Natal], Mt Amajuba, 7 Dec. 1892, *Wood 4768* (K, holo.; NH, iso.).

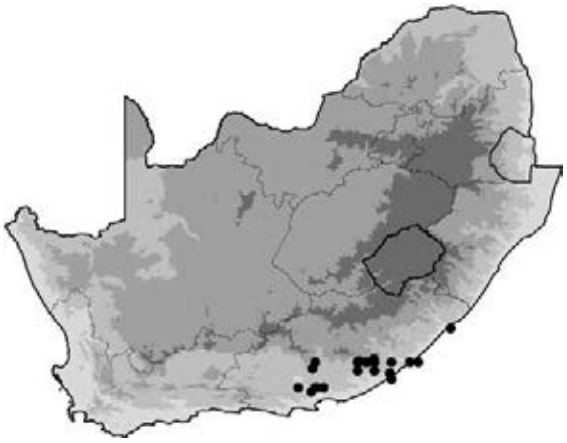
Plants mostly 120–300 mm high. *Stem* strongly compressed, 2- or 3-angled below first flower cluster, simple or with 1 or 2 short branches, lateral flower clusters sessile. *Leaves* mostly basal, linear to narrowly lanceolate or falcate, 3–7 mm wide, ± half as long as stem, firm-textured, cauline leaves smaller, sometimes entirely sheathing. *Flower clusters* usually 2 to 6 per axis, sessile except the terminal or those at the lower nodes shortly stalked, each (2)4-flowered; spathes 8–12 mm long, initially green below, becoming dry and rust-brown with pale dry margins, becoming lacerate; inner spathes and bracts shorter, dry, becoming irregularly lacerate. *Flowers* deep blue, ± sessile or pedicels up to 2 mm long; tepals obovate, mostly 8–10 × 4–8 mm. *Filaments* 3.0–4.5 mm long; anthers ± 2.5 mm long. *Style* up to 7 mm long, deflexed, with deltoid apical lobes. *Capsules* ± ovoid, weakly 3-lobed, 6–10 mm long, ± sessile or on pedicels up to 2 mm long. *Seeds* angular-prismatic, sculpturing foveate. *Flowering time*: mainly December and January.

Distribution and ecology: Lesotho and South Africa in Eastern Cape, Free State and KwaZulu-Natal; in stony high altitude grassland, often on basalt substrates, 1 800–2 750 m elevations.

Diagnosis: evidently allied to *Aristea torulosa, A. montana* has similar dark green spathes and bracts with broad pale margins irregularly grading to darker colour and becoming irregularly fringed with age. The two are often difficult to distinguish, but *A. montana*, a high mountain species, is relatively low in stature, seldom exceeding 250 mm. They can best be distinguished by the stem, which is at most weakly compressed in *A. torulosa* and bears several, relatively laxly spaced flower clusters, those at the lower nodes sometimes on short branches. The stem of *A. montana* in contrast is strongly compressed and 2-angled and seldom bears more than 3 to 6 flower clusters, the lower ones often on short, relatively stout branches. The bracts of *A. montana*, while virtually identical to those of *A. torulosa*, seem less delicate and do not become fringed and torn as early.

6. **Aristea schizolaena** *Harv. ex Baker* in Journal of Botany, British and foreign 14: 267 (1876); Weim.: 31 (1940); Vincent: 235 (1985). Type: South Africa, [Eastern Cape], near Grahamstown, shady cliffs, without date, *MacOwan 195* (K ['sheet 1'], lecto., designated here).

Plants 350–800 mm high. *Stem* elliptic in section, simple or with one or more short, slender branches, lateral flower clusters sessile. *Leaves* linear to sword-shaped, ± ⅓ as long as stem, 4–8 mm wide, relatively firm-textured, pale green. *Flower clusters* several per axis in lax arrangement, each mostly 4-flowered; outer spathe green below, dry distally; inner spathes and bracts greenish-translucent below, dry and rust-brown above, becoming irregularly torn with age. *Flowers* ± sessile or on pedicels up to 2 mm long, deep blue; tepals subequal, 11–14 mm long. *Filaments* 3–5 mm long; anthers ± 2.5 mm long; *Style* 7–9 mm long; stigma lobes ± wedge-shaped. *Capsules* ovoid, sessile, ± 7 mm long, slightly



Distribution of ***Aristea schizolaena***.

3-lobed. *Seeds* angular-prismatic, sculpturing foveate. *Flowering time*: mainly December to February.

Distribution and ecology: restricted to Eastern Cape in southeastern South Africa, from the Zuurberg and Grahamstown to Cala and Baziya in the southern Drakensberg, and on the Boschberg near Somerset East; in coastal and inland rocky grassland.

Diagnosis: the relatively tall and slender *Aristea schizolaena* broadly resembles the more widespread *A. torulosa* in its few-branched or unbranched stem with several sessile lateral flower clusters but is distinguished by the spathes and bracts subtending the flower clusters, these membranous distally and red-brown even before the first flowers open. The different spathes and floral bracts prevent confusion with otherwise similar *A. torulosa*, which has the spathes subtending the flower clusters green below becoming membranous and pale-translucent distally feathered with green or brown.

Formal typification of *Aristea schizolaena* is necessary as Baker cited two collections in the protologue, *Baur 447* and *Macowan 195*, of which there are two sheets at K. Weimarck (1940: 31) cited the MacOwan collection as the 'spec. orig' and merely listed the Baur collection in the exsiccatae. This has been accepted as effective lecotypification but as there are two sheets of the MacOwan collection at K, the specimen annotated 'sheet 1' is designated here as the lectotype.

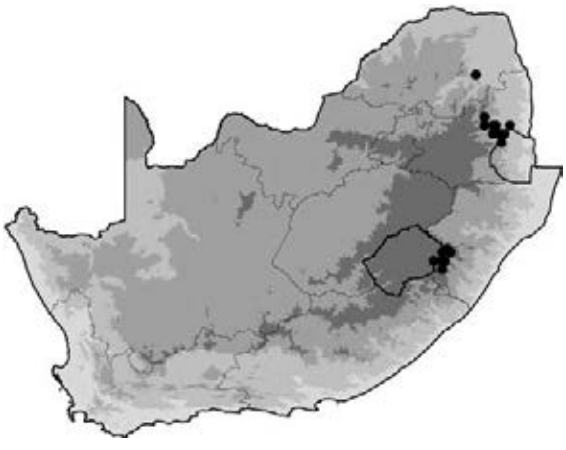
7. **Aristea galpinii** *N.E.Br. ex Weim.* in Acta Universitatis Lundensis, ser. 2, 36: 26 (1940); Vincent: 221 (1985). Type: South Africa, [Mpumalanga], Saddleback Range, Sept./Nov. 1890, *Galpin 1015* (K, holo.; BOL, PRE, SAM, iso.).

Plants 200–650 mm high. *Stem* simple or rarely shortly branched below, lightly compressed in the lower half, most flower clusters sessile. *Leaves* several, the basal ± linear, 4–9 mm wide, ± half as long as stem, markedly firm-textured in northern populations, the upper cauline, largely to entirely sheathing. *Flower clusters* 3 to several per axis, sessile except the terminal (occasionally lowermost flower cluster shortly stalked), crowded, with up to 12-flowers each; outer spathe prominent, green to brown, 15–20 mm long; inner spathes and bracts greenish to translucent below, becoming dry and red-brown in upper half, irregularly torn with age. *Flowers* ± sessile except the terminal, mid- to deep blue; tepals 12–14 × 5–7 mm, outer smaller than inner. *Filaments* ± 3 mm long; anthers 2–3 mm long. *Style* ± 8 mm long, deflexed, with small deltoid apical lobes. *Capsules* narrowly ovoid-oblong, 7–8 mm long, shallowly 3-lobed. *Seeds* angular with slightly flattened sides, ± 1.5 mm long, sculpturing foveate. *Flowering time*: November to January.

Distribution and ecology: eastern southern Africa, extending from the central KwaZulu-Natal Drakensberg to eastern Mpumalanga and southern Limpopo in South Africa, and in Eswatini; in grassland at 1500–2600 m elevation.

Diagnosis: *Aristea galpinii* closely resembles *A. grandis* from coastal KwaZulu-Natal in its large flower clusters, each containing 8 to 12 flowers and subtended by a prominent spathe, initially green below but aging rust-brown from the apex. *Aristea galpinii* is a shorter and less robust species, up to 650 mm high (although the type is less than 300 mm high), with narrower leaves up to 9 mm wide, whereas *A. grandis* has leaves 10–16 mm wide and may reach up to 950 mm high. The capsules are relatively short, up to 8 mm long, ± oblong to obovoid in outline and slightly 3-lobed. Like most other southern African species of sect. *Cladocarpae*, the seeds have a foveate surface whereas those of *A. grandis* are smooth.

As circumscribed here, *Aristea galpinii* is relatively widespread, extending from the KwaZulu-Natal Drakensberg at Sani Pass to eastern Mpumalanga and southern Limpopo. Plants from the Barberton area of southeastern Mpumalanga, the type locality, have deep blue flowers and firm-textured, slightly striate leaves, whereas populations from KwaZulu-Natal have



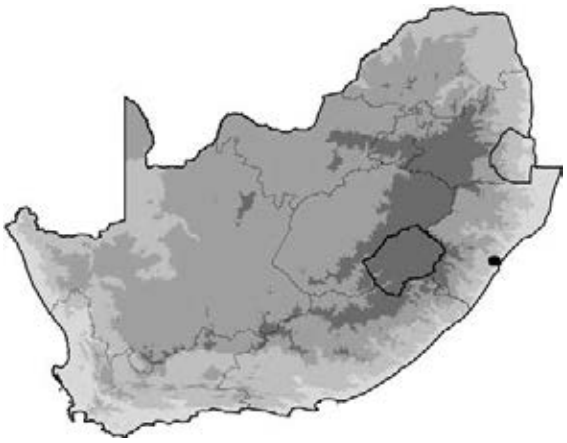
Distribution of ***Aristea galpinii***.

softer leaves and slightly smaller, paler blue flowers with somewhat broader style lobes. These populations are provisionally included here but require additional study. A seemingly outlying population from Lekgalameetse Nature Reserve near The Downs in southern Limpopo represents the northernmost population so far recorded. *Aristea galpinii* was not associated with any particular species by Vincent (1985), but we consider it to be closely allied to *A. grandis*, a coastal species from Inanda and the highlands near Kloof and Hillcrest in KwaZulu-Natal.

8. **Aristea grandis** *Weim.* in Acta Universitatis Lundensis, ser. 2, 36: 30 (1940); Vincent: 237 (1985). Type: South Africa, [KwaZulu-Natal], Inanda, Dec. 1880, *Wood 738* (K, lecto., effectively designated by Weim.: 30 (1940); BOL, NH, SAM, iso.).

Plants 700–950 mm high. *Stem* simple, lightly compressed in lower half, flower clusters sessile except the terminal. *Leaves* several, the basal ± ½ as long as stem, ± linear, relatively soft-textured, 10–16 mm wide, the upper cauline, shorter, partly to entirely sheathing. *Flower clusters* 5 to 6 per axis, sessile except the terminal (?or lowermost flower cluster shortly stalked), subtended by a prominent green spathe up to 24 mm long, crowded with up to 16 flowers each; remaining spathes and floral bracts pale green below, becoming dry and reddish brown with age, often ultimately irregularly torn, 15–20 mm long. *Flowers* ± sessile, deep blue; tepals 12–15 × 5–6 mm, outer whorl smaller than inner. *Filaments* ± 4 mm long; anthers ± 3 mm long. *Style* ± 5 mm long, slightly lobed apically. *Capsules* narrowly ovoid-oblong, 7–8 mm long, shallowly 3-lobed. *Seeds* angular with slightly flattened sides, ± 1.5 mm long, surface smooth. *Flowering time*: December and January.

Distribution and ecology: restricted to coastal KwaZulu-Natal, South Africa, from Inanda near Durban and a short distance inland in the Kloof–Hillcrest area; in grassland.



Distribution of ***Aristea grandis***.

Diagnosis: *Aristea grandis* Weim. (1940) was described from a single collection from Inanda, near Durban, collected in 1880 by J. Medley Wood, and the few additional records since then are from the Kloof and Hillcrest areas inland of Durban. The species is robust, up to 950 mm tall, and has leaves 10–16 mm wide. The distinctive flowering stem may bear up to 6 large flower clusters, each with up to 16 flowers in a complex arrangement. The inner floral spathes and bracts are greenish to translucent below, light red-brown above, and closely resemble those of *A. galpinii* and *A. schizolaena.* Most significantly, the angular seeds have a smooth surface, in marked contrast to those of most other eastern southern African species, which have foveate sculpturing. *Aristea grandis* is evidently most closely related to the more widespread *A. galpinii*, a smaller species with stems up to 650 mm high, narrower leaves 2–9 mm wide, and seeds with foveate sculpturing.

9. **Aristea majubensis** *Baker* in Scott Elliot in Journal of Botany, British and foreign 29: 70 (1891). *A. angolensis* subsp. *majubensis* (Baker) Weim.: 21 (1940); Vincent: 234 (1985). Type: South Africa, [KwaZulu-Natal], Majuba, Nkwela Mt, Nov. 1890, *Scott Elliot 1638* (K, holo.).

Aristea cooperi Baker: 143 (1892). Type: South Africa, OFS [Free State], Tugela Valley, 1862, *Cooper 3212* (K, holo.).

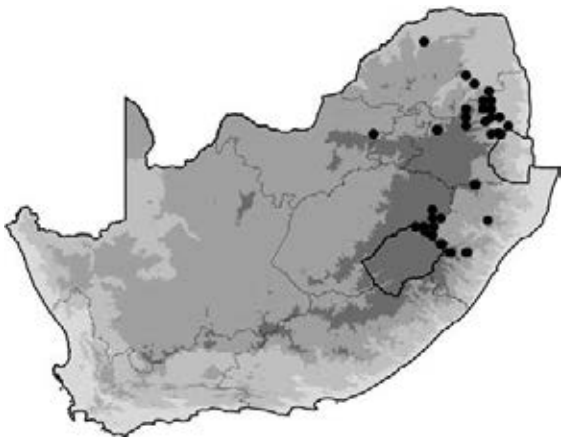
[*Aristea angolensis* of multiple authors, not of Baker (1877)]

Plants mostly 200–500 mm high. *Stem* compressed below and ± broadly elliptic in section, rounded above, (2) 3- to 6-branched, branching subdichotomous, rarely branches also branched, branches terete, fairly short, slender, diverging, rarely with sessile lateral flower clusters, all clusters thus terminal. *Leaves* several, mostly basal, a few cauline and smaller, linear to narrowly lanceolate, 1.5–6.0 mm wide, ± ½ as long as stem. *Flower clusters* (2)4-flowered; spathes and bracts mostly 7–8 mm long, green below aging and drying black with broad, dull-translucent, membranous margins, becoming torn with age. *Flowers* ± sessile or on pedicels up to 2 mm long, usually deep blue; inner tepals obovate, 9–10 × 4–5 mm, outer slightly smaller. *Filaments* suberect, 2.5–3.5 mm long, anthers ± 2.5 mm long. *Style* 6–8 mm long, deflexed, broadly to narrowly 3-lobed apically. *Capsules* ovoid, 3-lobed, (4–)5 mm long, usually ± sessile or on pedicels up to 4 mm long. *Seeds* angular-prismatic, sculpturing foveate. *Flowering time*: mainly November to February.

Distribution and ecology: restricted to northeastern southern Africa, extending from Blouberg and Soutpansberg in Limpopo through the highlands of Mpumalanga to northern KwaZulu-Natal as far south as Cathedral Peak and adjacent eastern Free State, also in Eswatini and probably Lesotho; mainly in rocky, montane sites, usually above 1 000 m elevation but only 550 m on the Blouberg.

Diagnosis: *Aristea majubensis* is recognised by the weakly compressed stem (sometimes lightly angled but not winged) becoming terete in the upper half, subdivaricate branching with lateral branches usually simple (rarely with 1 or more sessile lateral flower-clusters), and the comparatively short, partly transparent, entire or lightly torn spathes and bracts, 7–8 mm long. The flowers are typical of subg. *Eucapsulares* in their moderate size and medium to dark blue perianth. The style is relatively long and the stigmatic lobes are fan- to wedge-shaped. Plants in fruit (and herbarium specimens) are almost uniformly black, less so distally. In the Sentinel area of the northern Drakensberg *A. majubensis* co-occurs with *A. montana,* the latter usually past flowering when *A. majubensis* is in bloom. It also grows near populations of *A. torulosa*, which occurs on different soils there, and we have not seen them growing together. In the upper Mahai Valley there are a surprising number of white-flowered plants among those with the usual dark blue perianth. Plants from the Blouberg are unusually slender in stem and leaves and have slightly smaller spathes and bracts, but the divaricate branching is typical of the species.

Both Weimarck (1940) and Vincent (1985) included *Aristea majubensis* in *A. angolensis* as subsp. *majubensis,* but we conclude that *A. angolensis* is exclusively tropical African and recognised by the straight axis and mostly smaller flower clusters of 2 blooms. Some collections of *A. torulosa* were also included in *A. angolensis* as subsp. *angolensis* and subsp. *acutivalvis* but differ in their bracts and flower clusters usually bearing 4 or more blooms. The type material of *A. majubensis* and *A. cooperi* are nearly identical and clearly represent the same divaricately branched species. *Aristea majubensis* is likely most closely related to the wetland species, *A. flexicaulis*, a taller and more robust plant often exceeding 1 m, with broader leaves, sessile lateral flower clusters on the branches and often some axillary flower clusters as well, and larger, often pale blue flowers with widely divergent stamens.



Distribution of ***Aristea majubensis***.

10. **Aristea flexicaulis** *Baker*, Handbook of the Irideae: 143 (1892); Weim.: 24 (1940); *Vincent*: 221 (1985). Type: South Africa, 'Transvaal' also subsequently annotated 'Fall Creek,' and 'near Howick' in different hands, in 1877, *Mudd s.n.* (K, holo.).

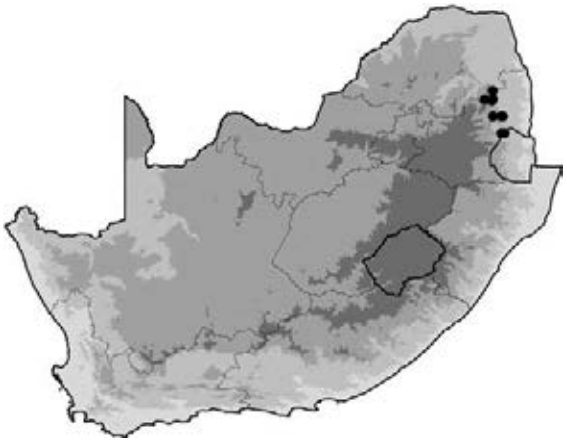
Aristea angolensis subsp. *pulchella* N.E.Br. ex Weim.: 22 (1940). Type: South Africa, [Mpumalanga], Lomati Valley, Nov. 1924, *Thorncroft 2118* (K, holo.; PRE, iso.).

Plants mostly 700–1 200 mm high. *Stem* compressed below and ± elliptic in section, rounded to weakly 2-angled above, subdichotomously several-branched, branches terete, with 1 to 3 sessile lateral flower clusters and 1 or more axillary branches or sessile flower clusters. *Leaves* several, mostly basal, a few cauline and smaller, linear to narrowly lanceolate with prominent white margins, the largest (4–)5–12 mm wide, ± $^1/_4$ to $^1/_3$ as long as stem. *Flower clusters* each 2- to 6-flowered; spathes and bracts mostly 7–11 mm long, brown at anthesis, drying black, with broad, transparent, membranous margins or bracts entirely translucent, becoming torn with age. *Flowers* ± sessile or on pedicels up to 2 mm long, pale to medium blue; tepals spreading, inner obovate, 9–12 × 5–8 mm, outer 8–10 × 4–5 mm. *Filaments* divergent, 3–4 mm long; anthers ± 2 mm long. *Style* 6–7 mm long, strongly deflexed, minutely 3-lobed apically. *Capsules* ovoid, 3-lobed, (5–)6–7 mm long, on pedicels 1–4 mm long. *Seeds* angular-prismatic, ± 1.5 mm long, sculpturing foveate. *Flowering time*: mainly November to February.

Distribution and ecology: extending from Mariepskop and Graskop to Mt Schagen and the Lomati Valley and the mountains between Barberton in Mpumlanga, South Africa and adjacent Eswatini; along streams and in wet or marshy grassland at 1 000 to 1 400 m elevation. Collections reported from KwaZulu-Natal are *Aristea congesta* or *A. majubensis*.

Diagnosis: first recorded in 1877 by Christopher Mudd, collecting for Messrs Veitch & Sons Ltd., and described by Baker (1892), *Aristea flexicaulis* has been recollected occasionally since then along the Mpumalanga Escarpment, including near Graskop. It is quite distinctive but poorly documented. Both Weimarck (1940) and Vincent (1985) recognised the species, but mistook the type locality as 'Fall Creek, near Howick' in KwaZulu-Natal. Baker (1892) recorded the locality simply as 'Transvaal'. There is no record that Mudd ever travelled in what is now KwaZulu-Natal. He entered southern Africa at Delagoa Bay (now Maputo) and travelled through eastern Mpumalanga to MacMac near Sabie and thence to the interior (Gunn & Codd, 1981), later visiting Durban (according to information on specimens).

Aristea flexicaulis is immediately recognised by the tall stature, some individuals exceeding 1 200 mm high, with stems divaricately branched in the upper quarter. Some of the branches bear sessile lateral flower clusters



Distribution of ***Aristea flexicaulis***.

plus one or two sessile axillary flower clusters. Flowers of plants from Graskop and Blyde are pale blue but elsewhere are deeper sky blue. The branching pattern and black colour on drying recalls the smaller *A. majubensis*, a species that rarely exceeds 350 mm in height, with mostly narrower leaves 1.5–6.0 mm wide, lacking white margins, and fewer branches typically without sessile lateral flower clusters. In habit and inflorescence *A. flexicaulis* resembles *A. compressa* from coastal areas along the eastern seaboard and has been much confused with it in the past, but that species has distinctive compressed, winged stems. The Eastern Cape and southern KwaZulu-Natal endemic *A. parviflora*, also with branches bearing several sessile lateral flower clusters, is distinguished from *A. flexicaulis* and other species in the alliance by its smaller spathes and bracts, up to 6 mm long, and smaller flowers with tepals ± 6 mm long and short, erect stamens.

11. **Aristea platycaulis** *Baker* in Gardeners' Chronicle, ser. 3, 1: 732 (1887); Weimarck: 50 (1940); Vincent: 250 (1985). Type: South Africa, [Eastern Cape], Pondoland coast, without precise locality but possibly Port Grosvenor, cultivated in Great Britain, *Tillet s.n.* (K, holo.).

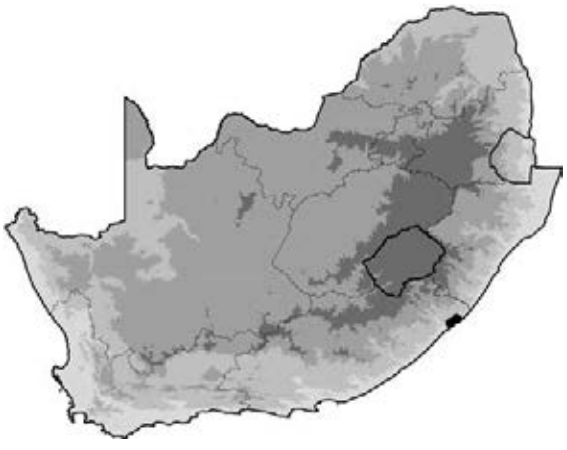
Plants up to 250 mm high. *Stem* flattened and broadly winged, 5–6 mm wide below first fertile node, lower fertile nodes bearing short branches, lateral flower clusters sessile. *Leaves* sword-shaped, mostly 10–25 mm wide, soft-textured, basal ± as long as stem, cauline progressively smaller above. *Flower clusters* few to several in lax racemose arrangement, mostly 2- to 4-flowered; spathes and bracts narrow, 4–5 mm long, green becoming rust-brown, apices attenuate. *Flowers* blue, on pedicels ± 3 mm long; tepals 6–8 × 2–3 mm. *Filaments* 2–3 mm long; anthers ± 1.5 mm long. *Ovary* 3-lobed, papillate; style ± 5 mm long; stigma lobes narrowly deltoid. *Capsules* deeply 3-lobed, 3.5–4.0 × 4.0–4.5 mm, wider than high, conspicuously warty. *Seeds* evidently 2 per locule in a single row, ± globose, surface reticulate. *Flowering time*: mainly November and December.

Distribution and ecology: a narrow endemic of Eastern Cape, South Africa, known only from the Pondoland coast between Port St Johns and Port Edward; in clearings and forest margins in partly to fully shaded sites.

Diagnosis: the very distinctive *Aristea platycaulis* resembles the widespread *A. ecklonii* in general aspect, notably the modest stature, compressed, 2-winged stem and fairly soft-textured leaves, but the small flowers are crowded in shortly stalked or sessile flower clusters and have a short, papillate ovary that develops into a conspicuously warty, deeply 3-lobed capsule only 3.5–4.0 mm long and slightly wider than high. The distinctive capsules contrast starkly with the elongate, smooth-walled capsules of *A. ecklonii* and its allies. Weimarck (1940) placed *A. platycaulis* in his monospecific sect. *Trilobatae* because of its unusual fruits, but the deeply lobed capsules with rounded outlines and seeds placed in a single vertical row in each locule are comparable to the situation in *A. ecklonii* and *A. ensifolia* and it seems that it is mainly the proportions of the capsules, shorter than wide, and their warty surface that are unusual. Given the similar, broadly compressed stems in the three species, *A. platycaulis* remains included in a now more broadly circumscribed sect. *Cladocarpae* close to *A. ecklonii*. The pollen is not, however, shed in tetrads as is characteristic of *A. ecklonii* and *A. ensifolia*.

12. **Aristea ecklonii** *Baker* in Journal of the Linnean Society, Botany 16: 112 (1877); Weim.: 58 (1940); Vincent: 244 (1985); Goldblatt: 5 (1993); Goldblatt: 4 (1996). Type: South Africa, [Eastern Cape], banks of Kowie R., and to the east, June 1829, *Ecklon & Zeyher 59* [S, lecto., designated by Vincent: 244 (1985)].

Aristea stipitata R.C.Foster: 50 (1936), as a new name for *A. cyanea* De Wild.: 51 (1921), illegitimate homonym, not *A. stipitata* Aiton (1789). Type: Congo (DR), [Shaba], without precise locality, 7 Oct. 1914, *Bequaert 6025* (BR, syn., two sheets).



Distribution of ***Aristea platycaulis***.

Aristea dichotoma Eckl. ex Klatt: 551 (1866), illegitimate homonym, not *A. dichotoma* (Thunb.) Ker Gawl. (1827). Type: three syntypes cited, no lectotype designated.

Aristea paniculata Pax: 151 (April 1892). *A. lastii* Baker: 142 (Sept. 1892), illegitimate superfluous name for *A. paniculata* Pax [based on same type]. Type: Mozambique, Makua country, Namuli, *Last s.n.* (K, holo.).

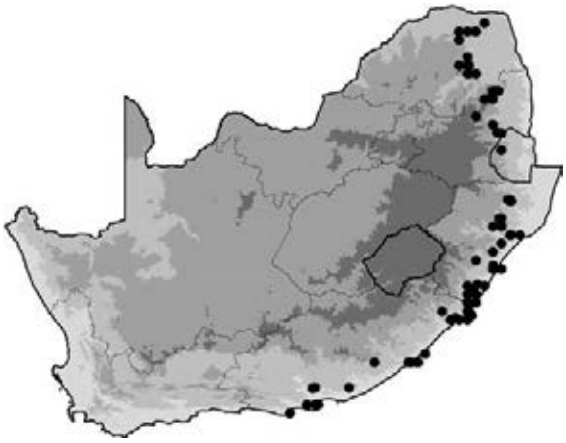
[*Aristea maitlandii* Hutch. in Hutchinson & Dalziel: 374 (1936), invalid name without description.]

Plants mostly 350–600 mm high. *Stem* compressed, 2-winged, usually several-branched and with sessile axillary flower clusters in upper axils subtended by short, sometimes bract-like leaves, when dry often turning rusty brown. *Leaves* sword-shaped, mostly 8–15 mm wide, soft-textured, mostly basal, cauline leaves shorter. *Flower clusters* several in lax arrangement, each mostly 4-flowered; spathes green with dry margins or completely dry and rust-brown, ± 10 mm long, bracts papery, rusty brown, shorter than spathes. *Flowers* deep blue; tepals elliptic, mostly 8–10 mm long. *Filaments* ± 4 mm long; anthers ± 2.5 mm long. *Style* short, erect, ± 5 mm long, broadly lobed apically. *Capsules* oblong-elongate, deeply 3-lobed, 12–20 mm long, on pedicels up to 4 mm long. *Seeds* shortly columnar, sculpturing reticulate, many per locule lying in a single vertical row. *Flowering time*: mostly September to December.

Distribution and ecology: widespread, extending from Humansdorp in Eastern Cape through KwaZulu-Natal and Mpumalanga to Limpopo in South Africa, and in Eswatini; also in tropical Africa in Cameroon, Democratic Republic of the Congo, Mozambique, Malawi, Kenya, Nigeria, Tanzania and Zimbabwe; in coastal and montane habitats, usually in shade in evergreen forest or forest margins. Widely cultivated today, both in Africa and in the Old and New World tropics and subtropics (notably in India, Sri Lanka and New Zealand).

Diagnosis: *Aristea ecklonii* is recognised by the compressed and relatively broad, sharply 2-winged flowering stem, rust-coloured floral bracts and sometimes spathes, and the relatively long, cylindric ovary (up to 8 mm long). The species is unmistakable in fruit as the elongated capsules are up to 20 mm long and deeply 3-lobed, showing the outline of the seeds. Unusually, the pollen is shed in tetrads, a condition rare in the Iridaceae and shared in the genus only with the closely allied *A. ensifolia* and with the unbranched *A. pusilla*. The tetrads are loosely held together and are best seen in microscopic preparations of fresh or recently dried collections. The related *A. cladocarpa* from Madagascar is often difficult to distinguish from *A. ecklonii* but is a smaller plant with shorter capsules, (6–)8–15 mm long compared to 12–20 mm in *A. ecklonii*, and the pollen is shed in monads.

Plants are self-compatible and autogamous, and the ample seed produced helps ensure its persistence in marginal situations, where it can even become weedy, remaining for years in abandoned gardens. In Africa it is sometimes uncertain whether plants encountered in the wild are native or introduced.



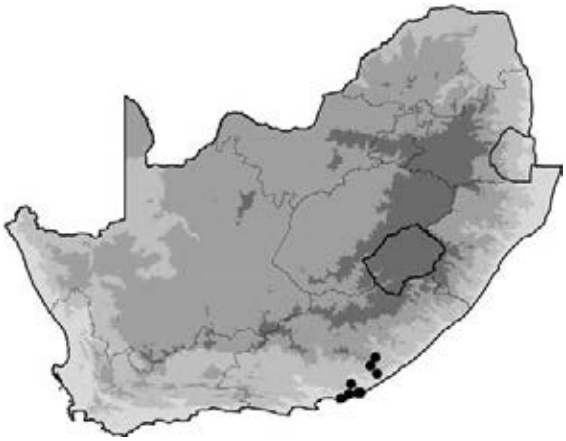
Distribution of ***Aristea ecklonii***.

13. **Aristea elliptica** *Goldblatt & A.P.Dold* in Goldblatt et al. in Bothalia 35: 3 (2005). Type: South Africa, Eastern Cape, Kariega Park, between Kenton-on-Sea and Salem, stony quartzitic outcrops, 21 Aug. 2003, *A.P. Dold 4604* (GRA, holo.; MO, NBG, iso.).

Plants 200–350(–500) mm high. *Stem* oval in section and prominently 2-winged, 2.5–3.0 mm wide, normally unbranched, with (2)3 or 4 sessile lateral flower clusters or lowermost shortly stalked. *Leaves* clustered basally, with 2 cauline leaves, linear to narrowly sword-shaped, (2.5–)4.0–6.0 mm wide, firm to leathery, with narrow hyaline margins. *Flower clusters* 3 to 5, terminal cluster 2-flowered, lateral clusters 1- or 2-flowered; spathes green with membranous, hyaline or brown margins, (25–)30–38 mm long; bracts green to dry, ⅓ as long as spathes. *Flowers* pale blue, outer tepals with broad green stripe on reverse; tepals unequal, outer 16–18 × ± 7 mm, inner ± 16 × ± 9 mm. *Filaments* ± 3 mm long; anthers ± 3 mm long. *Ovary* cylindric, 3-lobed, 12–16 mm long, on pedicels up to 3 mm long; style ± 6.5 mm long; stigma lobes fringed. *Capsules* cylindric, deeply 3-lobed, (20–)24–30 mm long. *Seeds* ellipsoid, many per locule in single row, often oriented obliquely to capsule axis, smooth, surface cells ± plane to weakly domed. *Flowering time*: August to October.

Distribution and ecology: restricted to central Eastern Cape, South Africa, extending from the Zuurberg Mtns to the Fish River Mouth; mainly on sandstone slopes and often on rock outcrops, in fynbos or grassy fynbos.

Diagnosis: *Aristea elliptica* most closely resembles the diminutive southern Cape species *A. pusilla*, in which it has been included as *A. pusilla* subsp. *robustior* (although the type illustration more likely represents a well-grown specimen of typical *A. pusilla*). It is



Distribution of ***Aristea elliptica***.

recognised by its low stature, combined with relatively broad stem and leaves, these rather firm and more leathery, and by the long, angular ovary and elongate capsules 20–30 mm long. The seeds are ellipsoid and unique in *Aristea*, with the surface cells plane or only weakly domed. The seeds lie in a single row in each locule, as in the related *A. ecklonii, A. ensifolia* and *A. pusilla*, but, unlike the horizontally packed seeds in these species, those of *A. elliptica* are loosely arranged and often oriented obliquely to the long axis of the capsule in a zig-zag arrangement with only their tips touching. The pollen grains are disulculate and shed singly with the two large apertures covered with exine, whereas pollen of the related species is shed in tetrads, with the apertures operculate.

14. **Aristea pusilla** *(Thunb.) Ker-Gawl.* in König & Sims, Annals of Botany 1: 236 (1804); Weimarck: 68 (1940); Vincent: 246 (1985). *Moraea pusilla* Thunb.: no. 7 (1787). Type: South Africa, without precise locality or date, *Thunberg s.n.* (UPS–THUNB 1262, holo.).

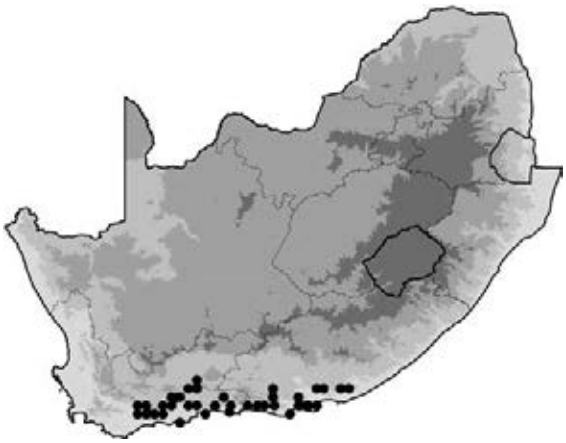
Aristea pusilla subsp. *robustior* Weim.: 69 (1940); Vincent: 248 (1985). Type: South Africa, without precise locality, illustration entitled *Aristea pusilla* in Ker Gawl.: t. 1231 (1809).

Plants (50–)80–150 mm high. *Stem* oval in section and narrowly 2-winged, 1.5–2.2 mm wide, unbranched, sometimes with 1 or 2 sessile lateral flower clusters. *Leaves* linear to sword-shaped, mostly 2–4 mm wide, fairly soft-textured, with narrow hyaline margins. *Flower clusters* 1 to 3, terminal cluster 2-flowered, lateral clusters usually 1-flowered; spathes subequal or unequal, green with membranous, hyaline or rust-coloured margins, 16–20 mm long, bracts ± dry, < ⅓ as long as spathes, sometimes minute, concealed in spathes. *Flowers* deep blue, outer tepals with a broad green strip outside; tepals unequal, outer 11–14 × 5–7 mm, inner 9–11 × 8–9 mm. *Filaments* ± 2 mm long; anthers ± 2.5 mm long. *Ovary* triangular-columnar, up to 12 mm long, on pedicels up to 2 mm long; style ± 6.5 mm long, stigma lobes slightly fringed. *Capsules* cylindric, 3-lobed, lobes with rounded to acute edges, (14–)20–25(–30) mm long. *Seeds* round in section, flattened or lightly concave at top and bottom, many per locule in a single row, sculpturing foveate, surface cells domed to papillate. *Flowering time*: September to November.

Distribution and ecology: occurring in South Africa in Western and Eastern Cape, along the southern coast from Swellendam to Alexandria and inland in the Swartberg and Langeberg; mainly on stony clay flats and lower slopes, typically in renosterveld or in grassland in the east of its range.

Diagnosis: a dwarf plant, typically 80–120 mm high but sometimes shorter, *Aristea pusilla* is readily recognised by its soft-textured, sword-shaped leaves and compressed and narrowly 2-winged flowering stem, 1.5–2.0 mm wide, bearing one or more leaves along its length. The stem is often unbranched with a single terminal flower cluster but particularly robust plants may have one or two sessile lateral flower clusters. The flower clusters have at most two flowers and the lateral clusters often just a single flower. The flowers are contained within relatively long, green spathes and are ± sessile and carried on elongate ovaries above the spathes. The ovary is triangular in cross section, but mature capsules, (14–)20–25(–30) mm long, are 3-lobed with each locule having a broad, rounded outline. The seeds lie closely packed in a single row in each locule, and are round in cross section with the top and bottom flattened due to pressure. As in other members of sect. *Cladocarpae*, the seeds have foveate sculpturing and fairly prominently domed to papillate surface cells. *Aristea pusilla* shares an elongate, 3-lobed capsule with *A. elliptica*, *A. ecklonii* and *A. ensifolia*, and this evidence of relationship is supported by a second derived feature, pollen shed in tetrads in the latter two species (but not in *A. elliptica*).

Weimarck (1940) recognised subsp. *robustior* for somewhat larger plants with thicker, fibrous leaves. The type of this name, an illustration in *Curtis's Botanical*



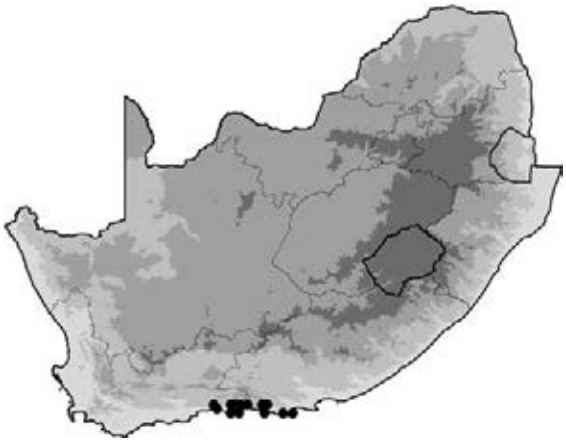
Distribution of ***Aristea pusilla***.

Magazine, seems in no significant way different from typical *A. pusilla*, but some specimens cited by Weimarck as subsp. *robustior* are now included in *A. elliptica*, usually a taller plant 200–350(–500) mm high. Typical *A. pusilla* rarely exceeds 120 mm and the tallest plants are 150 mm high, with specimens less than 80 mm tall not uncommon. Associated with its larger size, *A. elliptica* has flowering stems with up to 4(5) flower clusters, the lowermost sometimes shortly stalked, and flowers with tepals 16–18 mm long, thus larger than those of *A. pusilla*, which has tepals 12–14 mm long.

At some sites in the southern Cape *Aristea pusilla* grows close to or mixed with *A. nana* and the two are superficially very alike. Plants of *A. nana* always have an extended, leafless terminal internode and flowers borne on pedicels 10–20 mm long, a short ovary 5–8 mm long, and ovoid capsules 6–12 mm long. In contrast, *A. pusilla* has at least one cauline leaf inserted at about the middle of the stem, often one or more sessile lateral branches, flowers borne on short pedicels, an elongate ovary up to 12 mm long and triangular in outline, and cylindric, 3-lobed capsules (14–)20–25(–30) mm long. No hybrids between the two are known even though bees visit and pollinate flowers of both species.

15. **Aristea ensifolia** *Muir* in L.Bolus in Annals of the Bolus Herbarium 3: 139 (1922); Weim.: 63 (1940). Type: South Africa, [Western Cape], Albertinia, Nov. 1922, *Muir 2458* (BOL, holo.).

Plants up to 500 mm high. *Stem* compressed and 2-winged, few- to several-branched, bearing several sessile, lateral flower clusters. *Leaves* sword-shaped, ± ⅔ as long as stem, 6–12 mm wide, soft-textured. *Flower clusters* several per axis in lax arrangement, each mostly 2 or 3(rarely 4)-flowered; spathes green, bracts ± membranous. *Flowers* blue; tepals ellipsoid, ± 15 mm long. *Filaments* ± 5 mm long; anthers ± 3 mm long. *Ovary* on pedicels up to 5 mm long; style ± 7 mm long; stigma lobes deltoid, fringed. *Capsules* on pedicels 10–15 mm long, 35–50 mm long, cylindric, 3-lobed, erect or drooping, indehiscent, decaying with age to release seeds. *Seeds* shortly columnar, with foveate sculpturing, many per locule, in single row. *Flowering time*: mainly October and November.



Distribution of ***Aristea ensifolia***.

Distribution and ecology: restricted to southern South Africa, extending from near Albertinia in Western Cape to the Van Stadens Mtns in Eastern Cape; in coastal evergreen forest, in shade or clearings.

Diagnosis: *Aristea ensifolia* is distinguished by the strongly compressed and winged stem, often with a few branches but with sessile lateral flower clusters, relatively small flowers and elongate, often drooping capsules 35–50 mm long. The seeds are shortly columnar and arranged in a single row in each locule. The pollen of *A. ensifolia* is shed in tetrads, a feature found elsewhere in the genus only in *A. ecklonii* and *A. pusilla*. The three species evidently comprise a clade within sect. *Cladocarpae*. The Madagascan *A. cladocarpa*, which also has elongate capsules and locules with seeds in a single vertical row, has pollen grains shed singly. The capsules are indehiscent, the walls decaying irregularly to release the seeds.

Sect. 3. **Ancipites** *Weim.* in Acta Universitatis Lundensis, ser. 2, 36(1): 36 (1940). Type: *Aristea anceps* Eckl., lecto., designated here.

Plants small to moderate in size, up to 50 mm high. *Stem* usually unbranched, compressed and broadly 2-winged, of a single internode, bearing a small leaf below first flower cluster (or leafless in *A. nana*). *Flower clusters* 1(2, rarely 3), 2 to 4-flowered. *Flowers* blue; tepals connate at base, subequal. *Style* 3-lobed. *Capsules* ovoid to ellipsoid or ± shortly cylindric. *Seeds* angular-prismatic. *Pollen grains* zonasulculate, exine reticulate.

Species ± 5: eastern southern Africa as far south as George, also in tropical Africa as far north as Ethiopia.

16. **Aristea abyssinica** *Pax ex Engler*, Über die Hochgebirgsflora des tropischen Afrika: 173 (1892); Goldblatt: 7 (1993); Goldblatt: 10 (1996); Goldblatt: 165 (1997). *A. alata* subsp. *abyssinica* (Pax) Weim.: 44 (1940). *A. cognata* subsp. *abyssinica* (Pax) Marais: 932 (1987). Type: Ethiopia, Tigre and Begemder, *Schimper 279* (B, holo.; BM, K, iso.).

Aristea johnstoniana Rendle: 48 (1894). Type: Malawi, Mt Mulanje, June 1891, *Whyte 14* (BM, lecto., designated by Goldblatt: 10 (1996); K, isolecto.).

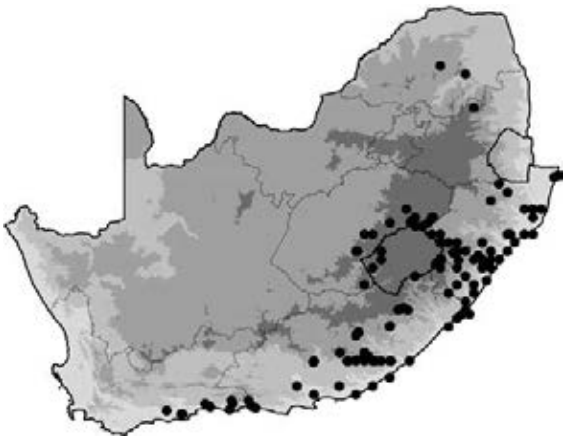
Aristea tayloriana Rendle: 48 (1894). Type: Tanzania, Kilimanjaro, *W.E. Taylor s.n.* [BM, lecto., designated by Goldblatt: 10 (1996)].

Aristea cognata N.E.Br. ex Weim.: 174 (1937); Weim.: 39 (1940). Type: South Africa, Transvaal, [Limpopo], Houtbosch, 1875–1880, *Rehmann 5769* (K, holo.).

Plants (80–)120–300(–500) mm high. *Stem* compressed and 2-winged, 1–2(–3) mm wide, consisting of 1 long internode with a short, subterminal leaf, simple or with short subterminal branch. *Leaves* linear to narrowly sword-shaped, in a basal fan, half to ± ⅔ as long as stem; cauline leaf solitary, 8–20 mm long, subtending apical flower cluster. *Flower clusters* mostly 1 or 2(3) on short branches or ± sessile, crowded near stem apex, each mostly 2-flowered, rarely with ± sessile flower cluster at stem base; spathes green with dry margins or entirely dry, 6–11 mm long, bracts slightly shorter than spathes, dry-membranous, often rust-brown, torn with age. *Flowers* blue, ± sessile; tepals elliptic, unequal, outer ± 6–11 × 3–6 mm, inner ± as long but 5–7 mm wide. *Filaments* 3–4 mm long; anthers ± 2.2 mm long. *Style* 5–6 mm long; stigma lobes broad, undulate. *Capsules* ovoid-oblong, (4–)5–8 mm long, subsessile or on pedicels up to 2 mm long. *Seeds* angular-prismatic, sculpturing reticulate. *Flowering time*: November to January.

Distribution and ecology: widespread in eastern South Africa, extending from near Knysna in Western Cape through Eastern Cape, Free State, KwaZulu-Natal and Mpumalanga to Limpopo, also Lesotho and Eswatini, and in tropical Africa as far north as Ethiopia; in coastal and montane grassland.

Diagnosis: Aristea abyssinica is readily recognised by the compressed, 2-winged stem, comprising a long terminal internode bearing a subterminal leaf subtending one or two flower clusters. This growth form is matched only in *A. alata* of eastern tropical Africa and *A. anceps* and *A. nana* of Eastern Cape, South Africa. *Aristea anceps* has dry, rust-coloured spathes and bracts 15–20 mm long, whereas the more robust *A. alata* has broader, softer-textured leaves (3–)4–6 mm wide, and capsules typically borne on well-developed stalks 5–16(–25) mm long. Diminutive *A. nana* does not have a subterminal leaflet and the flowers are enclosed in green spathes and are borne on pedicels ± 10 mm long.



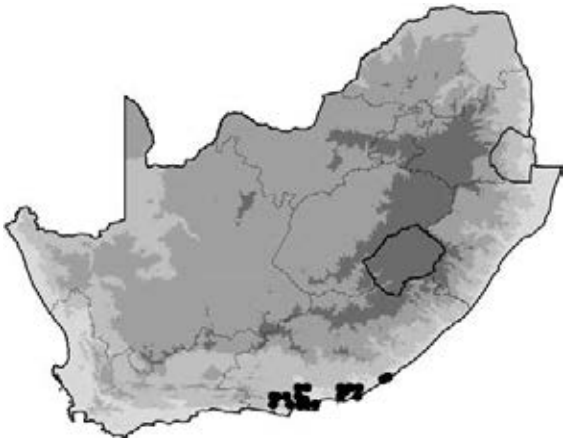
Distribution of ***Aristea abyssinica***.

With so wide a range it is not surprising that *Aristea abyssinica* is somewhat variable. Dwarfed plants from eastern South Africa and Lesotho may be only 80–100 mm high and were described as *A. cognata*. Marais (1987) later reduced *A. abyssinica* to subspecies rank in *A. cognata* (despite the nomenclatural priority of the former name), recognising their strong similarity but emphasizing the smaller size of southern African plants. *Aristea cognata* is regarded here as a synonym of *A. abyssinica* because of the absence of a discrete separation between the two taxa. In southern Africa both short (*A. cognata*-type) plants and taller ones 150–300 mm high, virtually identical to *A. abyssinica* from Zambia, Tanzania and elsewhere, can often be found growing together, the shorter plants in exposed, rocky or trampled places and the taller ones in deeper soils in dense grass. Other features, including flower size, leaf and stem width, cited by Marais (1987) as separating the two taxa, overlap considerably and plants from South Africa often match those from tropical Africa closely.

A characteristic feature of *Aristea abyssinica* that appears not to have been recorded in the literature is the production of flower clusters at the base of some plants on very short flowering stems in both southern and tropical Africa. The flowers of these almost stemless flower clusters are not known, but apparently normal capsules are produced, possibly the result of cleistogamous reproduction. *Aristea abyssinica* is heteroploid, with chromosome numbers of $2n = 32$ and 64 reported for different populations.

17. **Aristea anceps** *Eckl. ex Klatt* in Linnaea 34: 550 (1866); Weimarck: 37 (1940); Vincent: 215 (1985). Type: South Africa, [Eastern Cape], banks of the Kowie River and to the east, Nov. [without year], *Ecklon & Zeyher Irid 55* (S, lecto., designated by Vincent: 215 (1985); BSB, C, LD, MO, isolecto.).

Plants (80–)150–350 mm high, usually in small tufts. *Stem* flattened and 2-winged, mostly consisting of 1 long internode 2.0–3.5 mm wide, usually with a short, subterminal leaf up to 60 mm long, this sometimes evidently not developed or indistinguishable from spathes. *Leaves* narrowly sword-shaped, half to ± as long as stem, (1.5–)2.5–4.0 mm wide, with narrow, acute hyaline margins. *Flower clusters* (1)2(3) crowded at stem apex, nearly sessile or on short stalks up to 5 mm long, each (2)4-flowered; spathes dry rusty brown (or green toward base), 15–22 mm long, bracts slightly shorter or longer than spathes, dry rust-brown, becoming torn with age. *Flowers* subsessile, deep blue; tepals united basally for ± 3 mm, outer tepals 15–18 × 6–7 mm, inner ± 17 × 8–9 mm. *Filaments* ± 4 mm long; anthers ± 3 mm



Distribution of ***Aristea anceps***.

long. *Style* ± 5 mm long, stigma lobes rounded, undulate. *Capsules* ovoid-oblong, 8–12 mm long, subsessile. *Seeds* angular-prismatic, sculptering foveate. *Flowering time*: mainly September to November, occasionally as late as January.

Distribution and ecology: endemic to Eastern Cape, South Africa, extending from Joubertina in the Long Kloof through the Baviaanskloof and Zuurberg Mtns to Grahamstown and as far east as East London; mainly on rocky sandstone slopes and flats, but in montane grassland up to 700 m elevation. [Published records of the species from Sir Lowry's Pass and the Hottentots Holland in Western Cape are incorrect and should be ignored].

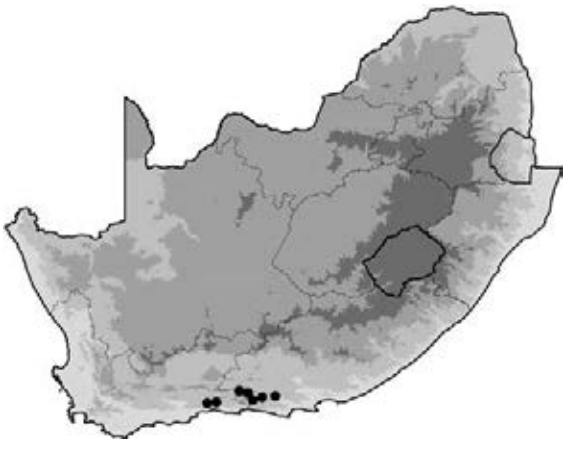
Diagnosis: *Aristea anceps* has the distinctive growth form of sect. *Ancipites*, the flowering stem comprising a long upper internode with a small subterminal leaf subtending the terminal flower cluster. Although broadly similar to *A. abyssinica*, it is distinguished by the sturdier stem and the longer, firm-textured, rusty brown spathes and bracts ± 15–20 mm long. *Aristea abyssinica*, which has sometimes been included in *A. anceps* (Baker, 1896), has shorter spathes and bracts 6–11 mm long, either green or dry and translucent but not rust-coloured. The two are sympatric around Grahamstown in Eastern Cape, but they normally have different habitats, *A. anceps* largely restricted to sandy soils in stony, montane or lowland grassland and grassy fynbos, and *A. abyssinica* a grassland species most often found in montane habitats in areas of higher rainfall.

18. **Aristea nana** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 35: 1 (2005). Type: South Africa, Eastern Cape, hill slopes immediately north of Joubertina (growing with *A. pusilla*), 19 Sept. 2004, *P. Goldblatt & L.J. Porter 12492* (NBG, holo.; K, MO, PRE, iso.).

Plants 80–150(–180) mm high. *Stem* flattened and 2-winged, 1.2–1.7 mm wide, 1 or 2 per plant, with an elongate, leafless upper internode up to 105 mm long, occasionally with a second short stem up to 30 mm long; stems each with a single terminal flower cluster. *Leaves* narrowly sword-shaped to linear, ± as long as stem or slightly longer, 1.5–3.0 mm wide, with narrow, acute hyaline margins sometimes flushed red. *Flower clusters* solitary, terminal, (1)2-flowered; spathes green, acute-attenuate, margins dry, translucent, (13–)15–22(–26) mm long, bracts similar, 6–15 mm long. *Flowers* on pedicels 10–15 mm long, blue, outer tepals green outside; tepals unequal, outer 10–16 × 3.5–5.0 mm, inner 11–17 × 5.5–11.0 mm. *Filaments* 3–4 mm long; anthers 2.5–3.0 mm long, yellow. *Style* 5.5–8.0 mm long; stigma lobes slightly fringed. *Capsules* ovoid, 6–12 mm long, on pedicels up to 20 mm long. *Seeds* globose, without sculpturing, surface cells tuberculate. *Flowering time*: September and October.

Distribution and ecology: occurring in Western and Eastern Cape, South Africa, from Robinson's Pass to Bathurst; on sandy and rocky slopes, in grassy fynbos.

Diagnosis: a dwarf species mostly less than 120 mm tall, *Aristea nana* has rarely been collected and has then usually been confused with similarly low-growing *A. pusilla*. The two sometimes co-occur but can be distinguished not only by height but also by the leaves, those of *A. nana* having a glaucous bloom and wider translucent margins, whereas the pale green leaves of *A. pusilla* are softer textured. The flowering stem of *A. nana* is almost always unbranched and bears leaves only near the base. The terminal internode is several times longer than the rest of the stem and terminates in a single inflorescence of 2(3) flowers. Particularly striking are the well-developed pedicels of the flowers, 10–12 mm long, and the ovoid ovary 4–6 mm long, quite different to the short pedicels, ± 2 mm long and triangular-columnar ovary 12 mm long of *A. pusilla*. The two species also differ in pollen, the grains in *A. pusilla* shed in tetrads and monosulcate with exine masses over the aperture, but shed singly in *A. nana* and dizonasulculate with 2 smooth, well-defined apertures at opposite ends of the grains.



Distribution of ***Aristea nana***.

Despite their superficial similarity, *Aristea nana* and *A. pusilla* are probably not closely related, with *A. nana* evidently most closely allied to the eastern southern African *A. abyssinica* Pax (including *A. cognata* N.E.Br.) and *A. anceps* Eckl. ex Klatt. These two species also have unbranched, flattened and broadly winged flowering stems with an extended upper internode, thus bearing leaves only near the base. In addition, *A. nana*, *A. abyssinica*, and *A. anceps* are unusual in the genus in sometimes producing a short flowering stem held close to the base of the plant in addition to the normal extended flowering stems.

Subg. 2. **Pseudaristea**

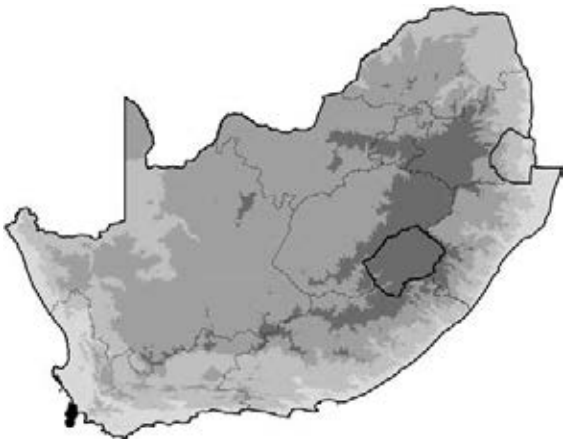
Pseudaristea *(Pax) Goldblatt* in Novon 22: 416 (2013). *Aristea* sect. *Pseudaristea* Pax: 153 (1888). Type: *A. spiralis* (L. f.) Ker Gawl., lecto., designated by Goldblatt: 416 (2013).

Flowers either deep to pale blue and fugaceous, or pale blue, cream-coloured or white with contrasting markings and lasting 1 full day or 2 days; tepals subequal or outer slightly to much smaller than inner. *Capsules* cylindric, 3-angled or 3-lobed, tardily or not dehiscent. *Seeds* columnar-triangular, many per locule in single row. *Pollen grains* dizonasulculate, exine reticulate.

Species 9: restricted to the southern African winter-rainfall region.

19. **Aristea pauciflora** *Wolley-Dod* in Journal of Botany, British and foreign 38: 171 (1900); Weim.: 65 (1940). Type: South Africa, [Western Cape], Cape Peninsula, Orange Kloof, below farm, Oct. 1897, *Wolley Dod 3507* (K, lecto., effectively designated by Weim.: 65 (1940); BOL, isolecto.).

Plants 200–400 mm high, forming tufts. *Stem* elliptic in section, 2-angled to narrowly winged, usually unbranched with sessile lateral flower clusters. *Leaves* linear, leathery, mostly 2–4 mm wide, oval in cross section with rounded edges and without defined margins. *Flower clusters* 2 to 4, each (2)3- or 4-flowered; spathes greenish becoming dry and blackish above, 15–20 mm long, bracts dry, shorter than spathes. *Flowers* deep blue, upright; tepals subequal, 15–22 × 8–10 mm, outer slightly shorter than inner. *Filaments* ± 3.5 mm long; anthers 3–4 mm long. *Ovary* cylindric-trigonous; style ± 9 mm long; stigma lobes broad, fringed. *Capsules* elongate, 3-lobed, lobes acutely angled, woody, indehiscent, (20–)25–35 mm long. *Seeds* triangular-columnar, many per locule in a single row, surface smooth. *Flowering time*: October to December.



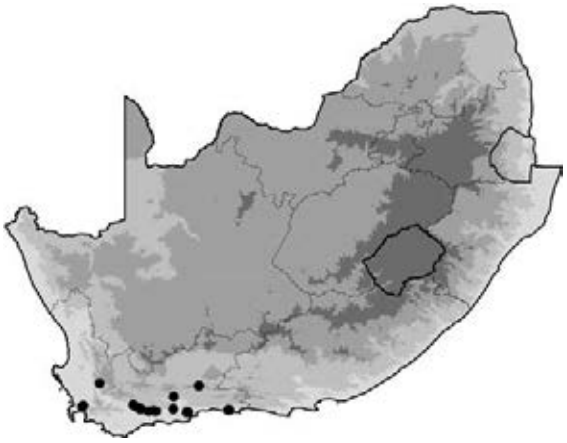
Distribution of ***Aristea pauciflora***.

Distribution and ecology: a rare local endemic of the Cape Peninsula, Western Cape, South Africa; mainly on granitic slopes.

Diagnosis: the small, deep blue flowers of *Aristea pauciflora* are unremarkable for the genus, but the elongate, 3-angled ovary and long, indehiscent capsules place the species in subg. *Pseudaristea*, an association confirmed by the pollen grains with two circular apertures, thus dizonasulculate as in other members of the subgenus. The relatively small flowers with subequal tepals 15–22 mm long and short anthers 3–4 mm long resemble those of most species of *Aristea* whereas other species of sect. *Pseudaristea* often have longer anthers, mostly 4.5–6.0 mm long. The leaves of *A. pauciflora* are unique in the section in their rounded margins lacking the typical marginal anatomy of translucent, thickened marginal epidermal cells of other members of subg. *Pseudaristea*, in which the margins have acute edges that become hyaline when dry. *Aristea pauciflora* is most easily confused with *A. simplex*, which has either pale or sometimes deep blue flowers of similar proportions but half to fully nodding, and plane leaves with acute margins.

20. **Aristea simplex** *Weim.* in Acta Universitatis Lundensis, ser. 2, 36: 64 (1940). Type: South Africa, [Western Cape], Grootvadershoek, stony slopes near Rietkuil, Oct. [without year], *Zeyher 4058* (B [? Destroyed], C, K, S, syn.).

Plants up to 500 mm high, forming tufts. *Stem* elliptic in section, usually unbranched, bearing sessile lateral flower clusters. *Leaves* linear, narrow, 2–4 mm wide, firm to stiff and leathery, margins angular, translucent, hyaline when dry. *Flower clusters* (2)3 to 6, each (2)4-flowered; spathes dark green with translucent margins, bracts dry-membranous. *Flowers* half to fully nodding, pale to deep blue, greenish in throat; outer tepals 16–19 × 6–8 mm, inner tepals 15–22 × 10–12 mm. *Filaments* ± 4 mm long; anthers ± 3.5 mm long. *Ovary* elongate, >20 mm long, triangular in section; style broadly 3-lobed;



Distribution of ***Aristea simplex***.

stigma lobes fringed. *Capsules* elongate, deeply 3-lobed, up to 35 mm long, woody, indehiscent. *Seeds* triangular-columnar, many per locule in a single row, surface smooth. *Flowering time*: September and October.

Distribution and ecology: widespread in the southwestern and southern Western Cape, South Africa, extending from the Witzenberg to George, and local in the Swartberg Mtns; on clay and sandy loam flats and lower slopes in renosterveld or fynbos.

Diagnosis: superficially similar to *Aristea spiralis* and often confused with it, *A. simplex* has narrower leaves and significantly smaller, pale to deep blue flowers with tepals 15–20 mm long versus white or pale blue flowers with tepals 30–35 mm long in *A. spiralis*. The ovate to broadly elliptic stems of *A. simplex* and narrow, ± linear, leathery leaves, 2–4 mm wide, also contrast with the compressed, prominently winged stems of *A. spiralis* and its broader, sword-shaped, softer-textured leaves, 4–7 mm wide. Flowers of *A. spiralis* are unique in the genus in producing small quantities of nectar from nectaries at the tepal bases, while the flowers of two populations of *A. simplex* examined do not produce nectar. Although their ranges appear to overlap, *A. spiralis* is predominantly a species of sandstone or granitic mountain slopes, whereas *A. simplex* favours heavier soils of clay or sandy loam and is known mainly from relatively low elevations.

21. **Aristea spiralis** *(L.f.) Ker Gawl.* in König & Sims, Annals of Botany 1: 236 (1804); Weim.: 51 (1940). *Moraea spiralis* L.f.: 99 (1782). *Sisyrinchium spirale* (L.f.) Eckl.: 16 (1827). Type: South Africa, [Western Cape], without precise locality or date, *Thunberg s.n.* (UPS–THUNB, holo.).

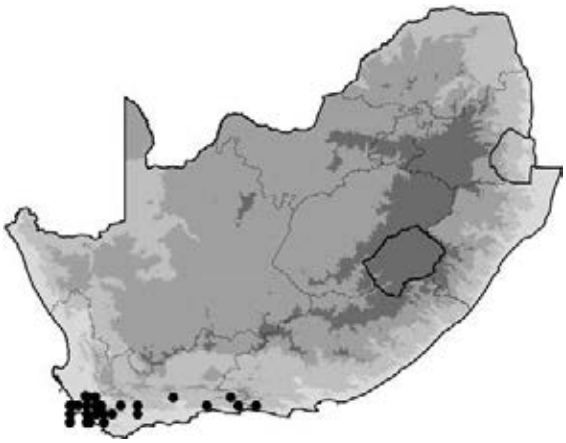
Plants 200–500 mm high, often in small tufts. *Stem* flattened, elliptic in section, 2-winged, often broadly so in lower half, usually unbranched, bearing (2)4 to 7 sessile lateral flower clusters. *Leaves* narrowly sword-shaped, 4–7 mm wide, relatively soft-textured, margins angular, translucent, hyaline when dry. *Flower clusters* several, each (2)4-flowered; spathes greenish with translucent margins, 33–45 mm long, bracts dry-membranous, shorter than spathes. *Flowers* half to fully nodding, on pedicels 3–5 mm long, white or pale blue, with linear or V-shaped purple markings at tepal bases; tepals 28–35 mm long, inner slightly larger than outer. *Filaments* usually 22–26 mm long (rarely half as long); anthers 4.5–6.3 mm long. *Ovary* elongate, 3-lobed, 12–15 mm long; style 30–35 mm long, stigma lobes spreading, deeply fringed. *Capsules* elongate, ± woody, tardily dehiscent, deeply 3-lobed, 30–50 mm long. *Seeds* triangular-columnar, many per locule in a single row. *Flowering time*: mainly September to November.

Distribution and ecology: fairly widespread in Western Cape, South Africa, extending from Bain's Kloof to the Cape Peninsula and east to Knysna; mainly on stony sandstone and granite slopes, up to 1 000 m elevation and flowering well only after fire.

Diagnosis: the most widespread and common species of sect. *Pseudaristea*, *Aristea spiralis* is recognised by the large, half to fully nodding flowers, mostly white with light purple markings near the bases of the tepals but an attractive pale blue in the southern part of its range in the Langeberg and the mountains around Hermanus and Bredasdorp. It is the only species of *Aristea* that produces nectar, secreted from perigonal nectaries at the base of the tepals. The stamens and style extend horizontally and most populations have particularly long filaments, 22–26 mm long, whereas allied species have filaments 5–6 mm long or only 3–4 mm in *A. pauciflora*.

The elongate filaments and nectar production are adaptations to its unique pollination system as the only species of the genus pollinated by long-proboscid flies, *Philoliche* species (Tabanidae) (Goldblatt & Manning, 1997a).

Some populations currently included in *Aristea spiralis* have unusually short filaments but otherwise match the species in their distinctive, strongly compressed,



Distribution of ***Aristea spiralis***.

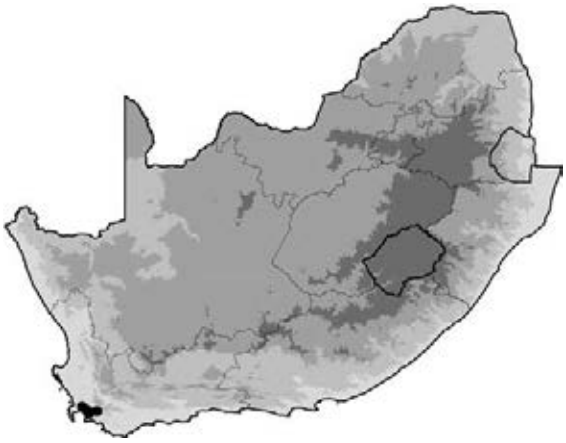
broadly 2-winged flowering stem and tepals with purple markings near the base. Whether flowers of this morph produce nectar or not is unknown. It is noteworthy that plants with either long or short stamens have the same unique pollen grains with rounded, supratectal exine deposits termed gemmules (Goldblatt & Le Thomas, 1997; Goldblatt et al. 2004).

22. **Aristea cantharophila** *Goldblatt & J.C.Manning* in Novon 7: 138 (1997a). Type: South Africa, Western Cape, foot of Sir Lowry's Pass, 1 Sept. 1995, *Goldblatt & Manning 10284* (NBG, holo.; K, MO, iso.).

Plants 200–400 mm high, forming tufts. *Stems* oval to elliptic in section, usually unbranched, bearing 1 or 2 sessile lateral flower clusters. *Leaves* linear, reaching to ± middle of stem, 2–4 mm wide. *Flower clusters* 2 or 3, sessile except the terminal, each 2- to 4-flowered; spathes greenish with translucent margins, becoming dry from apex, 20–28 mm long, bracts dry-membranous, ± 10 mm long, membranous. *Flowers* on pedicels 8–10 mm long, pale lilac, mauve, or whitish with a dark greenish black central eye 6–7 mm diam. grading to turquoise at edges, reverse of outer tepals greenish along midlines and the right halves flushed beige; tepals obovate, 22–26 × 12–15 mm, outer three slightly smaller than inner. *Filaments* ± 5 mm long; anthers ± 5.5 mm long; pollen orange. *Ovary* cylindric-trigonous, curving outward, 15–18 mm long, rapidly elongating after fertilisation; style 12–15 mm long, stigma lobes broad, fringed. *Capsules* cylindric, deeply 3-lobed in cross section, woody, indehiscent, (25–)35–50(–60) mm long. *Seeds* many per locule in a single vertical row, obliquely truncate, surface smooth. *Flowering time*: August and September; opening ± 9:00, fading in late afternoon the same day.

Distribution and ecology: local in Western Cape, South Africa, from Du Toit's Kloof to Bot River; on clay and granite slopes in fynbos or renosterveld.

Diagnosis: typical of subg. *Pseudaristea*, *Aristea cantharophila* has sessile lateral inflorescences, a cylindric ovary and elongate capsules 50–60(–75) mm long, longer than any other species of the subgenus. The flower colour is distinctive, pale lilac, mauve, or whitish with a dark greenish black central eye 6–7 mm diam. grading to turquoise at edges. Both the filaments and style are also dark greenish black. The relatively large tepals are 22–26 × 12–15 mm with the outer three slightly smaller than the inner, and the large anthers, ± 5.5 mm long, bear orange pollen. The relationships of *A. cantharophila* appear to be with *A. pauciflora* and *A. simplex*, both of which have pale or dark blue flowers without a dark centre. All three species have flowers that last a single day each, the flowers of *A. pauciflora* opening shortly after sunrise and fading early in the afternoon whereas those of *A. cantharophila* open at ± 9:00 and fade late in the afternoon (phenology unknown for *A. simplex*). Apart from the distinctive colouring of the tepals, filaments and anthers, there are no major differences among the three species. *Aristea cantharophila* appears to have particularly long capsules and is the smallest of the three, plants mostly ± 200 mm high, occasionally up to 300 mm. More robust, *A. pauciflora* stands 350–600 mm high and has dark blue flowers with subequal tepals 15–18 mm long. *Aristea simplex* has pale or sometimes dark blue flowers with an unusual secund orientation, and stands 300–500 mm high. Flowers of *A. cantharophila* are pollinated by hopliine beetles, species of which assemble and mate on the horizontally oriented flowers (Goldblatt & Manning 1997a).

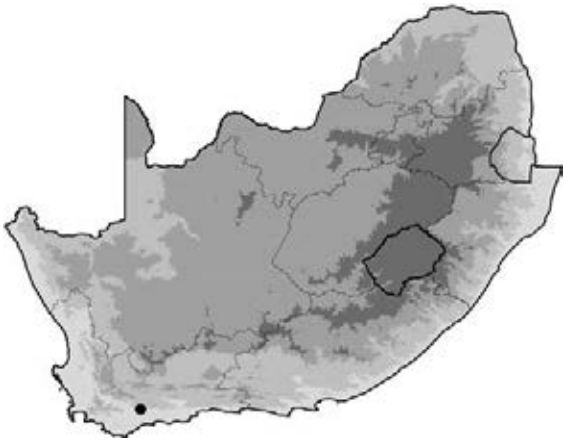


Distribution of ***Aristea cantharophila***.

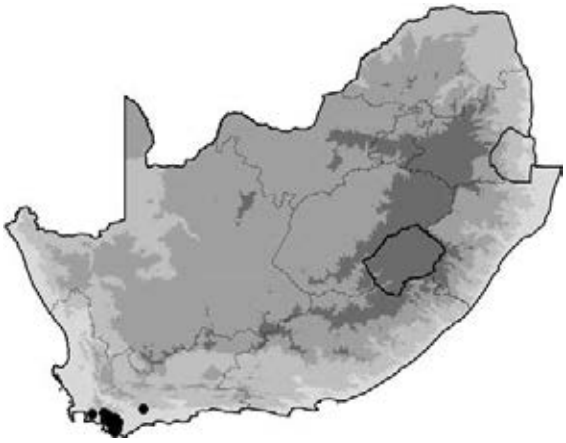
23. **Aristea cistiflora** *J.C.Manning & Goldblatt* in Goldblatt et al. in Bothalia 35: 5 (2005). Type: South Africa, Western Cape, Swellendam, Marloth Reserve, Reservoir Hill, 22 Aug. 2003, *J.C. Manning 2875* (NBG, holo.; MO, PRE, iso.).

Plants (100–)300–500 mm high, forming tufts up to 150 mm diam. *Stem* erect, occasionally with 1 or 2 short branches, elliptic in cross section, with (1)4 to 6 sessile lateral flower clusters. *Leaves* linear, mostly 2.5–3.0 mm wide, reaching to ± middle of stem, loosely twisted. *Flower clusters* (1)4 to 6, mostly sessile, each 2- to 4-flowered; spathes greenish with translucent margins becoming dry above, 15–18 mm long, bracts shorter than the spathes. *Flowers* half nodding, held at 45° to horizontal, pale pink to pale lilac, streaked dull brownish outside, outer tepals copper-brown in the lower ⅓, usually with a yellow central streak; outer tepals 22–23 × 13–14 mm, inner 23–25 × 15–17 mm. *Filaments* ± 4 mm long; anthers ± 5 mm long; pollen yellow. *Ovary* ± 10 mm long, slightly curved; style ± 11 mm long, stigma lobes broad, deeply fringed. *Capsules* elongate, woody, indehiscent, 35–40 mm long. *Seeds* triangular-columnar, truncate at apex and base, fringed with papillae along angles, sculptering obscurely foveate, epidermal cells domed, reddish brown, 1.5–1.8 × ± 1.5 mm. *Flowering time*: August to mid-September.

Distribution and ecology: a narrow endemic of the Langeberg near Swellendam in Western Cape, South Africa; on lower southern slopes in peaty sandstone soil, flowering after fire.



Distribution of ***Aristea cistiflora***.



Distribution of ***Aristea teretifolia***.

Diagnosis: *Aristea cistiflora* is evidently most closely related to *A. teretifolia* (Goldblatt & Manning, 1997a), which also has the outer tepals with dark markings, the markings extending to the middle of the tepals in *A. teretifolia* versus close to the base in *A. cistiflora*. *Aristea teretifolia* is additionally distinguished by the leaves sometimes terete or linear and up to 2 mm wide, the flowering stem bearing at most two lateral flower clusters (versus up to six in *A. cistiflora*), and by the slightly smaller flowers with ascending tepals, the outer ± 20 mm long and the inner 24–28 mm long, thus substantially longer than the outer. In *A. cistiflora* the inner tepals are only 1–2 mm longer than the outer. *Aristea teretifolia* also has smaller capsules, 20–30 mm long versus 35–40 mm long in *A. cistiflora*. As in other members of subg. *Pseudaristea*, pollen grains of *A. cistiflora* are dizonasulculate, with two smooth, ring-shaped apertures.

24. **Aristea teretifolia** *Goldblatt & J.C.Manning* in Novon 7: 141 (1997a). Type: South Africa, Western Cape, Bredasdorp District, Fairfield Estate, 25 Aug. 1994, *Nänni 48* (NBG, holo.).

Plants 200–400 mm high, forming tufts up to 80 mm diam. *Stem* broadly elliptic in section, rarely with a single slender branch, bearing 1 or 2 sessile flower clusters. *Leaves* several, mostly basal, linear or terete, 1–2 mm wide. *Flower clusters* 1 to 3, sessile except the terminal, 2- to 4-flowered; spathes greenish with translucent margins becoming dry above, 15–18 mm long, bracts dry-membranous, shorter than spathes. *Flowers* on pedicels 8–10 mm long, large, lilac to cream-coloured, rarely pale yellow, with a large dark mark toward base of outer tepals; outer tepals obliquely obovate, 20–22 × ± 12 mm, inner fiddle-shaped, 24–28 × 15–18 mm. *Filaments* ± 6.5 mm long; anthers ± 4.5 mm long, yellow; pollen light orange. *Ovary* cylindric-trigonous, slightly curved, 12–15 mm long, rapidly elongating after fertilization; style 9–10 mm long, dividing into three short, broad, fringed lobes ± 1.3 mm long, white with purple fringes. *Capsules* elongate, woody, indehiscent, 20–30 mm long. *Seeds* triangular-columnar, many per locule, arranged in a single vertical row. *Flowering time*: August and September.

Distribution and ecology: restricted to southern Western Cape, South Africa, from Shaw's Pass near Caledon to Elim in the south and Tradouw Pass in the Langeberg; mostly on clay or clay loam slopes and flats.

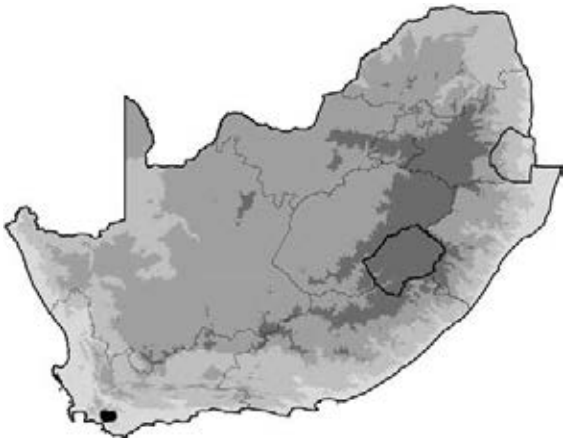
Diagnosis: *Aristea teretifolia* is distinguished in subg. *Pseudaristea* by the narrow, fibrous leaves either terete or plane and up to 2 mm wide, and by its relatively large flowers, 50–58 mm diam., and largely pale lilac, mauve or creamy yellow, with the outer tepals marked with a dark bronze-brown blotch in the lower half edged in pale blue or turquoise. The outer tepals are obovoid and relatively small, ± 20 mm long, compared with the inner which are fiddle-shaped and 24–28 mm long.

The relationships of *Aristea teretifolia* are with pale pink to pale lilac-flowered *A. cistiflora* and possibly with *A. biflora*, which also has lilac or mauve flowers and shares with *A. teretifolia* the curious feature of having the outer tepals asymmetric about the midline, the one half larger than the other. The flowers of *A. biflora* lack dark markings on the outer tepals, which have instead a pair of transparent windows at their lower sides that appear dark when viewed from above against the dark brown or green background. *Aristea biflora* has ± linear, plane leaf blades, 2–3 mm wide, and grows in dense clumps reminiscent of the growth form of *A. teretifolia*.

Aristea teretifolia was based on plants with terete leaves from Fairfield, near Napier in the southern Cape, but other populations have plane leaves, sometimes up to 2 mm wide. Like most species of subg. *Pseudaristea* with dark markings on the tepals, flowers of *A. teretifolia* are pollinated by hopliine scarab beetles (Goldblatt & Manning, 1997a).

25. **Aristea biflora** *Weim.* in Acta Universitatis Lundensis, ser. 2, 36: 54 (1940). Type: South Africa, [Western Cape], Caledon commonage, Sept. 1931, *W.F. Barker 30* (K, holo.).

Plants 300–450 mm high, forming tufts. *Stem* usually unbranched, lightly compressed, bearing several sessile



Distribution of ***Aristea biflora***.

lateral flower clusters. *Leaves* several, mostly basal, linear, mostly 3–5 mm wide, firm and leathery. *Flower clusters* several, each (1)2- to 4-flowered; spathes greenish with translucent margins, 20–28 mm long, bracts dry-membranous, shorter than spathes. *Flowers* on pedicels 7–10 mm long, large, blue to pale mauve, outer tepals with transparent to translucent, light brown windows on lower margins; tepals 25–30 mm long, outer ± obliquely obovate, inner ± fiddle-shaped, slightly larger than outer. *Filaments* 5–6 mm long; anthers 7–8 mm long. *Ovary* cylindric-trigonous, 8–12 mm long; style 12–16 mm long, stigma lobes broad, spreading, deeply fringed. *Capsules* elongate, woody, indehiscent, deeply 3-lobed, 35–50 mm long. *Seeds* triangular-columnar, many per locule, arranged in a single vertical row. *Flowering time*: mainly late August and September.

Distribution and ecology: a narrow endemic of the Caledon District of Western Cape, South Africa, known only from the lower southern slopes of Caledon Swartberg and adjacent low hills; in loamy clay in transitional fynbos–renosterveld, flowering best after fire. Its narrow range in prime agricultural land leaves it endangered and it survives today in a few isolated sites.

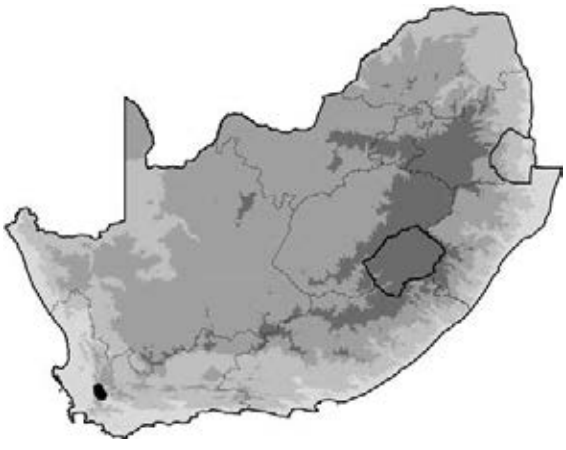
Diagnosis: one of the most striking species in the genus, *Aristea biflora* is readily recognised by the large, pale blue to mauve flowers 50–60 mm diam. with the outer tepals asymmetric about the midline and each with a pair of transparent to slightly bronzed windows near the base. Seen from above the windows appear dark green or brown depending on lighting. Like most other members of the subgenus the flowers open in midmorning and last till sunset, sometimes even opening again the following day, when they appear flaccid and partly wilted.

26. **Aristea nigrescens** *J.C.Manning & Goldblatt* in Bothalia 37: 189 (2007). Type: South Africa, Western Cape, Wolseley, Farm Romansrivier, southwestern slopes of hill above dam behind farmhouse, in rocky alluvium, 2 Sept. 2006, *J. Manning 3054* (NBG, holo.; K, MO, iso.).

Plants mostly 250–400 mm high, in small clumps. *Stem* angled to slightly winged, bearing 2 or 3 short, reduced leaves, unbranched, rarely with one sessile lateral flower cluster. *Leaves* in a basal fan, linear, ⅓ to ± ½ as long as stem, loosely twisted, 3–5 mm wide. *Flower clusters* 4- to 6-flowered; spathes broadly lanceolate, acute, green at base, dry and papery brown in distal ⅔ with paler margins, sometimes irregularly torn, (10–)12–15 mm long; bracts entirely dry and papery, 5–7 mm long. *Flowers* on pedicels ± 1.5 mm long, upright, white or pale to mid-blue but paler in centre, outer tepals partially glossy black on reverse; tepals spreading, obliquely obovate-spathulate, subequal or inner slightly broader, (20–)25–25 × 13–14 mm. *Filaments* suberect, 5–7 mm long, white to pale blue; anthers 6–7 mm long, yellow; pollen yellow. *Ovary* cylindric, ± 10 mm long, elongating rapidly after fertilization; style 12–15 mm long; stigma lobes broad, deeply fringed, 1.5–2.5 mm long. *Capsules* on pedicels up to 12 mm long, cylindric, 3-lobed in section, 40–50 mm long. *Seeds* numerous per locule, triangular-columnar, base and apex truncate, papillate along angles, apex and base, obscurely alveolate on faces, reddish brown. *Flowering time*: late August to mid-September; opening midmorning ± 10:00 and fading in afternoon ± 17:00.

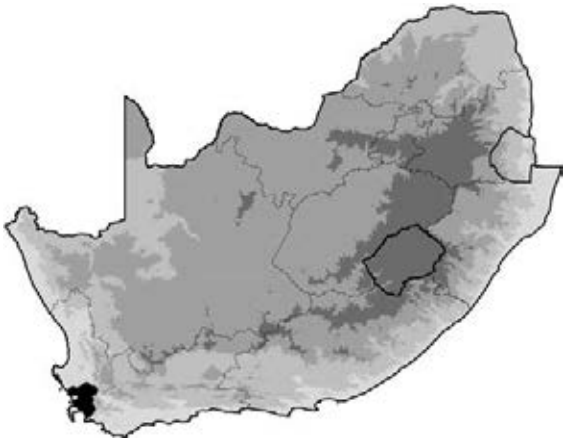
Distribution and ecology: a highly local endemic known from two sites along the foot of the Waaihoek Mtns overlooking the Breede River south of Wolseley in Western Cape, South Africa; on ferricrete or sandstone alluvium overlying Malmesbury shale in transitional fynbos–renosterveld. Its range is largely lost to agriculture and the species is highly endangered.

Diagnosis: *Aristea nigrescens* is characterised by unbranched stems usually with a solitary, terminal flower cluster, rarely with a sessile lateral flower cluster in the axil of the upper stem leaf. The large, white or blue flowers lack dark markings, but the undersides of the outer tepals are flushed blackish and the buds thus appear dark. Most plants at the type locality, Romansrivier Farm near Wolseley, have pale blue flowers, but flower colour varies through the population from white to mid-blue; at its second known site all plants were white-flowered.



Distribution of ***Aristea nigrescens***.

In its unbranched stems and broad, rather blunt rhipidial spathes the species resembles *A. lugens*, and it is likely that the two are closely allied. *Aristea lugens* is distinguished by its strongly dimorphic tepals, the outer about half as long as the inner, dark brown or black over most of the surface, and strongly incurved, exposing both upper and lower surfaces. Thus *A. lugens*, like *A. nigrescens*, utilises the underside of the tepals for pollinator attraction but, unlike the latter, only in the mature flower and not in bud. Other species in subg. *Pseudaristea* typically have branched stems or at least several lateral flower clusters, and smaller, acute or acuminate rhipidial spathes that are ± entirely leathery and green. Pollen grains, as in other species of subg. *Pseudaristea,* are dizonasulculate with reticulate exine. Like *A. lugens*, the species is adapted to pollination by hopliine beetles (Manning & Goldblatt 2007).



Distribution of ***Aristea lugens***.

27. **Aristea lugens** *(L.f.) Steud.,* Nomenclator botanicus, edn. 2, 1: 130 (1840); Weim.: 56 (1940). *Moraea lugens* L.f.: 99 (1782). *Cleanthe lugens* (L.f.) Asch. & Graebn.: 534 (1906). Type: South Africa, without precise locality [reported as from Paarl, Paardeberg, and near Riebeek Kasteel], Sept.–Oct., *C.P. Thunberg s.n* [LINN 62.1, lecto., designated here (one of two sheets in LINN said by Weimarck to be spec. orig., the other LINN 62.2 '*Moraea lugens*')].

Moraea melaleuca Thunb.: 5 (1787), illegitimate superfluous name for *M. lugens* L.f. *Aristea melaleuca* Ker Gawl.: 236 (1804) & t. 1277 (1810), illegitimate superfluous name. *Sisyrinchium melaleucum* Eckl.: 16 (1827). *Cleanthe melaleuca* Salisb. ex Pax in Engler & Prantl: 152 (Mar. 1888), as a new name for *M. melaleuca*. Type: South Africa, [Western Cape], as 'Paarl, Paardeberg, and near Riebeek Kasteel,' Sept.–Oct., *C.P. Thunberg s.n* (UPS–THUNB 1224 '*Moraea melaleuca B*', lecto., designated here).

[*Cleanthe bicolor* Salisb.: 312 (1812), invalid name without description.]

[*Sisyrinchium inundatum* Eckl.: 16 (1827), invalid name without description.]

Plants 300–500 mm high, in loose colonies. *Stem* flattened and winged below, slightly angled above, unbranched, sometimes with 1(2) sessile lateral flower clusters. *Leaves* mostly ± half as long as stem, falcate, 3–6 mm wide, soft-textured. *Flower clusters* 2- or 3-flowered; spathes green with translucent margins, 23–26 mm long, bracts dry-membranous, shorter than the spathes. *Flowers* on pedicels 12–18 mm long, inner tepals pale blue to whitish, outer tepals ± erect in upper half, dark blue-black or brownish; outer tepals 16–20(–25) × 10–15 mm, inner spreading, 28–45 × 28–32 mm. *Filaments* 5–7 mm long; anthers 6–9 mm long. *Ovary* elongate-trigonous, 15–22 mm long; style 12–15 mm long, stigma lobes spreading, deeply fringed. *Capsules* on pedicels up to 20 mm long, woody, indehiscent, cylindric, deeply 3-lobed, 38–45(–65) mm long. *Seeds* triangular-columnar, many per locule in a single vertical row. *Flowering time*: September and October; lasting 2 or 3 days.

Distribution and ecology: local in Western Cape, South Africa, from Riebeek Kasteel and Malmesbury to Stellenbosch; on low granitic hills in renosterveld or transitional fynbos.

Diagnosis: unmistakable in the genus, *Aristea lugens* has upright, predominantly white to blue flowers with the small outer tepals dark brown or black on both surfaces. The inner tepals are obovate and outspread, and the outer tepals, ± half as long as the inner, are suberect and curved inward distally. Plants grow in sparse colonies, spreading by rhizomes, thus unlike the usual solitary or tufted habit of other species. *Aristea lugens* has the dizonasulculate pollen grains and elongate, tardily dehiscent capsules typical of subg. *Pseudaristea*, and like most other species of the subgenus, the flowers are adapted for pollination by hopliine beetles (Goldblatt & Manning, 1996, 1997).

Subg. 3. **Aristea**

Flowers deep blue, always fugaceous, lasting one morning. *Capsules* usually about as short as wide (rarely longer than wide), with narrow, radial wings or deeply 3-lobed (sect. *Singulares*). *Seeds* tangentially compressed, less so in *A. singularis*. *Pollen grains* mostly monosulcate, zonasulculate in 1 sp. or trisulcate (sect. *Aristea*), with smooth aperture, exine reticulate.

Species 19: restricted to the Southern African winter-rainfall region.

Sect. 4. **Racemosae** *Weim.* in Acta Universitatis Lundensis, ser. 2, 36(1): 70 (1940). Type: *Aristea racemosa* Baker

Flowers with style minutely notched at apex. *Capsules* always with 3 narrow radial wings. *Seeds* radially compressed, lamellate, ± kidney-shaped with margins smooth or fringed with papillae. *Pollen grains* monosulcate, but zonasulculate in 1 sp.

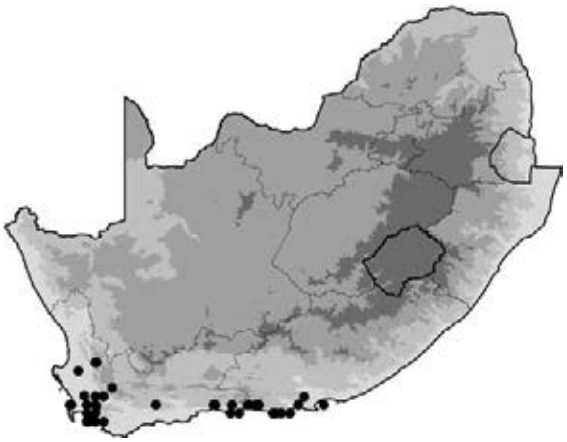
Species 11: Cape Flora region from the Bokkeveld Mtns to Uitenhage.

28. **Aristea bakeri** *Klatt* in Th.Durand & H.Schinz, Conspectus florae africae 5: 169 (1894), as a new name for *A. paniculata* Baker: 144 (Sept. 1892), illegitimate homonym, not *A. paniculata* Pax (Apr. 1892) [= *A. ecklonii* Baker]. Type: South Africa, [Western Cape], Galgebosch, near Van Staden's River, Dec. 1872, *P. MacOwan 2077* (K, holo.; GRA, SAM, iso.).

Aristea macrocarpa G.J.Lewis in Weim.: 74 (1940); Lewis: t. 1084 (1950b). Type: South Africa, [Western Cape], Cape Peninsula, Kirstenbosch, Nov. 1935, *G.J. Lewis s.n. BOL21665* (BOL, holo.).

Aristea confusa Goldblatt in Goldblatt & Barnard: 308 (1970). Type: South Africa, [Western Cape], Palmiet River Mtns, 30 Dec. 1923, *T.P. Stokoe s.n. BOL17518* (BOL, holo.).

Plants mostly 0.9–1.5 m high. *Stems* rounded in section, usually much branched, branches ascending, with few sessile lateral flower clusters. *Leaves* narrowly sword-shaped, broad, mostly 10–14(–25) mm wide, leathery and fibrous. *Flower clusters* many, mostly stalked, each mostly 4- or 5-flowered; spathes boat-shaped, mostly 9–15 mm long, dry, rust-brown with broad, pale transparent margins, minutely hairy or scabrid outside or glabrous. *Flowers* blue, upright to half nodding; tepals obovate, 16–20 × 6–8 mm. *Filaments* 7–8 mm long; anthers 4–5 mm long. *Ovary* obovoid, 3-lobed; style 8–10 mm long, apex minutely 3-notched. *Capsules* oblong in outline, 3-winged, 14–25(–30) mm long. *Seeds* lamellate, kidney-shaped, ± 3.0–3.5 mm long, mostly 2 or 3, rarely up to 5, per locule, margins papillate. *Flowering time*: mainly October to December.



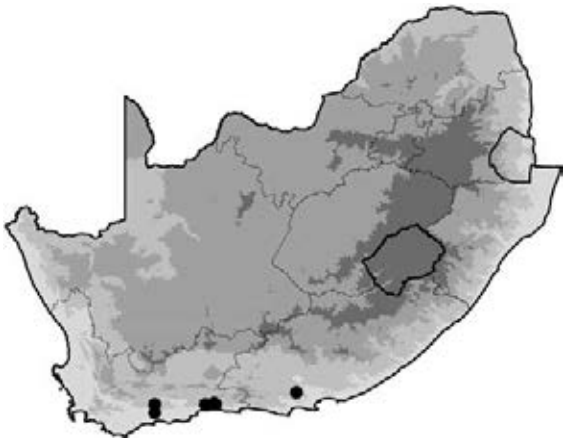
Distribution of ***Aristea bakeri***.

Distribution and ecology: widespread in winter rainfall South Africa, extending from Piketberg and the Cape Peninsula in Western Cape to Port Elizabeth in Eastern Cape; on stony sandstone or clay loam slopes, from near sea level to 1 500 m, flowering well only after fire.

Diagnosis: the interpretation of *Aristea bakeri* (also called *A. capitata* in earlier accounts) has varied in the past, but the species is recognised by its robust habit with a relatively open, branched flowering stem bearing relatively large flowers with tepals up to 20 mm long, and most significantly, elongate capsules 15–25(–30) mm long, thus oblong in outline but with broad, narrow vertical wings. The capsules contain 2 or 3 (occasionally more) flat seeds per locule, each seed always with a fringe of papillae along the margins. The inflorescence spathes and bracts are dry, papery and rust-brown and usually minutely hairy to scabrid on the abaxial (outer) surfaces. *Aristea macrocarpa* G.J.Lewis (Weimarck, 1940) from the Cape Peninsula and nearby was distinguished by the particularly long capsules 20–35 mm long and rough, somewhat bristly spathes but is now included in *A. bakeri*, populations of which nearly always have bristly to scabrid spathes and capsules up to 25 mm long across its entire range.

29. **Aristea rufobracteata** *Goldblatt & J.C.Manning* in Bothalia 45: 132 (2015). Type: South Africa, Western Cape, George, below the power station, 5 Nov. 1928, *J.B. Gillett 2096* (NBG, holo.).

Plants 0.8–1.0 m high, solitary or growing in clumps. *Stem* rounded in section, with suberect branches borne at lower fertile nodes, lateral flower clusters sessile, branches short, crowded. *Leaves* several, linear, 7–14 mm wide, firm and fibrous. *Flower clusters* many, crowded, those below the terminal mostly sessile but lower nodes with short to long branches, each mostly 2- to 4-flowered; spathes and bracts rusty brown, 8–10 mm long, thinner and somewhat translucent near the edges, glabrous, becoming slightly crinkled and torn with age. *Flowers* subsessile, blue; tepals obovate, ± 15 mm long. *Filaments* ± 4 mm long; anthers ± 4.5 mm long. *Ovary* 3-lobed; style ± 7 mm long, minutely 3-notched. *Capsules* oblong in outline, narrowly 3-winged, 11–14 mm long. *Seeds* lamellate, kidney-shaped, mostly 2 per locule, margins papillate. *Flowering time*: mainly November and December, sometimes in October.



Distribution of ***Aristea rufobracteata***.

Distribution and ecology: South Africa, from the Langeberg near Grootvadersbosch and Riversdale to the Outeniqua Mtns in Western Cape, to Loerie in Eastern Cape; on stony sandstone slopes, especially common after fire.

Diagnosis: the southern coastal *Aristea rufobracteata* is broadly similar to *A. capitata* from the southwestern parts of Western Cape in the columnar and relatively dense flowering axis with fairly short branches and sessile flower clusters but is readily distinguished by the rusty brown spathes and floral bracts that are thinner and slightly paler toward the margins, unlike those of *A. capitata*, which are pale and silvery-translucent with a dark brown central keel extending upward as an attenuate, cusp-like tip.

Aristea bakeri, also with rust-coloured bracts, is sometimes confused with *A. rufobracteata*, but the bracts in the former always have pale, more-or-less semi-transparent margins and are in addition usually minutely hairy to scabrid beneath. Both species occur at Loerie and near George. Capsules, particularly important in distinguishing species of sect. *Racemosae*, are not well known for *A. rufobracteata*, but two collections in early fruit and one with mature fruit have capsules 11–14 mm long, shorter than most collections of *A. bakeri*, which are typically 18–30 mm long. The seeds are lamellate and kidney-shaped with the margins of brown papillae, thus like those of *A. bakeri* and its allies, *A. juncifolia* and *A. racemosa*, whereas the seed margins of *A. capitata* are smooth.

Weimarck's (1940) circumscription of *Aristea capitata* included several collections from the George and Knysna Districts of southern Western Cape now referred to *A. rufobracteata* plus a few poorly preserved specimens from the southwestern corner of the province that are *A. bakeri.* The name *A. capitata* is now reserved for plants from the Cape Peninsula and nearby, also called either *A. major* or *A. thyrsiflora* in the past. Plants illustrated in *Curtis's Botanical Magazine* (Ker Gawler, 1802) as *A. capitata* are almost certainly *A. rufobracteata.*

30. **Aristea capitata** *(L.) Ker-Gawl.* in Curtis's Botanical Magazine 17: t. 605 (1802) [excluding illustration]. *Gladiolus capitatus* L.: 37 (1753). Type: South Africa [Western Cape], foot of Du Toit's Kloof, 15 Oct. 1949, *W.F. Barker 6075* (NBG, neo., designated by Goldblatt et al.: 191 (2002); K, MO, PRE, iso.).

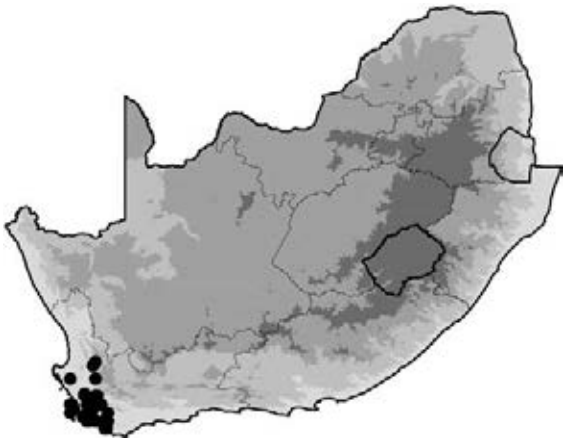
Aristea major Andrews: t. 160 (1801). *A. spicata* Pers.: 41 (1805), illegitimate superfluous name for *A. major*. Type: South Africa, without precise locality or collector, illustration in Andrews: t. 160 (1801).

[*Aristea thyrsiflora* sensu N.E.Br.: 36 (1929, misapplied to *A. capitata*); Weim.: 75 (1940): basionym *Ixia thyrsiflora* D.Delaroche: 20 (1766) probably not *A. capitata* but type unknown: the so-called type in Herb. Burman does not match the protologue, which is not adequate for identification of the species.]

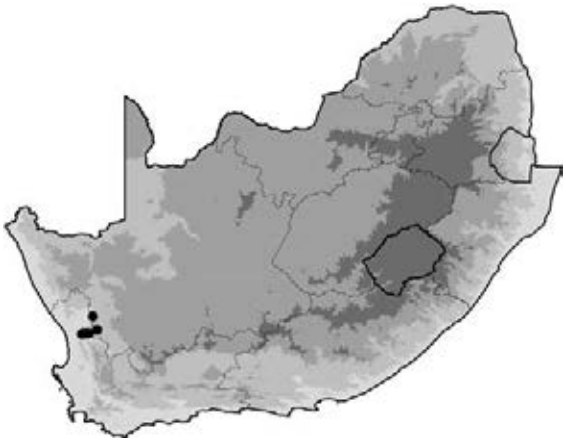
Plants up to 1.5 m high, usually forming clumps. *Stems* ± terete, bearing crowded, short branches above. *Leaves* linear, strap-like, broad, ± half as long as stem, mostly 10–15 mm wide, fibrous. *Flower clusters* numerous, borne on short branches or sessile, crowded in upper part of stem, each 4- to 6-flowered; spathes and bracts 5–10 mm long, lanceolate, dry-membranous, translucent with dark keels. *Flowers* nodding, blue (pale pink in some cultivated forms), greenish yellow in throat; tepals 14–16 mm long. *Filaments* ± 6 mm long; anthers 4–5 mm long. *Style* 10–12 mm long, minutely 3-notched at apex. *Capsules* short, narrowly 3-winged, 8–12 mm long. *Seeds* lamellate, kidney-shaped, mostly 2 per locule, ± 4 × 2.5 mm, margins smooth. *Flowering time*: October to December.

Distribution and ecology: South Africa, Western Cape, extending from the Piketberg and the upper Olifants River Valley to the Klein River and Riviersonderend Mtns, especially common on the Cape Peninsula; mainly mountain slopes on sandstone- or granite-derived soils, at 100–1 200 m elevation, often on cooler or damper slopes.

Diagnosis: the tall, robust *Aristea capitata* with flowering stems up to 1.5 m high and bearing a crowded compound inflorescence of hundreds of flowers is one of the most easily recognised members of the genus. The spathes are also distinctive, being dry-membranous, lanceolate, and translucent with narrow, dark keels extending upward as a short cusp. The relatively short, narrowly winged capsules are 8–12 mm long and contain one or two lamellate seeds per locule that are unusual in sect. *Racemosae* in having smooth rather than papillate margins. The distinctive spathes, together with the compact, columnar and crowded compound inflorescence, make *A. capitata* unlikely to be confused with other species except for the eastern Langeberg and Outeniqua Mountain species, *A. rufobracteata*, which has a similar habit although often a somewhat less compact arrangement of flower clusters but uniformly rust-coloured rhipidial spathes.



Distribution of ***Aristea capitata***.



Distribution of ***Aristea inaequalis***.

This species has been variously known under the names *A. capitata*, based on the mysterious *Gladiolus capitatus* L. (1753), *A. major*, and *A. thyrsiflora*, a combination based on D. Delaroche's *Ixia thyrsiflora*, which, like *G. capitatus*, is of uncertain identity and lacks a known type specimen or illustration. *Aristea major* (Andrews, 1801) is clearly this species and a neotype has been designated for *G. capitatus* fixing the application of the name. The plant illustrated in Curtis's Botanical Magazine where Ker-Gawler (1802) made the combination, *A. capitata*, has the large, rust-brown spathes and bracts of the allied *A. rufobracteata* and is evidently the earliest record of that species.

Aristea capitata is one of the few species of *Aristea* suitable for cultivation and is a common sight in Cape Town gardens and street plantings. It appears to be easy to grow and rewarding in its generous display of brilliant blue flowers in October and November. A form with pale pink flowers is also in cultivation.

31. **Aristea inaequalis** *Goldblatt & J.C.Manning* in Novon 7: 357 (1997b). Type: South Africa, Western Cape, rocky sandstone plateau at the top of Gifberg Pass, 3 Oct. 1996, *P. Goldblatt & J.C. Manning 10561* (NBG, holo.; K, MO, iso.).

Plants 1.0–1.5 m high. *Stems* ± terete, with long spreading branches, bearing several to many sessile and stalked flower clusters. *Leaves* several, linear, glaucous, with acute, often reddish margins, 4–5 mm wide, fibrous. *Flower clusters* numerous, stalked or sessile, laxly spaced, each usually 4-flowered; spathes lanceolate, 8–10 mm long, dry-membranous and translucent, with dark keels extending as a long cusp, bracts similar but 6–8 mm long. *Flowers* blue, secund, subsessile, tepals 14–16 mm long. *Stamens* unequal; lower (abaxial) filament 8 mm long, upper (adaxial) two filaments ± 6 mm long; anthers ± 3 mm long. *Ovary* obovoid, 3-lobed, ± 4 mm long; style 9–10 mm long, minutely 3-notched at apex. *Capsules* short, broadly 3-winged, 7–8 mm long. *Seeds* radially compressed, lamellate, kidney-shaped, ± 4 × 2.5 mm, margins smooth. *Flowering time*: October to November.

Distribution and ecology: restricted to the western coastal mountains, from the Bokkeveld Mtns of Northern Cape as far south as Pakhuis Pass in the northern Cederberg in Western Cape, South Africa; on sandstone outcrops, often in seasonal seeps and locally wet sites.

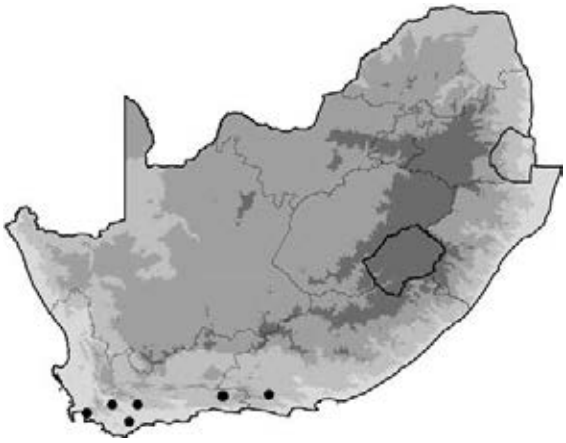
Diagnosis: the half-nodding, dark blue flowers of *Aristea inaequalis* are unique in the genus in having unequal stamens, the lower filament being ± 2 mm longer than the other two. The species is also distinctive in the laxly branched flowering stem, the branches bearing shortly stalked and sessile flower clusters. Apart from the unequal stamens the flowers are typical of sect. *Racemosae* in size, shape and colour. The inflorescence spathes and bracts are lanceolate, tapering to a narrow cuspidate apex, and have broad transparent margins with a dark brown central keel very much like those of *A. capitata*. On this basis the two are considered to be related although they are otherwise very different in appearance, *A. capitata* having flowered clusters crowded together in short branches forming a dense, compact, compound inflorescence. Molecular phylogenetic studies place *A. inaequalis* close to *A. bracteata*, but that species has quite different, broadly ovate, rust-brown spathes and bracts that are thinly hairy to scabrid.

32. **Aristea cuspidata** *Schinz* in Bulletin of Miscellaneous Information Kew 1906: 25 (1906); Weim.: 83 (1940). Type: South Africa, [Western Cape], Caledon District, Leoskraal, Oct. 1894, *Penther 555* (K, lecto., effectively designated by Weim.: 83 (1940); S, isolecto.).

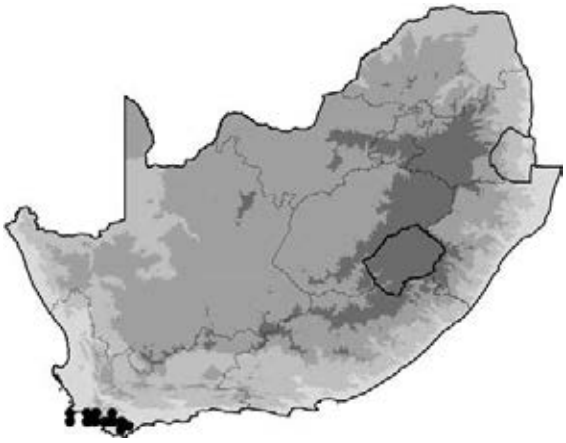
Aristea intermedia Eckl. ex Klatt: 549 (1865–66). Type: South Africa, [Western Cape], several syntypes listed, none designated as lectotype.

[*Aristea bracteata* Eckl.: 16 (1827), invalid name without description.]

[*Aristea intermedia* Eckl.: 16 (1827), invalid name without description.]



Distribution of ***Aristea cuspidata***.



Distribution of ***Aristea juncifolia***.

Plants (150–)300–600 mm high. *Stem* lightly compressed above, often partly sheathed by large cauline bracts 50–80 mm long; lower flower clusters subtended by narrow, almost linear to narrowly lanceolate bracts 12–20 mm long. *Leaves* linear, fairly narrow, mostly 3–5 mm wide, with translucent or reddish, acute margins. *Flower clusters* up to 7, sessile except terminal, or lower 1 or 2 shortly stalked, each 4-flowered; spathes boat-shaped, rust-brown with broad transparent margins, (7–)10–14 mm long, sometimes sparsely and obscurely scabrid, bracts similar but often narrower. *Flowers* dark blue, green in the throat; tepals obovate, 14–18 × 8–10 mm. *Filaments* 5–6 mm long; anthers initially ± 4 mm long. *Ovary* obovoid, 3-lobed, 4–6 mm long; style 6–7 mm long, minutely 3-notched apically. *Capsules* narrowly 3-winged, mostly 14–18 mm long. *Seeds* unknown. *Flowering time*: mainly October and November.

Distribution and ecology: relatively widespread in the Western Cape, South Africa, extending from the Cape Peninsula to Plettenberg Bay and in the Swartberg; on stony sandstone slopes, flowering well after fire.

Diagnosis: one of the smaller species of sect. *Racemosae*, *Aristea cuspidata* is recognised by the comparatively slender, usually unbranched stem bearing several sessile flower clusters or the lower clusters sometimes on short stalks, with relatively prominent spathes, initially green but soon turning rust-brown. The spathes and bracts are usually rough and minutely scabrid. The flowers are typical of the section in their deep blue colour and fairly large size.

33. **Aristea juncifolia** *Baker* in Journal of Botany, British and foreign 14: 267 (1876); Weim.: 88 (1940). Type: South Africa, [Western Cape], without precise locality or date, *J. Grey s.n.* [K, lecto., effectively designated by Weim.: 88 (1940)].

Plants 120–350 mm high, usually forming small tufts. *Stem* terete, usually unbranched or with 1 or 2 short branches, bearing sessile flower clusters. *Leaves* several, in a basal fan, centric, without defined margins, elliptic to subterete in section, mostly 1.5–3.0 mm wide, often somewhat twisted, relatively thick, tough and fibrous. *Flower clusters* few, sessile below the terminal, or lower on short stalks, subtended by prominent rust-coloured, keeled bracts, each 2- to 4-flowered; spathes and bracts rust-brown, becoming transparent toward the edges, the spathes 12–18 mm long, folded in the midline and keeled. *Flowers* deep blue, tepals 16–20 × ± 12–14 mm. *Filaments* 6–7 mm long; anthers ± 3 mm long. *Ovary* obovoid, 3-lobed; style 8–10 mm long, minutely 3-notched apically. *Capsules* oblong in outline, 3-winged, 15–25 mm long. *Seeds* radially compressed, lamellate, kidney-shaped, mostly 2 per locule, with fringe of marginal papillae. *Flowering time*: November to December.

Distribution and ecology: restricted to southern coastal Western Cape, South Africa, from the Cape Peninsula to the Klein River Mtns near Stanford; on slopes and coastal flats in sandy or stony ground, usually in wet or marshy places, flowering well only after fire.

Diagnosis: one of three similar dwarf species of sect. *Racemosae*, *Aristea juncifolia* rarely reaches 300 mm in height and has terete, mostly unbranched stems and relatively large, boat-shaped, rhipidial spathes 12–18 mm long, green with broad transparent margins. The rigid, somewhat twisted leaves are elliptic or nearly round in section and without true margins. Related *A. racemosa* typically has rigid, terete, usually straight leaves rarely exceeding 1.5 mm diam., and somewhat shorter spathes, ± 10 mm long. The third species in the group, *A. cuspidata*, has plane leaves 3–5 mm wide, with hyaline, lightly thickened, acute margins, and the bracts subtending the lower flower clusters are often conspicuously cuspidate, the apex tapering to a filiform point.

34. **Aristea bracteata** *Pers.*, Synopsis plantarum 1: 41 (1805), as a new name for *Moraea caerulea* Thunb.: no. 15 (1787), possibly illegitimate and superfluous name for *Gladiolus capitatus* L. (1753) cited but not unambiguously excluded; Lewis: t. 1083 (1950a) [as *A. coerulea*];

Goldblatt et al.: 192 (2002). *A. caerulea* Vahl: 124 (1805), superfluous name for *G. capitatus* L. (1753). *Aristea monticola* Goldblatt: 234 (1971), as a new name for *M. caerulea* Thunb. Type: South Africa, without precise locality or date, *Thunberg s.n.* [UPS–THUNB '*M. caerulea* α', lecto., effectively designated by Weimarck: 71 (1940)]. [Of the two localities mentioned for the species by Thunberg, 'hills around the Cape,' probably applies to the lectotype; the other 'between the Outeniqua Mtns and the Langkloof [Long Kloof]' is out of range for the species].

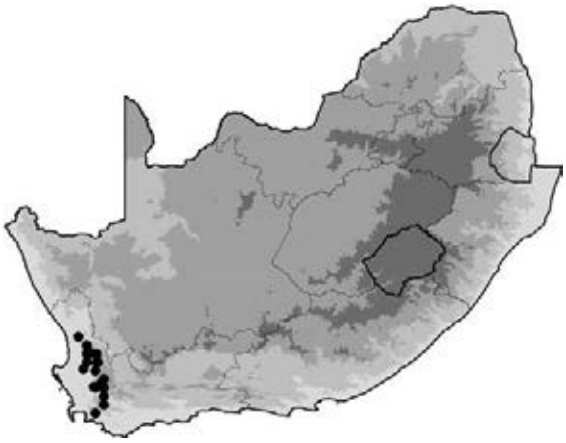
Aristea caerulea var. *elongata* Weim.: 73 (1940). Type: South Africa, [Western Cape], Saron, Sept. 1919, *L. Bolus s.n.* (BOL, K, syn.).

Aristea caerulea var. *robusta* Weim.: 74 (1940). Type: South Africa, [Western Cape], without precise locality, Oct. 1915, *Marloth 7173* (PRE, holo.)

Plants 600–1 300 mm high. *Stem* subterete, often much branched, branches short, also bearing sessile or subsessile lateral flower clusters. *Leaves* linear to sword-shaped, often fairly broad, 3–6 mm wide, leathery and fibrous. *Flower clusters* several to many, those below terminal usually sessile, mostly 5- or 6-flowered; spathes and bracts ovate, spoon-shaped, dry-membranous, rust-coloured, becoming translucent on margins, bracts often entirely transparent, (10–)12–16(–18) mm long, sparsely hairy or scabrid, bracts often slightly exceeding spathes. *Flowers* on pedicels ± 1.5 mm long, blue, greenish in throat; tepals obovate, 18–20(–25) mm long. *Filaments* ± 6 mm long; anthers 4–5 mm long. *Ovary* ± obconic, 3-lobed, ± 3.5 mm long; style ± 12 mm long, minutely 3-notched at apex. *Capsules* on pedicels up to 3 mm long, short, 3-winged, mostly 8–10 mm long, *Seeds* radially compressed, irregularly 4-sided, 2 to 4 per locule, surface cells domed, margins smooth or papillate. *Flowering time*: mainly September to November.

Distribution and ecology: restricted to the western half of Western Cape, South Africa, from the Olifants River Mtns and Cederberg south to the Piketberg, Michell's Pass and Du Toit's Kloof; on stony sandstone slopes, at 300–1 000 m elevation, especially conspicuous after fire but also flowering in mature vegetation.

Diagnosis: *Aristea bracteata* is readily recognised by the relatively large flower clusters enclosed by large, more-or-less dry, firm-textured, ovate, spoon-shaped spathes 10–18 mm long. Both the spathes and floral bracts are minutely hairy, papillate or scabrid, a feature shared with *A. rupicola* and many populations of *A. bakeri*. *Aristea bracteata* has relatively narrow, firm-textured leaves with conspicuous, acute, transparent to reddish margins (a distinctive feature shared with *A. inaequalis*). As in most of the tall species of sect. *Racemosae*, there is considerable variation in the branching pattern. Most commonly, the flowering stem has relatively long lateral branches, and one or more of the upper flower clusters on each branch is sessile. Var. *elongata* represents a plant



Distribution of ***Aristea bracteata***.

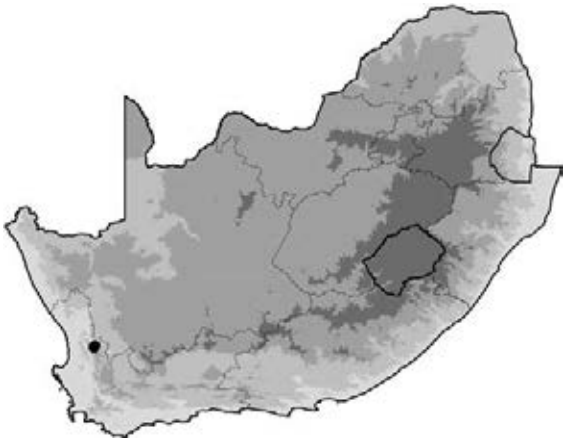
with short lateral branches and an elongate main axis while var. *robusta* resembles var. *elongata* but is larger in most features. Floral bracts of var. *elongata* are especially long, 15–18 mm, where the normal range is 12–16 mm. There seems to be no need to formally recognise these local variants as they intergrade, sometimes even within the same populations.

Seeds of *Aristea bracteata* as circumscribed here vary from those with smooth margins in the north of its range to those with papillate margins from the south. The significance of this variation remains to be investigated.

A confused taxonomic history surrounds this fairly common Western Cape species. C.P. Thunberg associated *Gladiolus capitatus* L. with his *Moraea caerulea* Thunb. (1787), with the caveat 'vid. differt. nostr. tab. 1' [different from the plant shown in our figure 1]. Nomenclaturally *M. caerulea* has been interpreted as superfluous and thus an illegitimate name, as is the name *A. caerulea* Vahl. The substitute name *A. monticola* was proposed for the species by Goldblatt (1971), who was then unaware that the name *A. bracteata* Pers. (1805) was available for it. Persoon (1805) actually renamed Thunberg's *Moraea caerulea* when he placed the species in *Aristea*, normally an unacceptable action. Happily, in hindsight, this provided a legitimate name for Thunberg's plant, although one that was overlooked for almost 200 years.

35. **Aristea rupicola** *Goldblatt & J.C.Manning* in Novon 7: 360 (1997b). Type: South Africa, Western Cape, track to Heuningvlei, on sandstone outcrops and low cliffs, 19 Dec. 1995, *P. Goldblatt 10446* (NBG, holo.; K, MO, PRE, iso.).

Plants mostly 180–400 mm high. *Stems* broadly elliptic in section, divaricately 2- to several-branched, terete above first branch. *Leaves* several in a tight fan, linear, narrow, ± ⅔ as long as stem, sometimes longer, 3–4 mm wide, leathery and fibrotic, margins acute, hyaline. *Flower clusters* several, usually all stalked, (2)5- or 6-flowered;



Distribution of ***Aristea rupicola***.

spathes and bracts ovate, spathes 6–7 mm long, bracts 7–8 mm long, rust-coloured, translucent toward edges, flecked with brown, sparsely hairy to scabrid. *Flowers* on pedicels ± 1 mm long, blue, yellow in throat edged darker blue; tepals obovate, 8–14 × 5–9 mm. *Filaments* ± 4 mm long; anthers ± 3 mm long. *Ovary* ± obconic in outline, 3-lobed, ± 3.5 mm long; style ± 8 mm long, apex minutely 3-notched. *Capsules* broadly 3-lobed (to ± winged), ± 7 mm long. *Seeds* radially compressed, irregularly 4-sided, (1)2 per locule, surface cells colliculate. *Flowering time*: late October to mid-December.

Distribution and ecology: a narrow endemic of the northern Cederberg in Western Cape, South Africa; on sandstone outcrops and cliffs, at ± 1 000 m elevation, flowering well after fire but also at other times.

Diagnosis: *Aristea rupicola* is distinguished by its low stature, dichotomous branching pattern, and prominently 3-lobed to -winged capsules, which place the species in sect. *Racemosae*. Consistent with the section, the style is minutely 3-notched and the pollen grains are monosulcate. The species is mostly closely allied to *A. bracteata* with which it shares shortly hairy to scabrid spathes and bracts, ± dichotomous branching (not always in *A. bracteata*), and laterally compressed, somewhat irregularly shaped, colliculate seeds. *Aristea rupicola* is a small plant, rarely exceeding 350 mm in height, with spathes 6–7 mm long, and floral bracts 7–8 mm long. All the flower clusters are normally carried on short branches and are therefore stalked, whereas taller *A. bracteata*, which may reach 1.3 m in height, has some of the flower clusters sessile, and the spathes (10–)14–18 mm long. Consistent with its smaller size, the capsules of *A. rupicola* are ± 7 mm long, whereas those of *A. bracteata* are typically 8–10 mm long.

36. **Aristea racemosa** *Baker* in Journal of Botany, British and foreign 14: 267 (1876); Weim.: 78 (1940). Type: South Africa, [Western Cape], Genadendal, Baviaanskloof, without date, *W.J. Burchell 7883* [K, lecto., effectively designated by Weim.: 78 (1940)].

Aristea racemosa var. *inflata* Weim.: 80 (1940), new synonym. Type: South Africa, [Western Cape], Steenbras Siding, Nov. 1913, *Kensit s.n. BOL21903* (BOL, holo.).

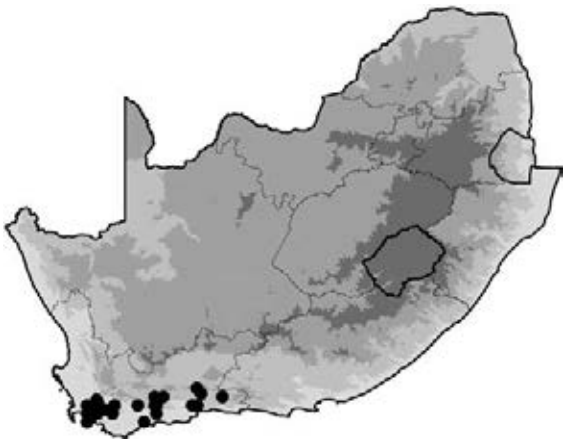
[*Witsenia spicata* E.Mey. ex Baker: 267 (1876), invalid name only in synonymy.]

[*Aristea juncifolia* Eckl.: 16 (1827), invalid name without description.]

Plants up to 400 mm high. *Stems* rounded, usually unbranched, or with 1 or 2 slender branches from lower cauline nodes, these often subtended by large inflated bracts, bearing several sessile lateral flower clusters. *Leaves* several, terete or broadly elliptic in section, 1.5–3.0 mm wide, fibrous, margins rounded, not differentiated. *Flower clusters* several, sessile except the terminal, each 2- to 4-flowered; spathes and bracts dry-membranous, rust-coloured, translucent on the edges, spathes ± 10 mm long. *Flowers* deep blue, ± sessile, tepals 12–16 mm long. *Filaments* ± 5–6 mm long; anthers ± 3.5 mm long. *Style* 6–7 mm long, minutely 3-notched. *Capsules* oblong in outline, narrowly 3-winged, 10–14 mm long. *Seeds* several, lamellate, densely papillate on margins. *Flowering time*: October to December.

Distribution and ecology: endemic to Western Cape, South Africa, extending from the Du Toit's Kloof and Hottentots Holland Mtns to George and the Swartberg; on rocky sandstone slopes, at 200–1 000 m elevation, flowering mainly after fire.

Diagnosis: Aristea racemosa, frequently seen in flower after fire in montane habitats, it is one of a group of three species of sect. *Racemosae* of similar low stature with boat-shaped, rust-brown spathes with broad membranous margins, and sessile rhipidia, the lower sometimes shortly stalked. It is readily recognised in the alliance by the relatively short spathes, inconspicuous bracts subtending the rhipidia, and the stiff, fibrous leaves, terete or elliptic in section without differentiated margins.



Distribution of ***Aristea racemosa***.

37. **Aristea rigidifolia** *G.J.Lewis* in Weim. in Acta Universitatis Lundensis, ser. 2, 36(1): 81 (1940). Type: South Africa, [Western Cape], Cape Peninsula, southwest of Smith's farm, Nov. 1932, *T.M. Salter 2881* (BOL, holo.).

Plants 0.6–1.3 m high, growing singly. *Stems* ± terete to broadly elliptic in section, usually with 1 or 2 short branches, each bearing several sessile lateral flowering clusters; in fruit a new leafy shoot emerging from base. *Leaves* usually ± 4, lower 2 basal, reaching to ± base of flower clusters, centric, elliptic in cross section with rounded margins, 3–5 mm wide, fibrous. *Flower clusters* several, each mostly 5- or 6-flowered; spathes and bracts ovate, rust-coloured, becoming irregularly torn, 3–4 mm long. *Flowers* blue; tepals obovate, 20–25 × ± 15 mm, inner slightly larger than outer. *Filaments* 6–7 mm long; anthers ± 3.5 mm long. *Ovary* obovoid, obscurely 3-lobed; style ± 12 mm long, apex minutely 3-notched. *Capsules* oblong, narrowly 3-winged, (20–)25–33 mm long. *Seeds* lamellate, ± rectangular, up to 12 per locule, ± 3 × 2 mm, surface ± plane, with short- to long-papillate margins. *Flowering time*: October to November.

Distribution and ecology: rare and local, extending from the southern Cape Peninsula to the Klein River Mtns near Hermanus in Western Cape, South Africa; in seeps and marshes on sandy slopes and flats, flowering only after fire.

Diagnosis: allied to the widespread *Aristea bakeri* and often confused with it, *Aristea rigidifolia* is a tall species with a much-branched stem, readily distinguished in having only two basal leaves, the blades narrow, 1.5–3.0 mm wide, and more-or-less elliptic in section with rounded margins of solid green tissue. *Aristea bakeri* has a basal fan of several plane leaves usually 8–12 mm wide, always with acute, translucent margins of thinner texture than the rest of the leaf. The two species have virtually identical floral spathes and bracts that are dry-membranous at flowering time and brown below but with pale, transparent margins. The capsules of *A. rigidifolia* can be distinguished immediately by their larger size, (20–)25–33 mm long with an acute apex, whereas those of *A. bakeri* are (12–)15–25 mm long with a somewhat truncate apex. Capsules of *A. rigidifolia* have up to 12 seeds per locule, unique in sect. *Racemosae*, other species of which have fewer seeds, mostly 2 to 5 per locule. *Aristea bakeri* has no more than 5 seeds per locule even in populations with the largest capsules.

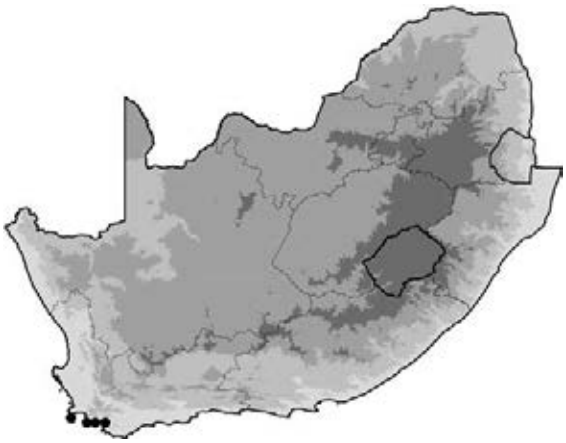
38. **Aristea zeyheri** *Baker*, Handbook of the Irideae 143 (1892); Weim.: 67 (1940); Goldblatt & Manning: 137 (1997a). Type: South Africa, [Western Cape], Hottentots Holland Mtns, western slopes above Grietjiesgat, without date, *Zeyher 4050* (K, holo.; P; iso.).

[*Aristea juncea* Eckl. ex Weim.: 67 (1940), invalid name only in synonymy.]

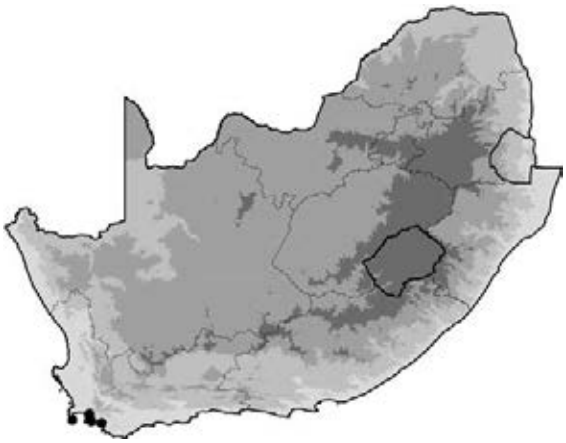
Plants 180–400 mm high. *Stem* terete, slender, unbranched. *Leaves* terete, filiform, lower basal, half as long as stem, upper shorter, ± 1 mm diam. *Flower clusters* 1 or 2(3), sessile except terminal, mostly 2-flowered; spathes dark green with narrow silvery-transparent margins, mostly 20–25 mm long, bracts transparent becoming lacerated. *Flowers* blue, evidently nodding; tepals obovate, 16–18 × 8–10 mm, obtuse to emarginate. *Filaments* 5 mm long; anthers ± 3 mm long. *Ovary* obovoid to subcylindric, 3-lobed, 5–10 mm long; style 3-lobed, lobes lightly fringed. *Capsules* elongate, broadly 3-winged, (16–)22–28 mm long. *Seeds* lamellate, kidney-shaped, ± 3 mm long, with prominently fringed margins. *Flowering time*: November to December.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, from the Cape Peninsula to Hermanus; in seeps and marshes on sandy ground, flowering only after fire.

Diagnosis: *Aristea zeyheri* is distinguished by the slender habit, growing singly (not in tufts as originally



Distribution of ***Aristea rigidifolia***.



Distribution of ***Aristea zeyheri***.

suggested) with an unbranched stem and terete leaves, and broadly lobed, style with fringed stigmatic lobes. The relatively large flowers, up to 35 mm diam., are evidently nodding and unusual in the elongate ovary as well as the fringed stigmatic lobes. Although the two latter features accord with subg. *Pseudaristea*, the winged capsule and lamellate, half-ovate seeds with papillate, fringe-like margins match exactly those of sect. *Racemosae* of subg. *Aristea* and are quite unlike the terete seeds in roundly lobed capsules of sect. *Pseudaristea*. The pollen grains are either monosulcate or zonasulculate in plants from Hermanus and some from the Cape Peninsula, both conditions unlike the dizonasulculate condition in subg. *Pseudaristea*. The monosulcate grains are consistent for sect. *Racemosae*, in which capsules are always broadly winged and the seeds tangentially flattened and usually with fringed margins, and *A. zeyheri* seems best placed here on the basis of current knowledge. The unusual vegetative morphology, lobed stigmas, and the aberrant pollen grains in some plants must then be seen as derived within the section.

Sect. 5. **Singulares** *Weim.* in Acta Universitatis Lundensis, ser. 2, 36(1): 12 (1940). Type: *Aristea singularis* Weim.

Plants forming diffuse tufts with trailing aerial stems rooting at nodes. *Flowering stems* bearing 1 or 2 flower clusters, nodding. *Style* obscurely 3-lobed. *Capsules* obscurely 3-lobed. *Seeds* compressed-ellipsoid with sunken chalaza.

Species 1: northern Cederberg–Pakhuis Mtn complex.

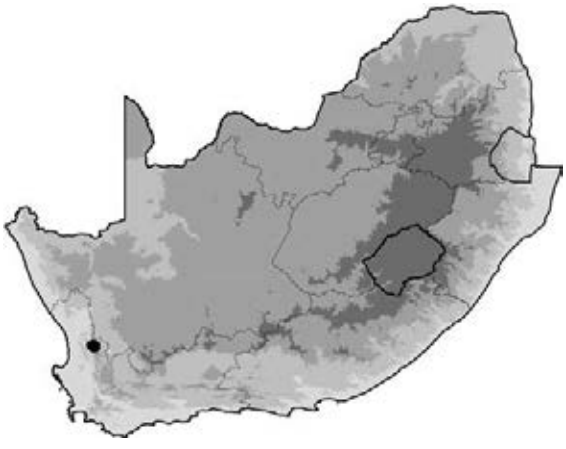
39. **Aristea singularis** *Weim.* in Acta Universitatis Lundensis, ser. 2, 36: 12 (1940); Goldblatt: 142 (1995). Type: South Africa, [Western Cape], Clanwilliam District, Boontjies River, July 1927, *Leipoldt s.n. BOL18888* (BOL holo.; K, iso.).

Plants up to 400 mm high, forming diffuse tufts, somewhat trailing. *Stems* slightly flattened, rooting at aerial nodes, dichotomously branched. *Leaves* sword-shaped, 3–6 mm wide, fairly soft-textured. *Flower clusters* (1)2 per flowering stem, nodding, (1)2-flowered; spathes greenish-translucent becoming dry and torn above, ± 5 mm long, lightly lacerate, bracts similar but smaller. *Flowers* blue, pendent; tepals subequal, elliptic, 12–15 mm long. *Filaments* ± 2.5 mm long; anthers ± 4 mm long. *Style* obscurely 3-lobed. *Capsules* 3-lobed, ± 7 mm long. *Seeds* 1(2) per locule, compressed-ellipsoid, with a deeply sunken chalaza (doughnut-shaped), with funicle forming a pale fleshy body, surface smooth, epidermal cells domed. *Flowering time*: mainly July and August.

Distribution and ecology: restricted to the northern Cederberg and Pakhuis Mtns in Western Cape, South Africa; on sandstone slopes in light shade near streams or in shelter of rocks.

Diagnosis: *Aristea singularis* was mistakenly interpreted by Weimarck (1940), who had only the type collection available to him, as a creeping or even vine-like plant but we now know that it has tufts of leaves at ground level and produces persistent aerial stolon-like stems that root at nodes some distance from the parent plant, a feature unique in *Aristea*, and in a sense it is a trailing plant. The slender flowering stems, produced from leaf clusters, are usually dichotomously branched and bear pendent flower clusters. The immature capsules led Weimarck (1940) to believe they were ovoid-spherical and many-seeded and hence to assume that its closest relationships lay with his sections *Euaristea* (now sect. *Cladocarpae*) and *Ancipites* (both now subg. *Eucapsulares*). A remarkable species in many ways, its affinities seem to be with subg. *Aristea*, some taxa of which also have dichotomously branched flowering stems. The broadly 3-lobed capsules are not exactly like the narrowly 3-winged capsules of subg. *Aristea* and contain only two seeds per locule (or by reduction one). Furthermore, the rounded, ± doughnut-shaped seeds with a depression at the chalazal end are quite unlike the tangentially flattened, lamellate seeds of other members of subg. *Aristea*. The seed funicle is persistent and fleshy, forming an irregularly lobed body that possibly serves as an elaiosome for ants, which would disperse the seeds by carrying them to their nests, later consuming the fleshy tissue.

Pollen grains of *Aristea singularis* are moderate in size for the genus and monosulcate, with a broad, elliptic aperture, the assumed ancestral condition for *Aristea*. Such grains are typical of sect. *Racemosae* of subg. *Aristea* but in other features *A. singularis* exhibits little in common with the section, which includes tall, robust plants with several to many, upright branched



Distribution of ***Aristea singularis***.

stems. In its small size it better resembles sect. *Aristea*, but pollen grains of that section differ in being much larger with complex apertures, typically trisulcate with three confluent apertures (Goldblatt & Le Thomas, 1997; Goldblatt et al., 2004). Preliminary molecular studies show *A. singularis* to be allied to species of sect. *Racemosae*, but its several morphological differences merit placement in its own section. The short stigmatic lobes resemble those of sect. *Racemosae*, in which the style is apically notched, whereas the stigmatic lobes of sect. *Aristea* are broad, fan-like and deeply fringed.

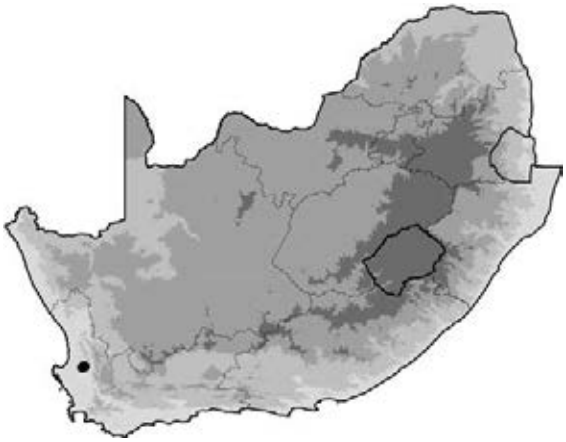
Sect. 6. **Fimbriatae** *Goldblatt & J.C.Manning*, new section. Type: *Aristea fimbriata* Goldblatt & J.C.Manning

Plants moderate in size, up to 350 mm high. *Stems* usually few-branched, flattened and 2-winged below. *Flower clusters* with spathes and bracts with broad, translucent margins fringed on upper edges. *Flowers* with style minutely notched at apex. *Capsules* narrowly 3-winged. *Seeds* lamellate.

Species 1: Western Cape, South Africa.

40. **Aristea fimbriata** *Goldblatt & J.C. Manning* in Novon 7: 361 (1997b). Type: South Africa, Western Cape, Piketberg Mountains, high plateau south of Zebrakop, 6 Jan. 1995, *P. Goldblatt & J.C. Manning 10167* (NBG, holo.; E, K, MO, PRE, WAG, iso.).

Plants 200–350 mm high, forming rounded cushions. *Stems* compressed, winged below, angled above, mostly 2- or 3-branched, branches crowded near apex. *Leaves* linear to sword-shaped, 3–4 mm wide, slightly shorter than stems, firm-textured. *Flower clusters* 2 to 4, lateral clusters on short branches and mostly concealed by a subtending leafy bract, each 4- to 8-flowered; spathes dry and translucent with a narrow green or brown keel, margins closely fringed and rust-brown, 11–14 mm long, bracts entirely translucent, smaller than spathes. *Flowers* blue, on pedicels 2–3 mm long; tepals obovate, 15–20 × 8–9 mm. *Filaments* ± 5 mm long; anthers ± 3 mm long. *Ovary* 3-winged, 4–5 mm long; style ± 8 mm long, minutely 3-notched. *Capsules* oblong in outline, broadly 3-winged, 12–15 mm long. *Seeds* lamellate, up to 4 per locule, mature seeds not known. *Flowering time*: December and January.



Distribution of ***Aristea fimbriata***.

Distribution and ecology: one of several narrow endemics in the genus, known only from higher elevations on the Piketberg in Western Cape, South Africa; on sandy plateaus in fynbos, at 500–800 m elevation, flowering well after fire.

Diagnosis: *Aristea fimbriata* is distinguished by the regularly fringed spathes and floral bracts, minutely notched style, and relatively long, narrowly winged capsules up to 15 mm long. The fringed bracts are matched in the apparently distantly related *A. africana* and *A. recisa* of sect. *Aristea* but these species have broad, fringed stigmatic lobes. Plants grow in compact low tufts 200–350 mm high. The pollen grains stand out in the *Aristea* in having a 3-lobed aperture confined to one face of the grain. Species of sect. *Racemosae* have monosulcate pollen grains with a single broadly elliptic aperture and those of sect. *Aristea* have more complex trisulculate grains with three, sometimes confluent apertures. Its apparently isolated position in subg. *Aristea* is supported by molecular studies and *A. fimbriata* is accordingly referred to a separate section.

Sect. 7. **Aristea**

Plants mostly small, mostly up to 250 mm, rarely up to 1 m high. *Stems* usually ± dichotomously few-branched, often flattened and 2-winged. *Flower clusters* with dry spathes and bracts with translucent margins or mostly white to silvery-translucent with dark keels, sometimes fringed, occasionally brown-tipped. *Flowers* with broad, prominent stigmatic lobes fringed distally. *Capsules* narrowly 3-winged. *Seeds* lamellate.

Species 6: western South Africa.

41. **Aristea dichotoma** *(Thunb.) Ker Gawl.*, Iridearum generum: 13 (1827); Weim.: 90 (1940). *Moraea dichotoma* Thunb.: 186 (1800); Thunb.: 266 (1811). Type: South Africa, [Western Cape], without precise locality or date, *Thunberg s.n.* (UPS–THUNB, holo.).

[*Aristea diffusa* Eckl.: 16 (1827), invalid name without description.]

Plants 150–300 mm high, forming low, rounded cushions. *Stems* flattened below and 2-winged, dichotomously 3- to 6-branched. *Leaves* linear, 1.5–3.0 mm wide, grey-glaucous, firm-textured. *Flower clusters* mostly 4 to 6, stalked, each 2- to 4-flowered; spathes and bracts dry, brown with broad, translucent margins, spathes 8–10 mm long, bracts ± as long or slightly longer. *Flowers* subsessile, blue; tepals obovate, 14–18 mm long. *Filaments* ± 5 mm long; anthers ± 2.5 mm long. *Style* 7–8 mm long, stigmatic lobes broad, prominently fringed. *Capsules* on pedicels 3–4 mm long, narrowly 3-winged, 8–10 mm long, pale with dark margins. *Seeds* lamellate, kidney-shaped, 2 per locule, sculpturing foveate, margins papillate. *Flowering time*: December to March.

Distribution and ecology: western South Africa, extending from Port Nolloth in Northern Cape to the Cape Peninsula and Swellendam in Western Cape; on well-drained, sandy lower mountain slopes and plateaus and coastal flats.

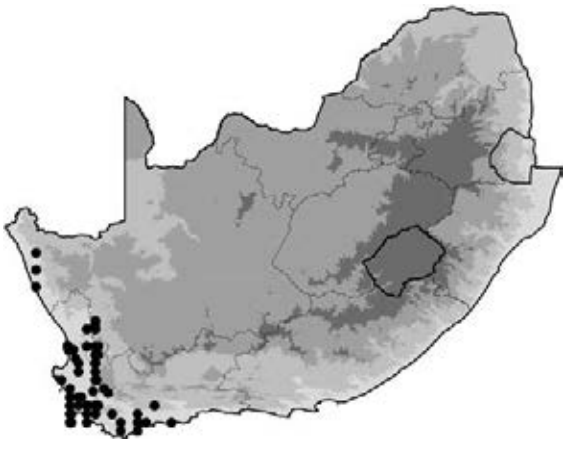
Diagnosis: the cushion-like habit, tuft of narrow basal leaves, and dichotomously branched stem make *Aristea dichotoma* easy to recognise. When dry it can be confused with closely related *A. glauca*. The two species have similar spathes and bracts with broad translucent margins, but *A. glauca* does not normally form cushions, and the stems are simple or 1- to few-branched and obviously flattened and 2-winged below the flower clusters, whereas the stems of *A. dichotoma* are narrower and obscurely winged. Flowers of *A. glauca* are deep blue and often larger, with tepals 15–20 mm long whereas the tepals of *A. dichotoma* are paler blue and typically 14–16 mm long. The two species have partially overlapping ranges and are sometimes sympatric and co-blooming, as at sites in the Cape Peninsula and then their differences become quite clear.

42. **Aristea glauca** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 321 (1882); Weim.: 93 (1940). Type: South Africa, Western Cape, Piekenierskloof, Dec. 1831, *Drège 2612* (B [probably destroyed], lecto., effectively designated by Weim.: 93 (1940); S, isolecto.).

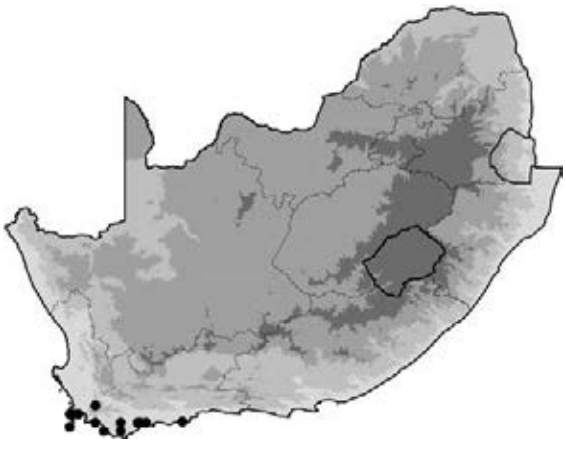
Plants 100–150 mm high, forming diffuse low cushions, spreading by slender underground stolons. *Stem* strongly compressed, 2-winged, dichotomously 1- to few-branched or simple. *Leaves* linear, slightly shorter than stems, 1–3 mm wide, glaucous, firm textured, cauline sometimes lacking as when unbranched. *Flower clusters* single or few, each 2- to 4-flowered; spathes and bracts green to brown with narrow translucent margins, 10–14 mm long. *Flowers* deep blue, tepals obovate, often emarginate, 15–20 mm long. *Style* 8–12 mm long, stigmatic lobes narrow, obscurely fringed *Capsules* on pedicels up to 5 mm long, 3-winged, 7–8 mm long. *Seeds* lamellate, kidney-shaped, 2 per locule, margins papillate, with sculpturing foveate. *Flowering time*: mainly October to December.

Distribution and ecology: Western Cape, South Africa, extending from Ceres and the Cape Peninsula to Riversdale; on sandy coastal and lower mountain slopes.

Diagnosis: one of the smallest species in the genus, *Aristea glauca* forms diffuse low tufts up to 150 mm high, and as the name suggests, has grey-glaucous leaves, mostly 2–3 mm wide. The flowering stems are relatively stout, conspicuously flattened, and often simple or 1- to 3-branched. The species appears to be closely related to *A. dichotoma* and the two are sometimes confused although the latter has narrower, often terete or slightly flattened stems bearing up to six branches and overtopping the leaves, and often smaller flowers with tepals 14–18 mm long and usually paler blue in colour. *Aristea glauca* spreads vegetatively by short underground stolons, sometimes forming diffuse mats.



Distribution of ***Aristea dichotoma***.



Distribution of ***Aristea glauca***.

43. **Aristea oligocephala** *Baker*, Handbook of the Irideae: 144 (1892); Weim.: 95 (1940). Type: South Africa, [Western Cape], Babylon's Tower, Dec., *Zeyher 4049* (K, holo.; B, P, S, SAM, iso.).

Aristea dichotoma var. *macrocephala* Schltr. in Baker: 529 (1897), new synonym. Type: South Africa, [Western Cape], [Sir] Lowry's Pass, Jan. 1896, *Schlechter 7250* (B, BOL, GRA, P, PRE, syn.).

[*Aristea dichotoma* var. *monocephala* Schltr. ex Weim.: 95 (1940), invalid name only in synonymy.]

Plants 150–250 mm high, usually growing singly. *Stem* compressed, dichotomously branched, rarely simple. *Leaves* mostly basal, linear, about half as long as stem, 1.5–3.0 mm wide, rigid, elliptic in section, margins translucent. *Flower clusters* terminal, stalked, each 2- to 4-flowered; spathes and bracts silvery-translucent with narrow, dark keels, 15–20 mm long. *Flowers* blue; tepals 18–25 × 14–16 mm. *Filaments* 6–7 mm long; anthers ± 2.5 mm long. *Style* 8–9 mm long, stigma lobes broad, slightly fringed. *Capsules* 3-winged, 10–12 mm long. *Seeds* lamellate, kidney-shaped, 2 per locule, sculpturing foveate, margins fringed. *Flowering time*: November to January.

Distribution and ecology: restricted to southern Western Cape, South Africa, extending from the Hottentots Holland Mtns and Kleinmond to Bredasdorp; on stony sandstone slopes and flats.

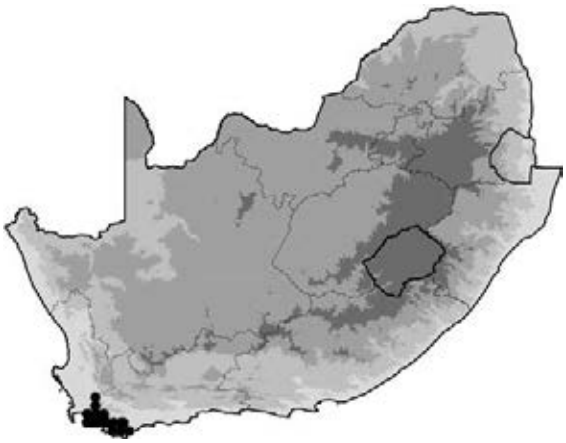
Diagnosis: a relatively short plant, seldom exceeding 200 mm, *Aristea oligocephala* has a few-branched or rarely simple stem bearing large flower clusters up to 20 mm long. The spathes and bracts are papery and shiny-translucent with narrow dark keels. The firm, fibrous leaves are about half as long as the stem and up to 3 mm wide. The short, prominently winged capsules and lamellate seeds are typical of sect. *Aristea*.

44. **Aristea palustris** *Schltr.* in Botanische Jahrbücher für Systematik 27: 96 (1899); Weim.: 97 (1940). Type: South Africa, [Western Cape], Bredasdorp, mountains near Koude River, Dec. 1896, *Schlechter 9586* (B, lecto., effectively designated by Weimarck: 97 (1940); BR, K, MO, P, PRE, SAM, S, isolecto.).

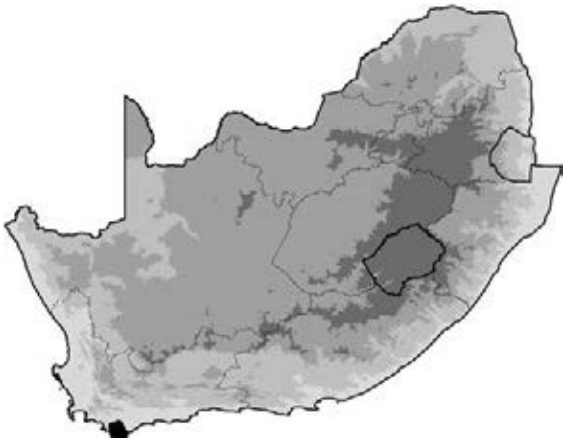
Plants up to 1 m high. *Stem* rounded in section, ± dichotomously several-branched. *Leaves* linear to sword-shaped, 4–9 mm wide, soft-textured, margins translucent. *Flower clusters* several, all terminal on branches, each mostly 4- to 6-flowered; spathes and bracts 10–12 mm long, silvery-translucent with narrow dark keels. *Flowers* blue; tepals 12–14 mm long. *Filaments* ± 5 mm long; anthers ± 2.5 mm long. *Style* with 3 shortly fringed lobes. *Capsules* short, deeply 3-winged, 7–8 mm long. *Seeds* lamellate, kidney-shaped, sculpturing foveate, 2 per locule, mature seeds with margins evidently fringed. *Flowering time*: November to January.

Distribution and ecology: restricted to the Agulhas Plain and slopes of the Bredasdorp Mtns in Western Cape, South Africa; in seasonally wet sites, mostly (?exclusively) on limestone substrates.

Diagnosis: despite its height, up to 1 m but usually only 500 mm, and robust habit, *Aristea palustris* is typical of sect. *Aristea* in the nearly dichotomous branching pattern, largely translucent spathes, and broadly winged capsules. Pollen is likewise consistent with the section, the large grains with specialised trisulcate apertures. The dry, silvery spathes and bracts with a narrow dark keel most closely resemble those of *A. oligocephala*, which is common throughout the Caledon and Bredasdorp Districts of Western Cape, and we assume the two species are immediately related. A shorter plant, *A. oligocephala* has firm-textured, fibrous leaves 1.5–3.0 mm wide, whereas those of *A. palustris* are sword-shaped, relatively soft-textured and 4–9 mm wide.



Distribution of ***Aristea oligocephala***.



Distribution of ***Aristea palustris***.

45. **Aristea africana** *(L.) Hoffmanns.*, Verzeichniss der Pflanzenkultur zu Dresden und Rammenau: 40 (1824); Weim.: 98 (1940). *Ixia africana* L.: 36 (1753). *Moraea africana* (L.) Thunb.: 7 (1787). *M. aristea* Lam.: 114 (1791), illegitimate superfluous name for *M. africana* (L.) Thunb. *A. eriophora* Pers.: 41 (1805), illegitimate superfluous name for *Ixia africana* L. Type: South Africa, Western Cape, without precise locality or collector (LINN, holo.).

Aristea cyanea Aiton: 67 (1789), illegitimate superfluous name for *Ixia africana* L. (1753). Type: unknown, possibly as for *I. africana* but collection made by F. Masson cited, possibly at BM.

Aristea lacera Stokes: 224 (1830), illegitimate superfluous name for *Ixia africana* L. (1753). Type: unknown, probably as for *I. africana*.

Plants mostly 100–150 mm high. *Stem* compressed, several-branched, sometimes ± dichotomously, sometimes simple. *Leaves* linear, 1.5–4.0 mm wide, relatively soft-textured, upper leaves with margins fringed near base. *Flower clusters* few in lax arrangement, each 3- to 6-flowered; spathes and bracts 8–12 mm long, green to brown in centre with wide silvery-translucent margins closely and deeply fringed, sometimes rust-coloured near tips. *Flowers* blue; tepals ± obovate, mostly 8–12 mm long. *Filaments* ± 4 mm long; anthers ± 2 mm long. *Style* 5–6 mm long, stigmatic lobes broad. *Capsules* deeply 3-winged, ± 8 mm long. *Seeds* lamellate, kidney-shaped, 2 per locule, sculpturing foveate, margins shortly papillate. *Flowering time*: mainly September to December.

Distribution and ecology: widespread in the Western Cape, South Africa, from the Gifberg to Bredasdorp and Riversdale; often on sandstone substrates but also on granitic or clay soils in areas of high rainfall, relatively common and rapidly colonising disturbed places.

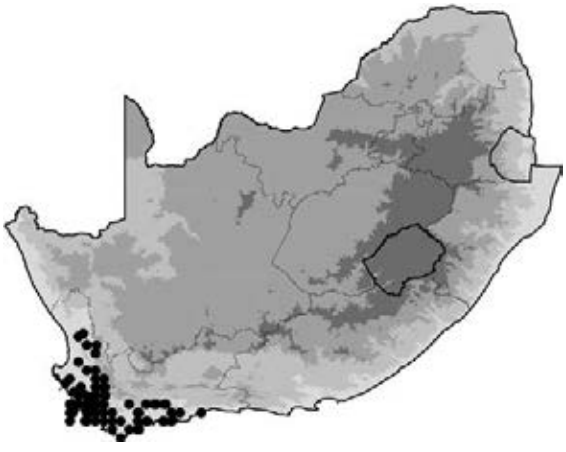
Diagnosis: type of the genus, the diminutive *Aristea africana* stands 100–150 mm high and is readily distinguished by the prominently fringed, silvery-translucent spathes and bracts, sometimes brown at the tips and appearing almost woolly, the feature that prompted one of its later synonyms, *A. eriophora*. Typical of subg. *Aristea* in the short, broadly winged capsules and flattened, lamellate seeds, *A. africana* has relatively soft-textured linear to narrowly sword-shaped leaves. The only species with which it may be confused is *A. recisa*, often a somewhat taller species, which has similar spathes and bracts but almost always with the spathes rusty brown in the upper half or third. The two species have similar large, trisulcate pollen grains with three confluent narrow apertures.

46. **Aristea recisa** *Weim.* in Acta Universitatis Lundensis, ser. 2, 36: 101 (1940). Type: South Africa, [Western Cape], Wildepaardeberg, Waterkloof, Jan. 1925, *Stokoe 1128* (PRE, holo.; BOL, iso.).

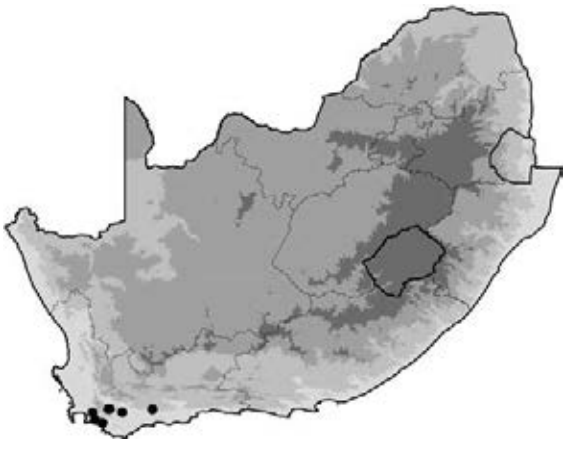
Plants mostly 200–400 mm high, forming small tufts. *Stems* compressed, simple or with 1 to 3 slender, suberect branches. *Leaves* in a basal tuft, sword-shaped, as long as or longer than stem, 3–5 mm wide, soft-textured. *Flower clusters* few in lax arrangement, each 2- to 4-flowered; spathes and bracts 12–13 mm long, green to brown in the centre with broad translucent margins closely and shallowly fringed, rust-brown in distal ⅓. *Flowers* blue; tepals ± 12 mm long. *Filaments* ± 5 mm long; anthers ± 2.5 mm long. *Style* ± 7 mm long; stigma lobes shortly fringed. *Capsules* ± 8 mm long, deeply 3-winged. *Seeds* lamellate, mature seeds unknown but evidently kidney-shaped, with foveate sculpturing, 2 per locule, margins shortly papillate. *Flowering time*: mainly October to December.

Distribution and ecology: a relatively narrow endemic of Western Cape, South Africa, extending from the Du Toit's Kloof Mtns to Hermanus and the central Langeberg; on moist sandstone slopes, at 600–1 200 m elevation.

Diagnosis: broadly similar to the more common and widespread *Aristea africana*, *A. recisa* shares with that



Distribution of ***Aristea africana***.



Distribution of ***Aristea recisa***.

species distinctive dry-papery, prominently fringed spathes and floral bracts. The two might easily be confused but the bracts of *A. recisa* are rusty brown along the margins, the leaves are often broader, up to 5 mm wide, and soft-textured, and the flowering stems are usually held well above the leaves, whereas the stems in *A. africana* are usually (but not invariably) not much longer than the leaves. The critical distinction between the two species lies in the spathes and bracts, which in *A. recisa* are fringed for less than a third of their length, whereas in *A. africana* they are fringed for half their length or more, as well as usually being uniformly coloured. A montane species, *A. recisa* is seldom found below 600 m, whereas *A. africana* occurs from near sea level on coastal flats to mountain slopes but rarely above 500 m.

UNCERTAIN SPECIES

Aristea thyrsiflora (D.Delaroche) N.E.Br.: 36 (1929) [applied to *A. capitata*]; Weim.: 75 (1940). *Ixia thyrsiflora* D.Delaroche: 20 (1766). Type: unknown. The so-called type in Herb. Burman does not match the protologue, which alone is not adequate for identification of the species.

EXCLUDED SPECIES

Aristea angolensis subsp. *acutivalvis* Weim. in Acta Universitatis Lundensis, ser. 2, 36: 20 (1940). Type: Southern Rhodesia [Zimbabwe], Macheke, *Eyles 1996* (K, holo.; SAM, iso.). This taxon is based on plants from Zimbabwe, but both Weimarck (1940) and Vincent (1985) cited specimens of *A. torulosa* and possibly also *A. majubensis* from southern Africa under this name. A final resolution of its identity requires study of tropical African material.

REFERENCES

AITON, W. 1789. *Hortus kewensis* 1. George Nicol, London.

ANDREWS, A, 1801. *Aristea major*. *The Botanist's Repository* 3: t. 160

ASCHERSON, P.F.A. & GRAEBNER, K.O.R.P.P. 1906. *Synopsis der Mitteleuropäischen Flora*, 3(4). Engelmann, Leipzig.

BAKER, J.G. 1876. New Aristeae and Sisyrinchia. *Journal of Botany, British and foreign* 14: 267–269.

BAKER, J.G. 1877 ['1878']. Systema Iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1887. New or Noteworthy Plants. *The Gardeners' Chronicle*, ser. 3, 1: 732, 733.

BAKER, J.G. 1892. Handbook of the Irideae. George Bell & Co., London.

BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1897. Addenda. In W.T. Thiselton-Dyer, *Flora capensis* 6: 528–536. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1906. Diagnoses Africanae. XIV. *Bulletin of Miscellaneous Information Kew* 1906: 15–30.

BENTHAM, G. & HOOKER, J.D. 1883. *Genera plantarum* 3(1). Reeve, London.

BOLUS, L. 1922. In: Novitates Africanae. *Annals of the Bolus Herbarium* 3: 123–146.

BROWN, N.E. 1929. The Iridaceae of Burman's Florae Capensis Prodromus. *Bulletin of Miscellaneous Information Kew* 1929: 129–139.

BROWN, N.E. 1931. XXIX. Notes upon some South African plants. *Bulletin of Miscellaneous Information Kew* 1931: 191–197.

DELAROCHE, D. 1766. *Descriptiones plantarum aliquot novarum*. Verbeek, Leiden.

DE WILDEMAN, E. 1921. *Plantae Bequaertianae* 1. Hoste, Brussels.

DURAND, T. & SCHINZ, H. 1894 ['1895']. *Conspectus florae africae*, vol. 5. Jardin botanique de l'Etat, Bruxelles etc.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.

ENGLER, A. 1892. *Über die Hochgebirgsflora des tropischen Afrika***.** Königlich Akademie der Wissenschaften. G. Reimer, Berlin.

FOSTER, R.C. 1936. Notes on nomenclature in Iridaceae. *Contributions from the Gray Herbarium of Harvard University* 114: 3750.

GOLDBLATT, P. 1971. A new species of *Gladiolus* and some nomenclatural changes in the Iridaceae. *Journal of South African Botany* 37: 229–236.

GOLDBLATT, P. 1993. Iridaceae. In G.V. Pope, *Flora Zambesiaca* 12(4): 1–106. Flora Zambesiaca Managing Committee, London.

GOLDBLATT, P. 1995. Notes on *Aristea* Aiton (Iridaceae: Nivenioideae): taxonomy, chromosome cytology, and phylogeny. *Annals of the Missouri Botanical Garden* 82: 139–145.

GOLDBLATT, P. 1996. Iridaceae. In R.M. Polhill, *Flora of Tropical East Africa*. A.A. Balkema, Rotterdam.

GOLDBLATT, P. 1997. Iridaceae. In S. Edwards, S. Demissew & I. Hedberg, *Flora of Ethiopia* 6: 162–183. University of Addis Ababa.

GOLDBLATT, P. 2013. *Aristea* (Iridaceae: Aristeoideae), a subgeneric classification. *Novon* 22(4): 415–417.

GOLDBLATT, P. & BARNARD, T.T. 1970. The Iridaceae of Daniel de la Roche. *Journal of South African Botany* 36: 291–318.

GOLDBLATT, P. & LE THOMAS, A. 1992. Pollen morphology of Madagascan *Aristea* and *Geosiris* (Iridaceae–Nivenioideae) in relation to systematics and phylogeny. *Bulletin du Museum d'Histoire Naturelle, Paris, 4 sér., sect. B, Adansonia* 14: 223–233.

GOLDBLATT, P. & LE THOMAS, A. 1997. Palynology, phylogenetic reconstruction and classification of the

Afro-Madagascan genus *Aristea* (Iridaceae). *Annals of the Missouri Botanical Garden* 84: 263–284.
GOLDBLATT, P. & MANNING, J.C. 1996. Aristeas and beetle pollination. *Veld & Flora* 82: 17–19.
GOLDBLATT, P. & MANNING, J.C. 1997a. New species of *Aristea* (Iridaceae) from South Africa and notes on the taxonomy and pollination biology of section *Pseudaristea*. *Novon* 7: 137–144.
GOLDBLATT, P. & MANNING, J.C. 1997b. New species of *Aristea* section *Racemosae* (Iridaceae) from the Cape Flora, South Africa. *Novon* 7: 357–365.
GOLDBLATT, P. & MANNING, J.C. 2013. Iridaceae. Taxonomic notes on *Aristea* (Iridaceae: Aristeoideae) in tropical and eastern southern Africa. *Bothalia* 43: 207–211.
GOLDBLATT, P. & MANNING, J.C. 2015. *Aristea rufobracteata* (Iridaceae: Aristeoideae), a new species from southern Western Cape, South Africa. *Bothalia* 45(1): 131–134 [epublished dx.doi.org/10.4102/abc.v45i1.1917].
GOLDBLATT, P. & MANNING, J.C. & GEREAU, R.E. 2002. Nomenclatural changes in *Aristea* section *Racemosae* (Iridaceae) in the Cape Flora of South Africa. *Novon* 12: 190–195.
GOLDBLATT, P., LE THOMAS, A. & SUÁREZ-CERVERA, M. 2004. Phylogeny of the Afro-Madagascan *Aristea* (Iridaceae) revisited in the light of new data on pollen morphology. *Botanical Journal of the Linnean Society* 144: 41–68.
GOLDBLATT, P., DOLD, A.P. & MANNING, J.C. 2005. Three cryptic new species of *Aristea* (Iridaceae) from southern Africa. *Bothalia* 35: 1–6.
GUNN, M. & CODD, L.E. 1981. *Botanical exploration of southern Africa*. A.A. Balkema, Cape Town.
HOFFMANSEGG, J.C. 1824. *Verzeichniss der Pflanzenkultur zu Dresden und Ramenau*. Dresden.
HUTCHINSON, J. & DALZIEL, J.M. 1936. *Flora of West Tropical Africa*, 2(2). Crown Agents for the Colonies, London.
KER-GAWLER, J.B. 1802. *Aristea capitata*. Tallest aristea. *Curtis's Botanical Magazine* 17: t. 605.
KER-GAWLER, J.B. 1804 ['1805']. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.
KER GAWLER, J.B. 1809. *Aristea pusilla*. Flat-stemmed aristea. *Curtis's Botanical Magazine* 30: t. 1231.
KER-GAWLER, J.B. 1810. *Aristea melaleuca*. Mourning-flowered Aristea. *Curtis's Botanical Magazine* 31: t. 1277.
KER-GAWLER, J.B. 1827. *Iridearum Generum*. De Mat, Brussels.
KLATT, F.W. 1866. Revisio Iridearum (Conclusio). *Linnaea* 34: 537–689.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
KRAUSS, F. 1845. Pflanzen des Cap - und Natal-Landes, gesammelt und zusammengestellt von Dr. Ferdinand Krauss. *Flora* 28: 305–315.
LAMARCK, J.B.A.P.M. de. 1791. *Tableau encyclopédique et* méthodique, vol. 1. Panckoucke, Paris.
LEWIS, G.J. 1950a. *Aristea coerulea*. *Flowering Plants of Africa* 23: t. 1083.
LEWIS, G.J. 1950b. *Aristea macrocarpa*. *Flowering Plants of Africa* 23: t. 1084.
LEWIS, G.J. 1952. Plantae novae Africanae: *Aristea latifolia* Lewis (Iridaceae–Sisyrinchieae). *Annals of the South African Museum* 40: 6–14.
LINNEAUS, C. 1753. *Species plantarum*, vol. 1. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.
MARAIS, W. 1987. Notes on *Aristea* (Iridaceae) in East Africa. *Kew Bulletin* 42: 932.
MANNNING, J.C. & GOLDBLATT, P. 2007. *Aristea nigrescens* (subgenus *Pseudaristea*), a new species from Western Cape, South Africa with a novel strategy for pollinator attraction. *Bothalia* 37: 189–209.
PAX, F. 1888. Iridaceae. In A. Engler & K. Prantl, *Die natürlichen Pflanzenfamilien* 2(5): 137–157. Engelmann, Leipzig.
PAX, F. 1892. Iridaceae africanae. *Botanische Jahrbücher für Systematik* 15: 150–160.
PERSOON, H. 1805. *Synopsis plantarum*, vol. 1. C.H. Cramer, Paris.
RENDLE, A.B. 1894. In J. Britten, E.G. Baker, A.B. Rendle & others, Plants of Milanji, Nyasa-land, collected by Mr. Alexander White. *Transactions of the Linnean Society, London*, *Botany* 4(2): 1–68.
SCHINZ, H. 1906. Diagnoses Africanae XIV. *Bulletin of Miscellaneous Information Kew* 1906: 15–30.
SCHLECHTER, R. 1899. Plantae schlechterianae novae vel minus cognitae describuntur II. *Botanische Jahrbücher für Systematik* 27: 86–220.
SCOTT ELLIOT, G.F. 1891. Novitates Capenses. *Journal of Botany, British and foreign* 29: 68–74.
STEUDEL, E.G. 1840. *Nomenclator botanicus*, edn. 2. J.G. Cotta, Stuttgart & Tübingen.
STOKES, J. 1830. *Botanical Commentaries*, vol. 1. Simpkin & Marshall, London.
THUNBERG, C.P. 1787. Dissertatio de *Moraea*. Edman, Uppsala.
THUNBERG, C.P. 1800. *Prodromus Plantarum Capensium*, part. 2: 85–191. Edman, Uppsala.
THUNBERG, C.P. 1811. *Flora capensis*, part 2: 145–386. Edman, Uppsala.
VAHL, M. 1805. *Enumeratio plantarum*, vol. 2. Copenhagen.
VINCENT, L.P.D. 1985. A partial revision of the genus *Aristea* (Iridaceae) in South Africa, Swaziland, Lesotho, Transkei and Ciskei. *South African Journal of Botany* 51: 209–252.
VINES, S.H. 1895. *A student's text-book of botany*. Swan Sonnenschein, London.]
WEIMARCK, H. 1937. Iridaceae. In T. Norlindh & H. Weimarck, Beiträge zur Kenntnis der Flora von Süd-Rhodesia. *Botaniska Notiser* 1937: 171–181.
WEIMARCK, H. 1940. Monograph of the genus *Aristea*. *Acta Universitatis Lundensis*, ser. 2, 36: 1–140.
WOLLEY-DOD, R.A. 1900. New Cape Plants. *Journal of Botany, British and foreign* 38: 170, 171.

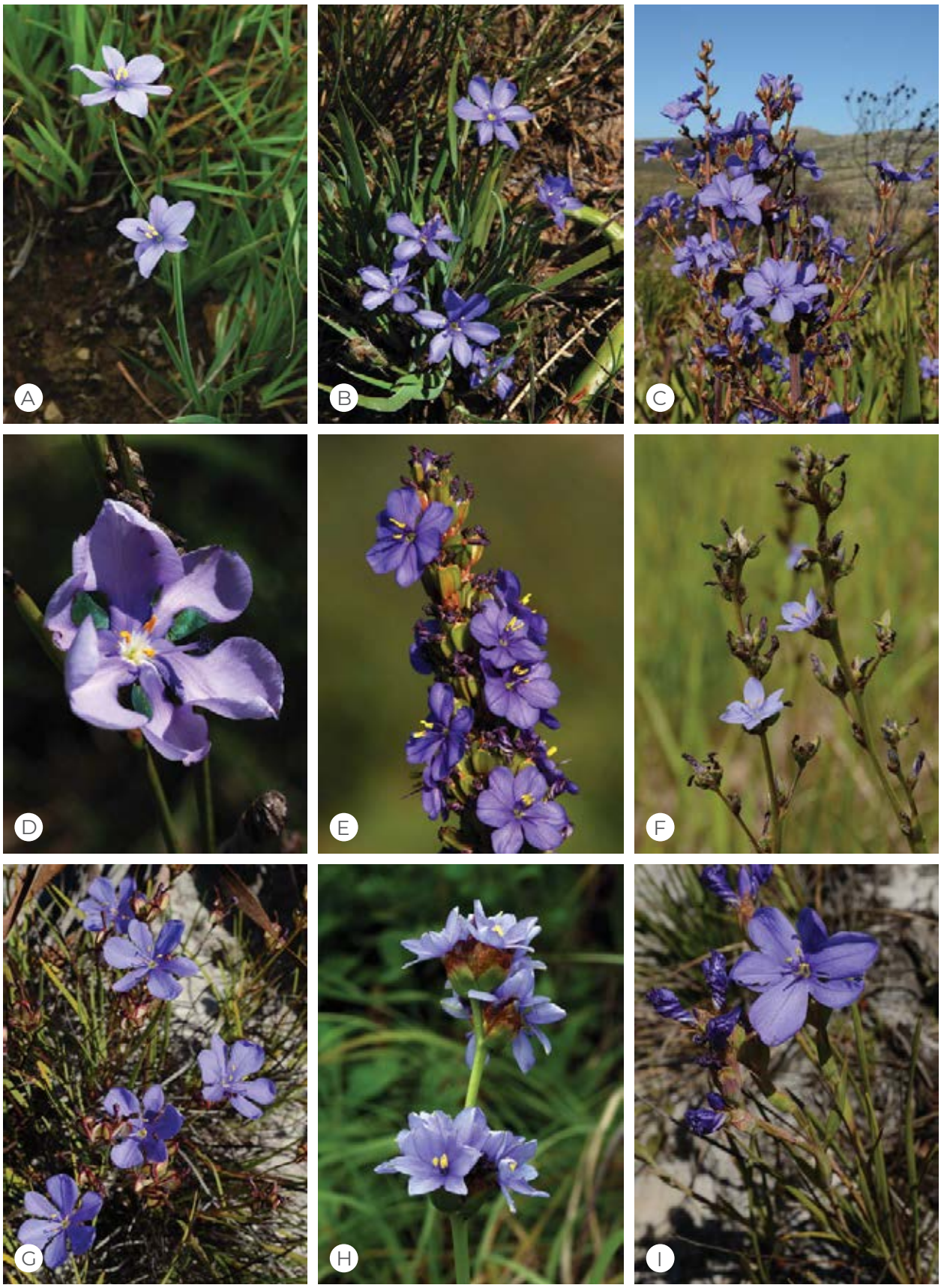


Plate 1: A, ***Aristea abyssinica***, Satansnek, EC; B, ***A. africana***, Hermon, WC; C, ***A. bakeri***, Cape Peninsula, WC; D, ***A. biflora***, Caledon, WC; E, ***A. capitata***, Cape Peninsula, WC; F, ***A. compressa***, Durban, KZN, G, ***A. dichotoma***, Cape Peninsula, WC; H, ***A. galpinii***, Giants Castle, KZN; I, ***A. juncifolia***, Cape Peninsula, WC.

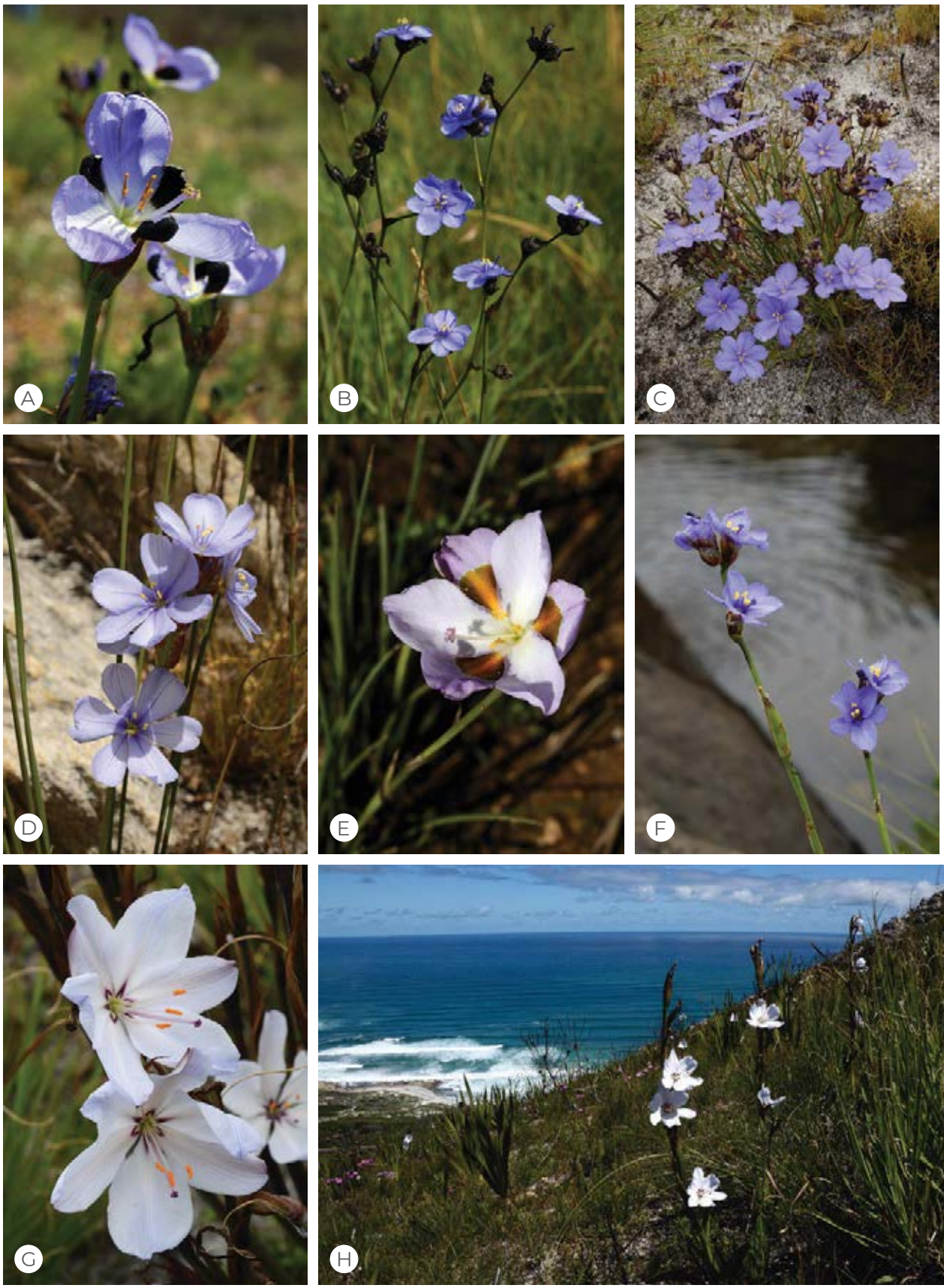


Plate 2: A, ***Aristea lugens***, Hermon, WC; B, ***A. majubensis***, Witsieshoek, FS; C, ***A. oligocephala***, Houwhoek, WC; D, ***A. racemosa***, Kogelberg, WC; E, ***A. teretifolia***, Napier, WC; F, ***A. torulosa***, Maclear, EC; G, ***A. spiralis***, Cape Peninsula, WC; H, ***A. spiralis***, Scarborough, WC.

2. Subfamily **NIVENIOIDEAE**

Nivenioideae *Schulze ex Goldblatt* in Annals of the Missouri Botanical Garden 77: 621 (1990). Type: *Nivenia* Vent.

Evergreen woody shrubs with a woody underground caudex. *Stems* woody, with anomalous, monocot-type secondary growth. *Leaves* unifacial, in 2 ranks, without main vein. *Inflorescence units* binate rhipidia (flower clusters) enclosed in paired, opposed leafy or dry spathes, units variously aggregated into false corymbs, racemes or heads. *Flowers* long lasting, radially symmetric, with septal nectaries; tepals united in a tube below, spreading or upright above. *Filaments* free; anthers loculicidal and extrorse; pollen grains monosulcate, exine reticulate. *Ovary* inferior; style slender, apically 3-notched or dividing into 3 slender branches. *Capsules* ± woody. *Seeds* tangentially compressed, shield-shaped. *Basic chromosome number x* = 16.

Genera 3, species 15, all of southern Western Cape.

Key to genera

1a Inflorescence compound, forming a compressed capitulum enclosed by enlarged green or coloured leaves; perianth tube shorter than the linear, spathulate tepals . . . . . 3. *Klattia*
1b Inflorescence either compound, forming branched panicles or corymbs, or flowers borne in isolated pairs, enclosed in green or brown spathes; perianth tube shorter or longer than the oblong to ovate tepals:
2a Flowers pale to deep blue; tepals patent, not villous on the outside; stamens and/or style well exserted, species often heterostylous . . . . . 2. *Nivenia*
2b Flowers green to blackish with the tepals yellow on the reverse; tepals remaining erect, densely villous on the outside; stamens included . . . . . 4. *Witsenia*

2. **Nivenia**

Nivenia *Vent.*, Decas generum novorum 3 (1808). *Aristea* subg. *Nivenia* (Vent.) Baker: 145 (1892). Type: *N. corymbosa* (Ker Gawl.) Baker, lecto., designated by Brown: 265 (1933).

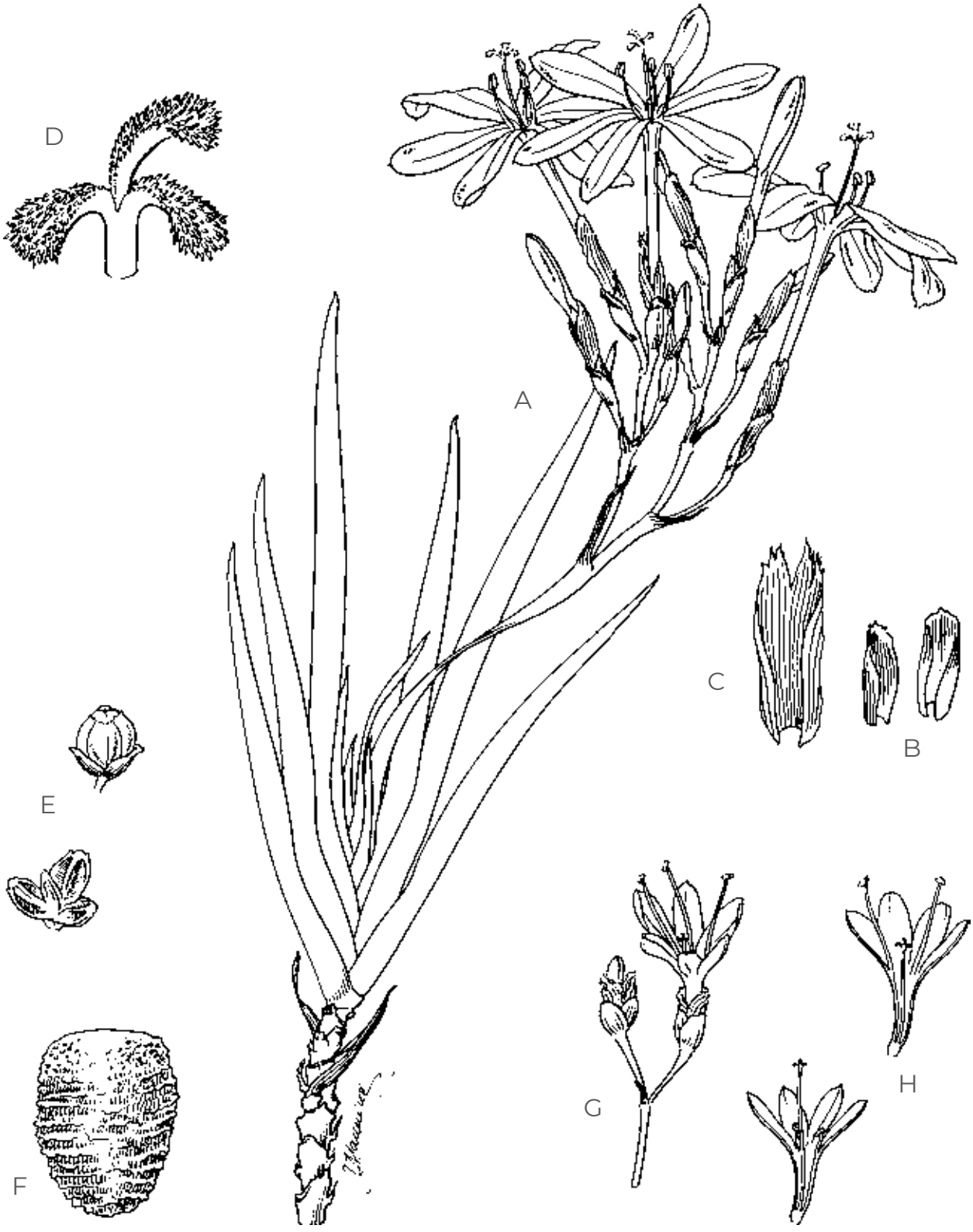
Genlisia Reichenb.: 60 (1828), superfluous name for *Nivenia* Vent. (1808).

[*Witsenia* sensu Ker Gawl.: 236 (1804), including *Klattia*; Thunb.: 65, 66 (1824).]

Revisionary account: Goldblatt: 51–99 (1993) but see Goldblatt (1997) and Goldblatt & Manning (2007).

Named for James Niven, Scottish botanist employed in the late 18th and early 19th century to collect plants in southern Africa. Niven was one of the first to collect the genus and was responsible for the introduction of *Nivenia* to the British Isles and thence to Western Europe.

Evergreen shrubs or subshrubs, sometimes forming cushion-like tufts, with woody underground caudex. *Stems* few to many, upright or inclined, compressed, becoming rounded below, conspicuously marked by leaf scars; major axes simple or branched or with short-lived spur-shoots. *Leaves* isobilateral, lanceolate to ± linear, sheathing below, clustered apically, without main vein; lasting more than a year; margins narrowly hyaline. *Inflorescence* terminal, peduncle compressed, short (vestigial in *N. fruticosa*) and included in leaves or long and exserted; forming a pseudopanicle with short to long axillary branches, thus either somewhat corymb- or raceme-like, (one)few- to many-flowered; ultimate branches of peduncle terminating in a pair of opposed spathes, these enclosing paired or single bracteate flowers (thus binate rhipidia); spathes leathery to ± less dry, long with membranous margins or short and ± obtuse, bracts usually conspicuous, often exceeding spathes, scarious, silvery-transparent to brown, smooth or wrinkled. *Flowers* sessile, salver-shaped, heterostylous in several spp., pale to deep blue, usually white at tepal bases, odourless; perianth tube well developed, ± cylindric but slightly wider toward mouth; tepals lanceolate to elliptic or obovate, subequal or inner slightly smaller, extended horizontally or ascending. *Filaments* filiform, equal or one shorter (*N. inaequalis*), inserted at or just below base of tepals, in heterostylous species either very short, sometimes occluding mouth of tube (pin flowers) or well exserted and much exceeding style (thrum flowers); initially extrorse, versatile after anthesis, yellow to ± white or deep blue; pollen yellow or blue. *Ovary* usually 2-ovulate, rarely 6-ovulate (*N. levynsiae*); style filiform, well exserted or (in heterostylous spp.) thrum flowers with style included or barely exserted; 3-lobed (*N. inaequalis*) or 3-branched, then branches



NIVENIA. N. stokoei: A, flowering stem; B, inner spathe (left) and outer spathe (right); C, bract; D, stigma; E, indehisced capsule (top) and dehisced capsule (bottom); F, seed showing outer surface. ***N. parviflora***: G, portion of inflorescence; H, half-flower of long-styled pin morph (bottom) and short-styled thrumb morph (top).

filiform. *Capsules* ± woody, with rudimentary beak. *Seeds* shield-shaped, tangentially compressed, usually 1 per locule, rarely 2 (2 to 4 in *N. levynsiae*), rugose, brown to blackish with translucent outer layer sometimes partially exfoliated. *Basic chromosome number x* = 16.

Species 11: southern and southwestern Cape, restricted to sandstones of the Table Mountain Series of the Cape System and mostly montane.

Largest of the three genera of shrubby Iridaceae, *Nivenia* species have pale to deep blue flowers that vary modestly, mainly in the length of the perianth tube. Variation in inflorescence morphology is, however, extensive. The basic inflorescence is a binate rhipidium (or flower cluster) bearing one or two flowers per unit enclosed in leathery bract-like spathes and arranged in flat-topped corymbose false panicles, the entire flowering stem thus a compound inflorescence, or in a spike-like arrangement. An unusual feature in the genus is the condition of heterostyly, with six species heterostylous, thus including plants with a long style and short stamens (pin flowers) or a short style and long stamens (thrum flowers).

The *Nivenia binata* species-group, restricted to the Swartberg Mtns of the Little Karoo, has distinctive dry, brown, wrinkled bracts and blue anthers and pollen. In other species the pollen is yellow to white. Pollination in short-tubed species is by bees foraging for nectar and in species with elongate perianth tubes by long-proboscid flies likewise seeking nectar.

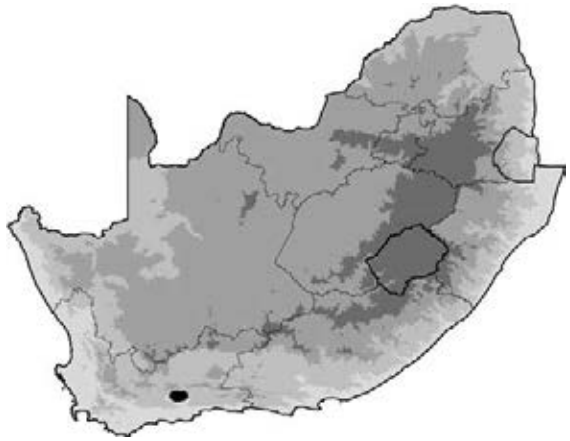
Key to species

1a Inflorescence compound, a flat-topped false panicle of > 10 flowers; ultimate peduncles slender and much exceeding subtending bracts:
  2a Flowers paired in ultimate flower clusters; anthers and pollen blue; plants from Little Karroo mtns:
    3a Perianth tube 20–25 mm long; floral bracts 8–9 mm long . . . . . 6. *N. stenosiphon*
    3b Perianth tube 5–15 mm long; floral bracts 5.5–10.5 mm long:
      4a Perianth tube 9–15 mm long; floral bracts 9–10 mm long . . . . . 4. *N. binata*
      4b Perianth tube ± 5 mm long; floral bracts ± 5.5 mm long (tepals 6–7 mm long) . . . . . 5. *N. parviflora*
  2b Flowers mostly or exclusively solitary in terminal clusters; anthers and pollen yellow or ± white; plants from southwestern coastal mtns:
    5a Perianth tube 27–33(–37) mm long; floral bracts (10–)12–15 mm long . . . . . 9. *N. stokoei*
    5b Perianth tube 11–21 mm long; floral bracts 6–7 mm long:
      6a Perianth tube 11–13 mm long; tepals 9–11 mm long . . . . . 7. *N. corymbosa*
      6b Perianth tube 16–18(–21) mm long; tepals 11–14 mm long . . . . . 8. *N. dispar*
1b Inflorescence of 1 to few(6) flowers or a dense false raceme; if many-flowered then ultimate peduncles short and concealed by subtending bracts:
  7a Inflorescence a dense false raceme; floral bracts (not spathes) silvery-membranous in upper half or entirely; flowers heterostylous; style branches lobed or filiform:
    8a Flowers paired in individual flower clusters; stamens unequal with one filament much shorter; floral bracts silvery-translucent throughout; plants from Rooiberg . . . . . 1. *N. inaequalis*
    8b Flowers solitary in individual flower clusters; stamens equal; floral bracts silvery only in upper half; plants from Riviersonderend Mtns and Langeberg . . . . . 2. *N. argentea*
  7b Inflorescence of 1 to few (6) flowers; floral bracts ± concealed by leaves or brown-membranous; flowers homostylous; style branches filiform:
    9a Perianth tube 20–30 mm long; flowers paired in spathes; plants from Langeberg. . . . . 3. *N. fruticosa*
    9b Perianth tube 5–15 mm long; flowers solitary within spathes; plants from Hottentots Holland Mtns and Kogelberg:
      10a Perianth intense blue; tepals spreading horizontally, 18–22 × 8–9 mm; perianth tube ± 15 mm long 10. *N. concinna*
      10b Perianth pale blue; tepals cupped, 13–15 × 6–8 mm; perianth tube ± 7 mm long . . . . . 11. *N. levynsiae*

1. **Nivenia inaequalis** *Goldblatt & J.C.Manning* in Bothalia 37: 195 (2007). Type: South Africa, [Western Cape], Rooiberg Mtns, next to forestry track near Bailey's Peak, 3 300–4 600 ft [± 1 000–1 400 m], 29 Dec. 1986, *J.H.J. Vlok 1794* (NBG, holo.; K, MO, PRE, iso.).

[*Nivenia argentea* sensu Goldblatt: 54 (1993).]

Rounded evergreen shrubs, 400–800 mm high, branching from base. *Stems* ascending, with short spur-shoots in upper part, leafy portions ± 3 mm diam. *Leaves* crowded apically, narrowly lanceolate, (40–)55–90 × 2–3 mm. *Inflorescence* a compound, congested, false raceme, primary peduncle axis compressed, exserted (10–)15–30 mm from leaves, up to 20-flowered; secondary peduncles 3–4 mm long, bearing a shortly stalked, 2-flowered binate rhipidium subtended by a lanceolate-attenuate, keeled bract ± 17 mm long, dry and white-translucent with brown midline; spathes tightly enclosing binate rhipidia, lanceolate-attenuate, 13–15 mm long, dry and membranous, brown below and in midline, margins white-transparent; floral bracts open to base, 22–25 mm long, dry and silvery-translucent throughout, becoming torn apically. *Flowers* salver-shaped, heterostylous, blue, darker at tepal bases, white in throat and tube; perianth tube 30–40 mm long, slightly wider toward mouth; tepals elliptic-lanceolate, ± 18 × 5–6 mm, spreading. *Filaments* unequal, either two exserted 7–8 mm and one exserted ± 5 mm (thrum flower) or two exserted 3 mm and one included 1.5–2.5 mm (pin flower); anthers 1.0–1.5 mm long before anthesis, yellow; pollen yellow. *Style* either



Distribution of ***Nivenia inaequalis***.

included 2–3 mm below mouth of tube (thrum flower) or exserted 6–8 mm, reaching 2–4 mm beyond anthers (pin flower); style branches rounded lobes 0.5 mm long. *Capsules* subglobose, ± 6 × 4.0–4.5 mm. *Seeds* 1 per locule, shield-shaped, rugose, ± 4.5 × 3.5 mm. *Flowering time*: mainly November and December, occasionally out of season in February and March.

Distribution and ecology: restricted to upper elevations of the Rooiberg, an isolated massif southeast of Ladismith, in Western Cape, South Africa; on rocky, sandstone ridges and summits above 1 000 m elevation in arid fynbos, usually in exposed sites in rock outcrops.

Diagnosis: *Nivenia inaequalis* is recognised in the genus by its unequal stamens, with one filament shorter than the other two, and by the short, rounded rather than linear or ± filiform style branches. The species is heterostylous and in the pin morph the shorter stamen is included in the elongate perianth tube, 30–40 mm long. The floral bracts are particularly conspicuous, being silvery-translucent throughout their length. It is most likely to be confused with *N. argentea* from the Langeberg and Riviersonderend Mtns as both have a similar general aspect, forming rounded, leafy shrubs, with similar dry, lanceolate-attenuate spathes and a distinctive, congested, raceme-like compound inflorescence, possibly the ancestral type for the genus. The individual flower clusters of *N. inaequalis* are always paired within the spathes whereas those of *N. argentea* are solitary, with partly or entirely brown spathes and floral bracts, and shorter perianth tube, 14–25 mm long. Illustrations published as *N. argentea* in *The Woody Iridaceae* (Goldblatt, 1993) actually represent *N. inaequalis*.

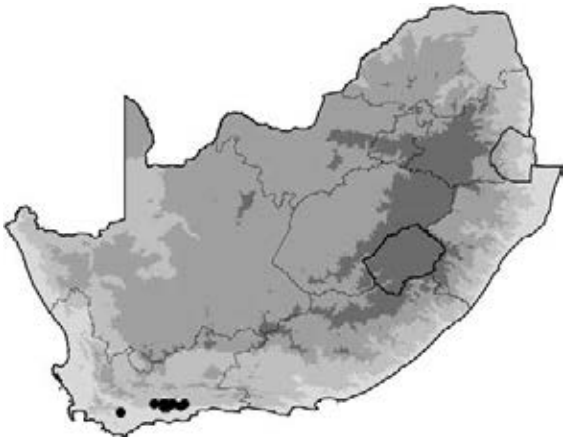
2. **Nivenia argentea** *Goldblatt*, Woody Iridaceae: 54 (1993) [including *N. inaequalis*], as a new name for *N. capitata* (Klatt) Weim.: 366 (1940), illegitimate homonym, not *N. capitata* R.Br. (1810) (Proteaceae). *Witsenia capitata* Klatt: 546 (1866). Type: South Africa, [Western Cape], banks of the Riviersonderend, Appelskraal, Eksteen, and surrounding mountains, 500–4 000 ft [150–1 200 m], *Ecklon & Zeyher Irid. 62* (90.9) (B, holo.; MO, S, iso.).

Rounded shrubs up to 400 mm high, forming low cushions. *Stem* branching from base, branches ascending, compressed, leafy portions 2–4 mm diam. *Leaves* crowded apically, linear-lanceolate, (20–)40–80 × 1.5–3.5 mm. *Inflorescence* a congested, branched false raceme, up to 15-flowered, lateral branches short, 3-flowered, each node shortly stalked, with 1 flower within spathes; primary peduncle axis compressed, extending (10–)20–40 mm from leaf cluster, ultimate branches ± 2 mm long, subtended by lanceolate-attenuate, keeled, bracts 15–25 mm long, dry, brown with brown membranous margins; spathes tightly enclosing flower, lanceolate-attenuate, 13–18 mm long, dry and papery, brown below and in midline, margins and apices transparent-membranous; floral bracts tubular, 18–25 mm long, dry and membranous, usually silvery-transparent in upper ½–⅓, brown in lower ½ –⅔, sometimes ± entirely shining brown, becoming torn apically. *Flowers* salver-shaped, heterostylous, deep blue, darker in centre, white in throat and tube; perianth tube 14–20(–25) mm long, widening gradually toward mouth; tepals oblong-oblanceolate, 13–18 × 4–6 mm, spreading. *Filaments* either 4–5 mm long (thrum flower) or 1.0–1.5 mm long (pin flower); anthers 1.0–1.5 mm long before anthesis, yellow; pollen yellow. *Style* either included 0.5–4.0 mm below mouth of tube (thrum flower) or exserted ± 7 mm, reaching ± 5 mm beyond anthers (pin flower), dividing into filiform branches ± 1.5 mm long. *Capsules* obovoid, ± 7 × 3.5–4.0 mm. *Seeds* unknown. *Flowering time*: mainly October to December, occasionally out of season in March and April.

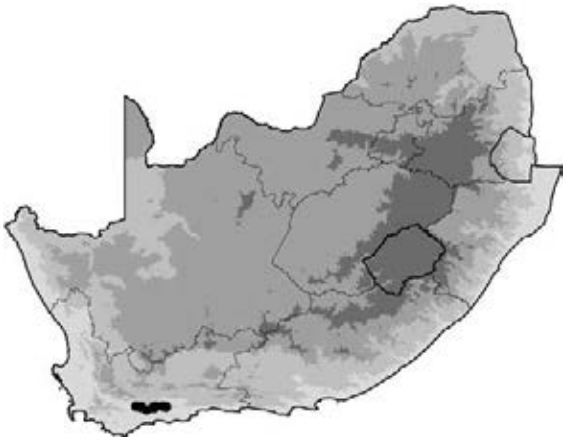
Distribution and ecology: South Africa, restricted to middle and upper elevations on the Riviersonderend Mtns and adjacent Langeberg, extending from Tradouwberg and Grootvadersbosch north of Heidelberg in the west to Garcia's Pass and Perdeberg near Riversdale in the east; on exposed, rocky ridges.

Diagnosis: *Nivenia argentea* is distinguished by its congested, compound, ± raceme-like inflorescence with lanceolate-attenuate subtending spathes that entirely brown and dry. The ultimate branches bear single-flowered rhipidia, each flower surrounded by a tubular, dry, membranous bract 18–25 mm long, usually silvery-transparent in the upper half and brown below but sometimes entirely shining brown. The species is heterostylous and the flowers have a perianth tube 14–25 mm long with the anthers exserted on filaments either 4–5 mm long (thrum flowers) or 1.0–1.5 mm long (pin flowers). The style branches are slender and typical of most other species in the genus, and differ from those of related *N. inaequalis*, which are short and rounded.

In the structure of the compound inflorescence *Nivenia argentea* closely resembles *N. inaequalis* from the Rooiberg, but that species has inflorescence bracts and spathes with broad, silvery margins and floral bracts that are entirely silver-transparent. The binate rhipidia



Distribution of ***Nivenia argentea***.



Distribution of ***Nivenia fruticosa***.

in *N. inaequalis* are 2-flowered and the flowers themselves are distinctive in the longer tube, 30–40 mm long versus 14–20(–25) mm long in *N. argentea*, and in their unique, short, rounded style branches. The tubular floral bracts of *N. argentea* are unusual in the genus in having the lower margins fused to form a closed cylinder, as the bract margins in most other *Nivenia* species are free to the base, although overlapping and enclosing the perianth tube. *Nivenia fruticosa*, also from the Langeberg, is the only other species with tubular floral bracts, suggesting a possible relationship between the two.

3. **Nivenia fruticosa** *(L.f.) Baker* in Journal of the Linnean Society, Botany 16: 109 (1877) [including *N. argentea* Weim.: 360 (1940)]; Goldblatt: 60 (1993). *Ixia fruticosa* L.f.: 93 (1782). *Witsenia fruticosa* (L.f.) Ker Gawl.: 237 (1804). *Aristea fruticosa* (L.f.) Pers.: 41 (1805). Type: South Africa, [Western Cape], Platte Kloof [Langeberg near Grootvadersbosch] and Riviersonderend Mtns, *Thunberg s.n.* (UPS–THUNB, holo.; C–Herb. Vahl, probable iso.).

Witsenia ramosa Vahl: 47 (1805), illegitimate superfluous name for *Ixia fruticosa* L.f. Type: uncertain, probably as for *I. fruticosa* L.f.

Subshrub forming compact, rounded cushions 100–250 mm high. *Stems* several to many from base, central nearly erect, laterals inclined, compressed, occasionally branched but showing apical dominance with a few spur-shoots produced each season, leafy part ± 2 mm wide. *Leaves* crowded apically, grey-green, 35–45 × 2.0–2.5 mm, narrowly lanceolate, acute. *Inflorescence* a single flower pair on a terminal peduncle 2–3 mm long, a single leafy bract subtending paired spathes; spathes green; floral bracts tubular, 9–15 mm long, membranous, light straw-coloured. *Flowers* ± salver-shaped, blue, darker at tepal bases, tube pale; perianth tube 20–25(–30) mm long, cylindric, ± 1 mm diam. At base, 1.5 mm at mouth; tepals lanceolate, ± 12 mm long, 3.5–4.0 mm wide, ascending below, ultimately recurved in upper half. *Filaments* ± 2.5 mm long; anthers ± 1 mm long; pollen yellow. *Style* dividing opposite or sometimes 2–3 mm above anthers, branches filiform, ± 2.5 mm long, white. *Capsules* obovoid, 4.5–5.5 mm long, often only one locule with a seed. *Seeds* ± 3 mm long, 1 per locule. *Flowering time*: December to January, rarely extending into mid-February.

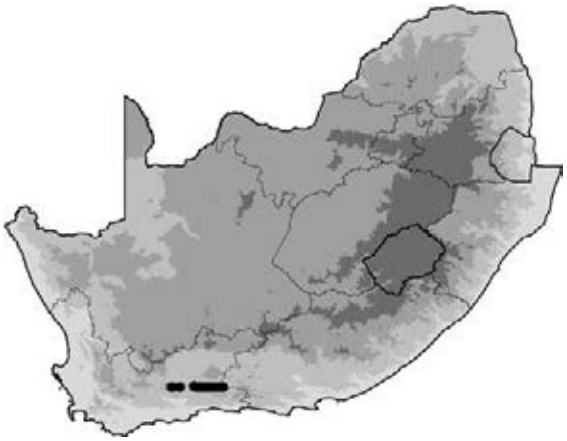
Distribution and ecology: restricted to the central Langeberg in southern Western Cape, South Africa, extending from the mountains above Swellendam in the west to Grootvadersbosch and Gysmanshoek some 40 km to the east; in open low fynbos above 1 000 m elevation in shallow stony soil in exposed situations where the plants are not overshadowed by surrounding vegetation.

Diagnosis: the growth form of *Nivenia fruticosa* is unmistakable, but herbarium specimens can also easily be recognised by the slender stems, narrow leaves 2.0–2.5 mm wide, and inflorescence of a single flower pair. The flowers are unusual in their long perianth tube and relatively short tepals ascending below and ultimately recurved, unlike the horizontally extended tepals of most other species of *Nivenia*. Apparently specialised in its vegetative morphology and in the inflorescence reduced to a single flower pair, *N. fruticosa* is probably most closely related to *N. argentea*. The two species have similar long inflorescence bracts and floral spathes and long, tubular, pale, partly membranous and transparent bracts. In other species of *Nivenia* the inflorescence bracts are relatively short, the spathes are leathery and brown, and the floral bracts brown and opaque.

4. **Nivenia binata** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 382 (1882); Goldblatt: 65: (1993). *Witsenia binata* (Klatt) Klatt: 172 (1894). Type: South Africa, [Western Cape], Great Swartberg at Klaarstroom, 30 July 1829, *Drège 2184* (B, holo.; BM, E, G, K, P, iso.).

Aristea lignosa Adamson: 373 (1931). Type: South Africa, [Western Cape], Seven Weeks Poort, *Adamson 3015* [BOL, lecto., designated by Goldblatt: 65 (1993)].

[*Witsenia ramosa* sensu Klatt: 547 (1866), non Vahl: 47 (1805) (= *Nivenia fruticosa* (L.f.) Baker).]



Distribution of ***Nivenia binata***.

Shrubs 150–900 mm high, usually rounded and with several branches from the base. *Stem* few and irregularly branched, the leafy part ± 2.5 mm diam. *Leaves* narrowly lanceolate, (40–)60–100 mm long, 2–3 mm wide. *Inflorescence* a compound, corymb-like false panicle, (12)20- to 60-flowered (6 to 30 flower pairs), primary peduncles exserted, compressed, 2–4 mm wide, ultimate peduncles bearing paired flowers within spathes; spathes 4–5 mm long, dry, brown, brittle-chaffy, green near base, bracts dry and red-brown, 9–10 mm long, firm-membranous, dry, brown, much-wrinkled above spathes. *Flowers* salver-shaped, heterostylous, deep to light blue, tube nearly white; perianth tube 9–15 × 1.3–1.8 mm, cylindric; tepals spreading horizontally, elliptic, 7.5–10.0 × 4.3–5.0 mm. *Filaments* either short, 2–3 mm long (pin flower) or 7–9 mm long (thrum flower); anthers ± 1.8 mm long before anthesis, later ± 1 mm long, dark blue-violet; pollen blue. *Style* either short, 7–12 mm long (thrum flower), dividing just below to ± 1.5 mm above mouth of tube, or 15–18 mm long, exserted 7–8 mm from tube (pin flower); style branches filiform, ± 1 mm long (± 0.3 mm in some long-styled plants). *Capsules* subglobose, ± 4 mm × 3 mm. *Seeds* usually 1 per locule, rugose, blackish with a transparent outer layer, ± 3.3 × 1.8–2.0 mm. *Chromosome number* 2*n* = 32. *Flowering time*: September to November (rarely also in April or in August).

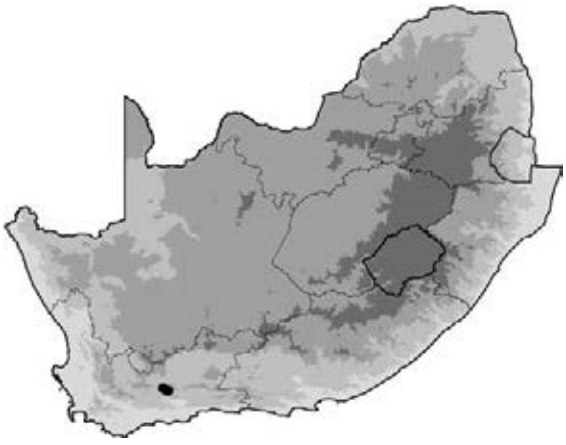
Distribution and ecology: restricted to the Swartberg Mtns of the Western Cape, South Africa, from Towerkop above Ladismith in the west to the mountains near Meiringspoort (the type collection was reported to have been made at Klaarstroom, at the north end of Meiringspoort, but no recent collections have been made in this area); in rocky sites on both southern and northern slopes under conditions variable in rainfall and sun exposure with more robust plants on southern slopes.

Diagnosis: the paired flowers in large corymbose inflorescences and long, brown, wrinkled bracts are the most distinctive features of *Nivenia binata*. The flowers have a relatively short perianth tube and are heterostylous. The unusual dark blue anthers and blue pollen are shared with *N. parviflora* and *N. stenosiphon*, restricted to the Klein Swartberg and adjacent Touwsberg, just east of the range of *N. binata*. *Nivenia stenosiphon* is also heterostylous and has a similar inflorescence and wrinkled floral bracts but is distinguished by its long-tubed flowers with relatively short tepals, the tube 32–38 mm long and tepals 10–12 mm long. The flowering time of *N. stenosiphon* is late autumn, from late March to early June, a significant difference from *N. binata*.

5. **Nivenia parviflora** *Goldblatt* in Bothalia 27: 101 (1997). Type: South Africa, Western Cape, Klein Swartberg Mtns, slopes of Toringberg, ± 800 m, 25 Mar. 1996, *Goldblatt 10498* (NBG, holo.; BOL, K, MO, PRE, WAG, iso.).

Shrubs 300–500(–800) mm high. *Stem* with several branches from base, branching irregularly, leafy terminal branches compressed, ± 3 mm wide. *Leaves* narrowly lanceolate to ± linear, mostly 50–70 × 3–4 mm, veins not evident when alive. *Inflorescence* compound, a flat-topped false panicle of 40 to 120 flowers (20 to 60 flower pairs), primary peduncles exserted from leaves, compressed, 2-winged, 3.0–4.5 mm wide, ultimate branches bearing paired flowers within opposed spathes; spathes 3–4 mm long, outer slightly larger than inner, leathery, red-brown, or green near bases, dry and dark brown above; floral bracts dry, reddish brown, much wrinkled, ± 5 mm long. *Flowers* salver-shaped, heterostylous, mostly pale blue, sometimes middle blue (rarely white), white at base of tepals and in tube; perianth tube cylindric, ± 5.5 mm long; tepals subpatent, held ± 30° above horizontal, lanceolate-elliptic, 6.3–7.0 × ± 2.4–3.0 mm. *Filaments* suberect, ± 6 mm long (thrum morph) or ± 2 mm long (pin morph); anthers ± 1.3 mm long, pale blue; pollen whitish. *Style* filiform, either emerging 2 mm from tube (thrum morph) or 7–8 mm from tube (pin morph), dividing into 3 linear stigma lobes, each ± 0.4 mm long. *Capsules* ovoid, ± 5 mm long, usually only 1 fertile locule fertile. *Seeds* usually single, 3.0–3.5 mm long. *Flowering time*: March to May.

Distribution and ecology: restricted to the lower southern slopes of the Klein Swartberg near Ladismith in



Distribution of ***Nivenia parviflora***.

Western Cape, South Africa; on rocky sandstone slopes, mostly in rock outcrops, in fynbos vegetation dominated by *Protea repens* L.

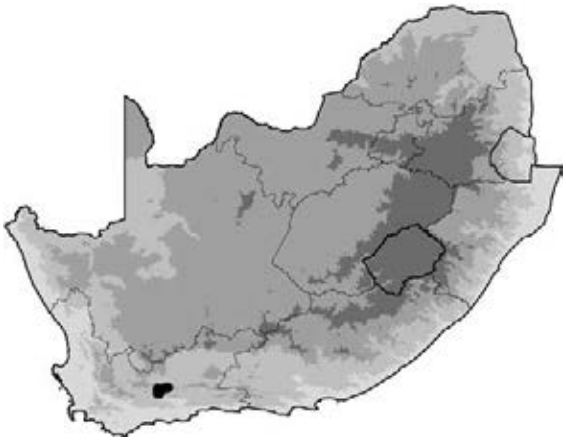
Diagnosis: *Nivenia parviflora* is an autumn-flowering species distinguished by the dark brown and much wrinkled floral bracts, and relatively small flowers with tepals 5–6 mm long and tube ± 5.5 mm long, and blue anthers. The brown, wrinkled floral bract and blue anthers are shared with *N. binata* and *N. stenosiphon*, but these two species have larger flowers with longer perianth tubes, usually 10–15 mm long in *N. binata* and 32–38 mm long in *N. stenosiphon*. The spathes in *N. parviflora* are 3–4 mm long and the floral bracts ± 5 mm long, whereas the spathes of *N. binata* are 4–5 mm long and the floral bracts 9–10 mm long, and it flowers in late spring, mainly October and November. Like its relatives, *N. parviflora* is heterostylous and has filaments are either ± 2 mm or ± 6 mm long (for long- or short-styled morphs) and the styles either 4 mm longer or shorter than the stamens.

6. **Nivenia stenosiphon** *Goldblatt*, Woody Iridaceae: 70 (1993). Type: South Africa, Western Cape, Klein Swartberg above Buffels River Poort, rocky sandstone slopes, 900–1 200 m, *Goldblatt & Manning 8864* (NBG, holo.; B, C, E, K, MO, PRE, S, US, WAG, iso.).

Shrubs (200–)400–900 mm high. *Stem* several-branched from base and in upper part, leafy shoots 3–4 mm diam. *Leaves* narrowly lanceolate, 50–90 × 2.5–3.5 mm. *Inflorescence* panicle-like, (20)40- to 80-flowered (10 to 40 flower pairs), peduncles exserted, 3–4 mm wide, ultimate branchlets bearing a pair of flowers within spathes; spathes 3–4 mm long, leathery, green below, dry and brown above, floral bracts dry and reddish brown, 8–9 mm long, firm-membranous below, much-wrinkled above. *Flowers* salver-shaped, heterostylous, deep blue throughout; perianth tube 32–38 mm long, ± 1.5 mm wide, cylindric, lower 2–5 mm filled with nectar; tepals ± patent, elliptic, 10–12 × 3–4 mm. *Filaments* either long, nearly 10–12 mm long (thrum flowers) or short, 2–3 mm long (pin flowers); anthers ± 1.4 mm long before anthesis, dark blue; pollen pale blue. *Style* either short and dividing just below to ± 1 mm above mouth of tube, 33–36 mm long (thrum flower) or 40–50 mm long, exserted ± 10 mm from tube (pin flower), branches filiform, 0.5–1.0 mm long, often shorter in thrum flowers, diverging after anther dehiscence. *Capsules* subglobose, 4–5 mm long. *Seeds* 1 per locule, rugose, dark brown, 3.0–3.5 × 1.8–2.0 mm. *Flowering time*: April to early June.

Distribution and ecology: a narrow endemic of the western Little Karoo in Western Cape, South Africa, recorded only from the western Klein Swartberg west of Ladismith and on the adjacent Touwsberg; on rocky, south-facing slopes and open level sites from 1 000–1 500 m elevation.

Diagnosis: *Nivenia stenosiphon*, which flowers in the autumn and early winter, closely resembles the late spring-flowering *N. binata* in the form of the inflorescence



Distribution of ***Nivenia stenosiphon***.

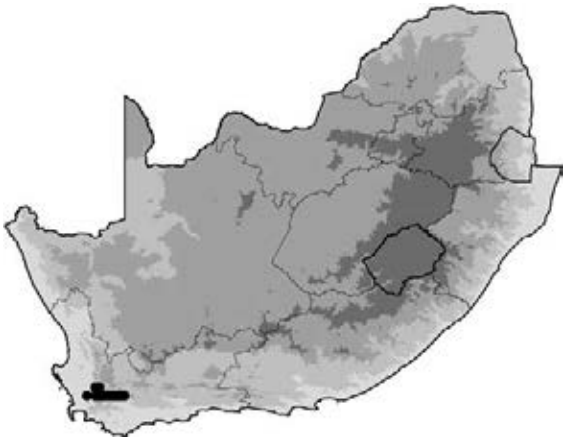
and in the long, wrinkled flower bracts, and the blue anthers and pollen. The flowers in both species are heterostylous and paired within the binate inflorescence units, and there seems little doubt that they are immediately related. They are distinguished by the phenology and dimensions of the floral bracts and perianth tube, the bracts 8–9 mm long and the perianth tube 32–38 mm long in *N. stenosiphon* versus bracts 9–10 mm long and perianth tube 9–15 mm long in *N. binata*.

The long-tubed flowers of *Nivenia stenosiphon* are adapted to pollination by the long-proboscid fly *Prosoeca ganglbaueri* (Nemestrinidae).

7. **Nivenia corymbosa** *(Ker Gawl.) Baker* in Journal of the Linnean Society, Botany 16: 109 (1877); Goldblatt: 74 (1993). *Witsenia corymbosa* Ker Gawl.: t. 895 (1805). *N. stylosa* Salisb.: 311 (1812), illegitemate superfluous name for *W. corymbosa* Ker Gawl. *Genlisia corymbosa* (Ker Gawl.) Reichb.: t. 24 (1836). *Aristea corymbosa* (Ker Gawl.) Benth. & J.D.Hook.: 701 (1883). Type: South Africa, without precise locality, illustration in Ker Gawl.: t. 895 (1805).

Nivenia filamentosa Salisb.: 311 (1812). Type: South Africa, Cape, locality unknown, type material not located.

Shrubs 0.8–2.0(–3.5) m high, occasionally only up to 0.3 m. *Stems* erect to inclined, usually several from base, compressed, leafy stems 5–6 mm diam., old stems reaching up to 30(–50) mm diam. At base, older plants with lateral branches smaller than main axes, these sometimes like spur-shoots. *Leaves* narrowly lanceolate, 10–20 × ± 8 mm, acuminate, usually 8 to 12 per growth flush. *Inflorescence* a compound, flat-topped false panicle of up to 120 flowers, primary peduncle strongly compressed, secondary branches subtended by leafy bracts below, or dry brown scales above, pedicels of variable length, 1–6(–8) mm long or ± lacking and some flowers sessile; spathes enclosing 1 or rarely 2 flowers, leathery, subequal, brown above, herbaceous



Distribution of ***Nivenia corymbosa***.

below, ± 4 mm long, inner floral bracts 6–7 mm long, dry and membranous, light to medium brown. *Flowers* salver-shaped, heterostylous, pale to deep blue, ± white at base of tepals and in tube; perianth tube 11–13 mm long, nearly cylindric, widening from 1.2 mm at base to ± 2 mm at mouth; tepals spreading, oblong, obtuse to subacute, 9–11 × 3.5–4.5 mm, inner slightly narrower than outer. *Filaments* either long, exserted ± 8.5 mm (thrum flower) or short, 0.5 mm long (pin flower), white; anthers ± 1.2 mm long after anthesis, yellow. *Style* 8–9 mm long (thrum flower) and included 1–2 mm below mouth of tube with branches 0.3 mm long, or ± 19 mm long (pin flower), exserted ± 9 mm, branches ± 0.8 mm long. *Capsules* obovoid, 3–4 mm long, 1 or 2 locules sometimes empty. *Seeds* 1(2) per locule, 2–3 × 1.8 mm. *Chromosome number* 2*n* = 32. *Flowering time*: late January to March.

Distribution and ecology: restricted to the southwestern corner of the Western Cape, South Africa, extending from Tulbagh Waterfall and the Elandskloof Mtns south to Bain's Kloof, a distance of some 30 km; mostly in sites where moisture is available during the dry summer, along streams and seeps, in crevices in cliffs and in rock outcrops.

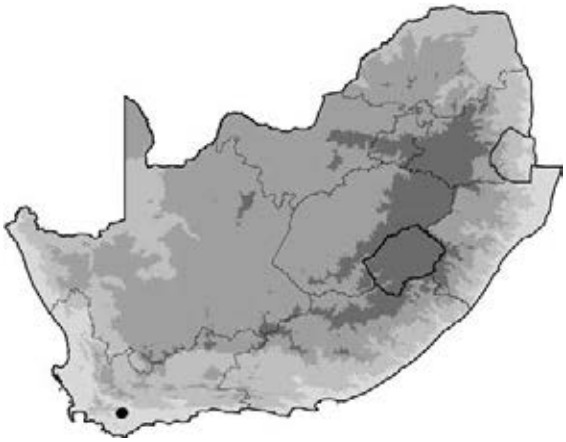
Diagnosis: the heterostylous *Nivenia corymbosa* can easily be recognised by its relatively small, dark blue flowers in large corymb-like compound inflorescence often comprising more than 100 flowers. The binate rhipidia bear a single flower each, and the two style morphs are quite different, with the filaments either prominently exserted ± 8.5 mm from the tube (thrum flowers), or nearly sessile with the anthers placed immediately above the mouth of the perianth tube (pin flowers). *Nivenia corymbosa* is most closely related to *N. dispar,* which occurs in the Riviersonderend Mtns to the east. The latter has larger, usually paler blue flowers with the perianth tube (16–)18–20 mm long and tepals 10.5–14.5 mm long compared with a tube 11–13 mm long and tepals 10–11 mm long in *N. corymbosa*.

Like most species of *Nivenia*, *N. corymbosa* flowers in the late summer, at the driest season of the year. The flowers open early in the morning just after sunrise and closing in the evening, usually wilting the following day but sometimes opening weakly although the tepals remaining flaccid. The intense blue flowers are visited and pollinated by a number of bees, the most important of these evidently the large-bodied, long-tongued *Amegilla fallax* (Anthophoridae).

8. **Nivenia dispar** *N.E.Br.* in Transactions of the Royal Society of South Africa 21: 268 (1933); Goldblatt: 81 (1993). Type: South Africa, [Western Cape], near Riviersonderend 'felsige Stellen bei Appelkraal, Rivier Zonder Einde,' [without date], *Zeyher s.n.* (K, holo.; K, SAM [20760], iso.).

Shrubs 0.8–2.0 m high, occasionally stunted and to only 300 mm. *Stems* erect to inclined, usually several from base, leafy shoots 2–3 mm wide. *Leaves* narrowly lanceolate, 100–200 × 7–8 mm. *Inflorescence* a false panicle of (15)30 to 80 flowers, peduncle strongly compressed, 3–4 mm wide, branches subtended by leafy bracts below, or dry brown scales above, ultimate peduncles of variable length, 4–15 mm long; spathes subequal, leathery, green below, brown above, ± 4 mm long, floral bracts 6–7 mm long, dry and membranous, brown. *Flowers* salver-shaped, heterostylous, pale to deep blue, paler at tepal bases and in tube; perianth tube (16–)18–20 mm long, ± cylindric, widening from 1.2 mm at base up to 2 mm at mouth; tepals obovate, obtuse to emarginate, 11–14 mm × (4.5–)5.0–6.0 mm, inner slightly narrower than outer. *Filaments* either ± 6 mm (thrum flower) or 0.5 mm (pin flower) long, white; anthers ± 1.2 mm long after anthesis. *Style* either 18–20 mm long and included 1–2 mm below mouth of tube (thrum flower) with branches < 0.5 mm long, or ± 25–27 mm long and exserted ± 7–9 mm (pin flower) with branches ± 1.4 mm long; branches filiform, slightly expanded in upper half and recurved. *Capsules* obovoid-ellipsoid, ± 4 mm × 3.5 mm. *Seeds* 1 per locule, ± 3 × 2 mm. *Flowering time*: late January to March.

Distribution and ecology: a narrow endemic of the Riviersonderend Mtns in southern Western Cape, South



Distribution of ***Nivenia dispar***.

Africa, and currently known only from only one locality, Olifant's Kloof north of the town of Riviersonderend; the small population occurs at the relatively low elevation of ± 200 m in sheltered sites at the base of cliffs, in rock crevices, and along a stream where moisture is available throughout the dry summer.

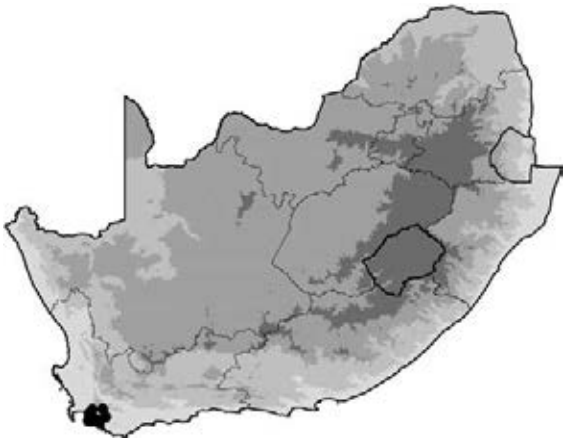
Diagnosis: the large, congested and flat-topped compound inflorescence of single-flowered rhipidia in *Nivenia dispar* closely resembles that of *N. corymbosa* and the two species can be distinguished only by comparison of flower size. Both species are heterostylous, but flowers of *N. corymbosa* are consistently smaller, with the perianth tube 11–13 mm long and tepals 9–11 mm long versus the perianth tube 16–20 mm long and the tepals 11–14 mm long in *N. dispar*.

9. **Nivenia stokoei** *(L.Guthrie) N.E.Br.* in Transactions of the Royal Society of South Africa 21: 267 (1933); Obermeyer: t. 1504 (1967); Goldblatt: 85 (1993). *Aristea stokoei* L.Guthrie: 24 (1925). Type: South Africa, [Western Cape], mountains near Palmiet River Mouth, *Stokoe 946* (BOL, lecto., designated by Goldblatt: 85 (1993); B, BOL, K, P, PRE [2 sheets], Z, isolecto.).

Rounded, woody, evergreen shrubs (0.3–)0.8–1.5 m high. *Stems* simple or irregularly branched, leafy stems 3–4 mm wide. *Leaves* narrowly lanceolate, 80–130 × 3–5(–6) mm, margins narrowly hyaline. *Inflorescence* a ± flat-topped false panicle of (12)20 to 40 flowers, bracts subtending branches of peduncle dry, 2–4 mm long, ultimate peduncles bearing single flowers; spathes 6–8 mm long, leathery, dry and dark brown near apices, inner slightly longer than outer; floral bracts dry, light brown, upper margin often lacerate, (10–)12–15 mm long. *Flower* salver-shaped, not heterostylous, but styles somewhat variable in length, pale or deep blue, ± white at base of tepals and in tube; perianth tube 27–33(–37) mm long, ± cylindric, 1.2 mm wide at base, expanding up to 2 mm at mouth; tepals spreading, elliptic-oblanceolate, 16–22(–25) mm long, outer 8–10 mm wide, inner 6.5–8.0 mm wide. *Filaments* (6.5–)8–10 mm long; anthers 2.0–2.8(–3.0) mm long. *Style* exserted (8–)10–15 mm from tube, usually dividing 3–5 mm beyond anther tips, in some plants ± as long as filaments, branches filiform, 2–3 mm long, recurved. *Capsules* globose-obovoid, 5–6 mm long, ± 4.5 mm diam., rarely with seeds in all locules. *Seeds* mostly 1 or 2 per locule, rugose, blackish with a loose translucent outer layer, ± 5 × 2.8 mm, smaller if 2 per locule. *Chromosome number* 2*n* = 32. *Flowering time*: mid-January to March.

Distribution and ecology: restricted to the southwestern corner of the Caledon District of Western Cape, South Africa, from the foot of the mountains at Betty's Bay and Kleinmond, close to sea level, to elevations of ± 800 m at Highlands; in open rocky sites in sandstone derived soil.

Diagnosis: *Nivenia stokoei* has the largest flowers in the genus, with relatively crowded inflorescences of pale to deep blue flowers with a perianth tube 27–37 mm long. The large flower size is reflected in the bracts and spathes so that the species can also be identified after flowering. Each inflorescence normally comprises 20 to 40 flowers although there may be as few as 12 flowers in depauperate plants. The flowers are not heterostylous but the style varies in length in different plants. The flowers are solitary in the binate rhipidia, as in *N. concinna*, and it is to this species that *N. stokoei* seems most closely allied. *Nivenia concinna* is a dwarf plant up to 200 cm high, with inflorescences of only 2 to 6, slightly smaller flowers with a perianth tube ± 15 mm long.



Distribution of ***Nivenia stokoei***.

In sheltered sites plants may reach heights of up to 1.5 m but in very rocky or exposed places individuals are usually dwarfed and less than a metre, sometimes no more than 300 mm high. *Nivenia stokoei* is a particularly handsome species and well grown, healthy plants in full bloom are a wonderful sight.

10. **Nivenia concinna** *N.E.Br.* in Transactions of the Royal Society of South Africa 21: 267 (1933); Lewis: t. 548 (1934); Goldblatt: 91 (1993) Type: South Africa, [Western Cape], Viljoen's Pass, *Salter 2033* (K, holo.; BM, BOL, iso.).

Low, often rounded, evergreen shrublets 120–200 mm high. *Stems* seldom branched except near base; leafy stems 2–3 mm wide. *Leaves* linear (rarely narrowly lanceolate), 60–100 × 1.3–2.5 mm. *Inflorescence* flat-topped, usually branched and with 2 to 6 flowers but rarely only one; primary peduncle compressed and included in leaf cluster, first node bearing a dry brown bract 5–9 mm long, bracts at other nodes smaller, individual flowers single in paired spathes, spathes green with brown apices, ± 6 mm long; bracts brown-membranous, semi-transparent, 10–12 mm long. *Flower* salver-shaped, homostylous, deep blue, ± white at tepal bases and in tube; perianth tube ± 15 mm long, ± cylindric, ± 1 mm wide at base, expanding gradually up to 2 mm at mouth; tepals spreading, elliptic-oblanceolate, up to 22 mm long, outer 9 mm wide, inner 8 mm wide. *Filaments* ± 6 mm long; anthers ± 3 mm long. *Style* exserted from tube for ± 6 mm, dividing near middle

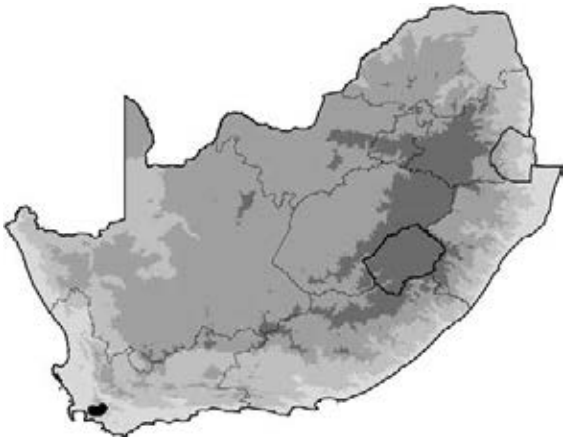




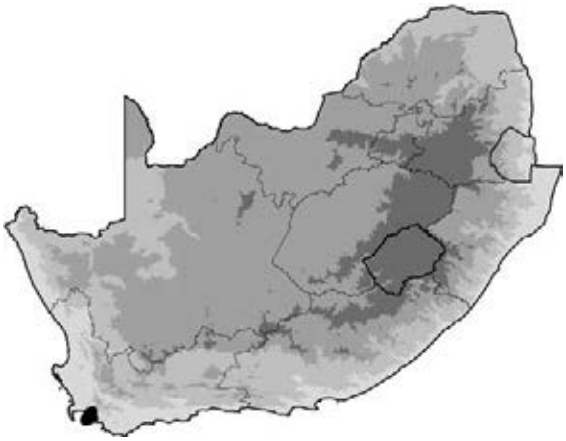




Plate 3: A, ***Nivenia corymbosa***, Wellington, WC, Long-style pin morph; B, ***N. corymbosa***, Wellington, WC, Short-style thrum morph; C & D, ***N. stokoei***, Kogelberg, WC.



Distribution of ***Nivenia concinna***.



Distribution of ***Nivenia levynsiae***.

of anthers, white, branches filiform, ± 4 mm long, ciliate in upper ⅓, arching upwards. *Capsules* obovoid, ± 6 × 4 mm. *Seeds* usually 1 per locule, dark brown, ± 5 × 2 mm. *Flowering time*: February and March.

Distribution and ecology: *Nivenia concinna* is restricted to a small area of mountainous terrain north of Grabouw in Western Cape, South Africa, near Viljoen's Pass in the Nuweberg Forest Reserve and in the western Groenland Mtns; growing in rocky ground with rootstocks wedged in weathered Cape sandstone. Like all species of *Nivenia* it is fire-tolerant and resprouts and flowers well after the surrounding vegetation has been burned.

Diagnosis: one of the smaller species in the genus, *Nivenia concinna* rarely exceeds 200 mm in height and has dark blue flowers with a relatively short perianth tube, ± 15 mm long, and unusually long, ascending style branches. The inflorescence is apparently a reduced pseudopanicle and homologous to the multi-flowered inflorescences of *N. corymbosa* and *N. dispar*. The species is not heterostylous but is evidently derived from heterostylous ancestors and the flowers are solitary in the paired spathes. These features, together with the general form of the inflorescence, suggest a close relationship with *N. stokoei*.

11. **Nivenia levynsiae** *Weim.* in Svensk Botanisk Tidskrift 34: 364 (1940). Type: South Africa, [Western Cape], mtns at Palmiet River Mouth, in rock crevices, 1 700–2 000 ft [± 550–600 m], *Levyns 5360* (BOL, holo.; BOL, K, MO, S, SAM, iso.).

Low tufted or somewhat straggling shrublets, 60–150(–250) mm high. *Stem* sparsely branched above, few to several(–20) per plant, leafy part ± 1 mm wide, older stems up to 2 mm diam. *Leaves* linear-lanceolate to linear, 20–40 × 1.3–2.0 mm. *Inflorescence* 1- to 4-flowered, congested, subtended by a dry bract 7–9 mm long, peduncle compressed, angular, 10–20(–30) mm long, flowers solitary within opposed spathes; spathes ± 6.5 mm long, green in lower ⅓, dry and dark brown above, acute, upper margins hyaline; floral bract ± 7 mm long, dark brown, upper margin ± transparent, ± lacerate. *Flowers* salver-shaped with tepals cupped, not heterostylous, pale blue with darker blue mark at base of each tepal; perianth tube ± 7 mm long, narrowly funnel-shaped; tepals obovate, obtuse, widest in upper ⅓, 13–15 × 6–8 mm. *Filaments* ± 2 mm long; anthers initially 1.5 mm long, 1.0–1.2 mm after pollen shed, yellow; pollen yellow. *Style* 10–12 mm long; branches filiform, 2.5–3.0 mm long, ascending, white. *Capsules* obovoid, ± 4.5 mm long. *Seeds* compressed to ± irregularly angled, (1)2–4 per locule, ± 2 mm wide. *Chromosome number* 2*n* = 32. *Flowering time*: late January and February.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, in the mountains between False Bay, Houw Hoek and Kleinmond; in rocky situations above 500 m elevation, often growing in the driest most exposed outcrops, but sometimes in deeper soils, flowering well two to three years after fire.

Diagnosis: *Nivenia levynsiae* is recognised by its low, tufted, often cushion-like habit, and pale blue, particularly short-tubed flowers with widely cupped tepals. It is the only species of the genus in which the tepals are substantially longer than the perianth tube, and one of only two species with ± cupped tepals. The other, *N. fruticosa* from the Langeberg, is also a cushion plant and has a longer perianth tube, 20–30 mm long. The affinities of *N. levynsiae* probably lie with *N. concinna* and *N. stokoei*, which also have homostylous flowers in one-flowered rhipidia but have inflorescences with more flowers, up to 6 in *N. concinna* and 12 to 40 in *N. stokoei*. We interpret the inflorescence of *N. levynsiae* as being a reduced false panicle in which there are no more than 4 flowers.

REFERENCES [See under 3. *Witsenia*]

3. Klattia

Klattia *Baker* in Journal of the Linnean Society, Botany 16: 109, 110 (1877); Goldblatt: 99 (1993). Type: *Klattia partita* Ker Gawl. ex Baker.

Revisionary account: Goldblatt: 99–107 (1993).

The name honours the 19th century German botanist, F.W. Klatt, who made a life-long study of the Iridaceae.

Evergreen shrubs with a woody underground caudex. *Stems* upright, primary growth compressed, becoming rounded below, secondary growth woody, with conspicuous leaf scars, ultimately up to 20 mm diam.; major axes either simple, branched or with short-lived spur-shoots. *Leaves* lanceolate to sub-linear, sheathing below, clustered apically, without a main vein; lasting more than a year; margins narrowly hyaline. *Inflorescence* compound, capitate, peduncle not differentiated from stem; enclosed in 2 or 3 opposed sheathing leafy bracts, sheathing part pale greenish to creamy yellow or red, usually green near base; flowers paired in binate rhipidia, each of these subtended by a short transparent bract and opposed prophyll; spathes membranous, acute; floral bracts membranous, transparent, 2-keeled, slightly smaller than spathes, sheathing lower part of flower. *Flowers* sessile, transparent below, coloured above, odourless; perianth tube short, cylindric inserted on ovary ± ⅓ below apex; tepals subequal, linear-spathulate, ± clawed, claws mostly included in inflorescence bracts, limbs exserted, intensely pigmented. *Stamens* inserted at base of outer tepals, filaments flattened below, terete and filiform above; anthers linear, sub-basifixed with connective forming pouch around filament apex, exserted from inflorescence bracts, yellow; pollen yellow. *Ovary* globose, each locule with 2 ovules; style filiform, exceeding or slightly shorter than tepals, minutely trifid. *Fruit* a woody capsule, ovoid-elliptic, shortly beaked, locules 1-seeded, or seeds not developed. *Seeds* compressed tangentially, shield-shaped, light grey-brown, outer layer translucent, lightly striate. *Basic chromosome number x* = 16.

Species 3: all of the southern and southwestern part of Western Cape, extending from Bain's Kloof and the Cape Peninsula east through the Caledon District to the Langeberg near Riversdale; restricted to moist or semi-marshy montane sites in peaty, sandstone-derived soils.

Klattia species are moderate-sized shrubs producing multiple, woody stems from a large underground rootstock. The broadly similar inflorescences are actually compound structures consisting of numerous individual binate rhipidia, each bearing two flowers enclosed in shared bract-like spathes, all crowded together in a head. The entire inflorescence in enclosed enlarged leafy bracts, these green (*K. partita*), red (*K. stokoei*) or yellow (*K. flava*). Apart from the colour of the prominent sheathing bracts, the species are separated by small floral differences, including length and colour of the tepals and length of the style. Seeds of *Klattia* are tangentially compressed as in the two other genera of woody Iridaceae, but the seed coat is striate and comprised of fusiform cells that remain intact. The tepals of all *Klattia* species are united basally in a short perianth tube, and the much longer tepals are spathulate and extend upward, enclosing the stamens and style, the latter minutely 3-notched at the tip as in *Witsenia*. The flowers secrete ample amounts of sugary nectar, some of which spills over the surrounding bracts as a sticky residue. All species are pollinated by sunbirds.

Key to species

1a Leafy bracts enclosing inflorescence red; upper leaves 8–14 mm wide . . . . . 3. *K. stokoei*
1b Leafy bracts enclosing inflorescence pale greenish to translucent cream-coloured; upper leaves 3–8 mm wide:
2a Upper leaves (3–)4–5 mm wide, deep green; limbs of tepals intense blackish purple; styles shorter than to nearly as long as tepals; tepals (47–)55–64 mm long . . . . . 1. *K. partita*
2b Upper leaves (3–)5—8 mm wide, glaucous-green; limbs of tepals yellow; styles exceeding tepals by (1–)2–5 mm; tepals 44–48 mm long. . . . . 2. *K. flava*

1. **Klattia partita** *Ker Gawl. ex Baker* in Journal of the Linnean Society, Botany 16: 110 (1877); Goldblatt: 101 (1993). *Witsenia partita* Ker Gawl. ex Spreng.: 147 (1824), illegitimate superfluous name for *Sophronia caespitosa* Licht. ex Roem. & Schult.: 482 (1817). Type: South Africa, [Western Cape], Riversdale, Kampscheberg [Rooielsberg], *Burchell 7159* (K, lecto., designated by Goldblatt: 101 (1993); B, GH, P, isolecto.).

Witsenia partita Ker Gawl. ex Klatt: 546 (1866), illegitimate homonym, not *W. partita* Ker Gawl. ex Spreng. (1824). Type: South Africa, [Western Cape], Swellendam, 'am Berge bei Puspasvlei', *Ecklon & Zeyher Irid. 263* (B, MO, iso.).



Klattia stokoei: A, flowering and fruiting branches; B, outer bract; C, inner bract; D, flower; E, anther; F, stigma; G, dehisced capsule; H, seed showing inner (left) and outer (right) surface.

[*Witsenia partita* Ker Gawl.: 237 (1804), invalid name without description.]

Shrubs up to 1 m high from woody base. *Stem* irregularly branched, leafy stems 3–4 mm wide, up to 6 mm diam. near base. *Leaves* deep green, narrowly lanceolate, 90–120 × (3–)4–5 mm. *Inflorescence* a compound head with (4)8 to 16 flowers (2 to 8 flower pairs); foliar bracts with sheathing part pale translucent green, dark green at tips; spathes membranous, 15–20 mm long, outer ± larger than inner; floral bracts membranous, translucent, 12–14 mm long. *Flowers* pale yellow-green below, dark blackish purple on exserted part of limbs; perianth tube 3.3–4.0 mm long; tepals (47–)55–64 mm long, limbs ± 12 mm long. *Filaments* ± 43 mm long, ± white, reaching to base of tepal limbs; anthers ± 7 mm long, reaching to within 5–8 mm of tepal tips, yellow; pollen yellow. *Ovary* ± 2.5 mm long; style 53–58 mm long, 2–3 mm shorter than tepals, stigmatic lobes minute. *Capsules* narrowly ovoid-oblong, 8–9 mm long, 4–5 mm at widest. *Seeds* ± 7 × 3 mm. *Flowering time*: October to December.

Distribution and ecology: a rare montane endemic of Western Cape, South Africa, extending from a few isolated sites in the Kogelberg–Hottentots Holland Mtn complex to the Langeberg near Riversdale [records from the Cape Peninsula and from Clanwilliam are evidently incorrect]; on cooler south trending slopes in seeps and marsh margins above 600 m elevation. Good drainage and year-round moisture appear to be a requirement for its survival. The species is believed to be adapted for pollination by sunbirds but this remains to be established.

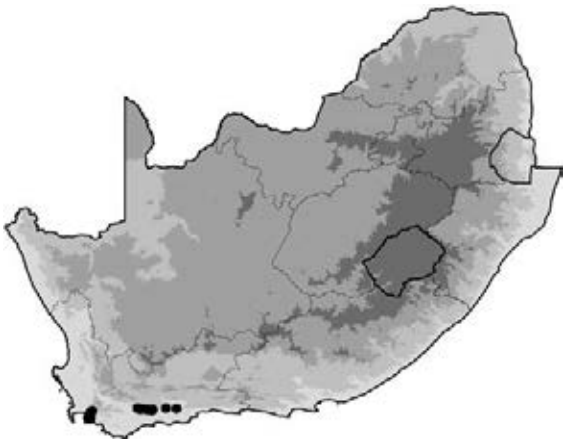
Diagnosis: the dark blackish purple tepals distinguish *Klattia partita* from the other species of *Klattia*. This unusual colour is rare in flowering plants. Apart from flower colour, *K. partita* can be recognised by the long tepals up to 64 mm long versus 44–48 mm in the related *K. flava*, and the stamens and style are shorter than the tepals. In *K. flava* the anthers reach to within 1–5 mm of the tepal apices and the styles are exserted up to 5 mm, whereas the anthers of *K. partita* are usually 5–8 mm short of the tepal apices and the styles are not exserted.

Vegetatively *K. partita* most closely resembles *K. flava* in having relatively narrow leaves, and inflorescence bracts not markedly different in colour from the foliage leaves. *Klattia stokoei* has broader leaves, 8–14 mm wide, and bright red inflorescence bracts.

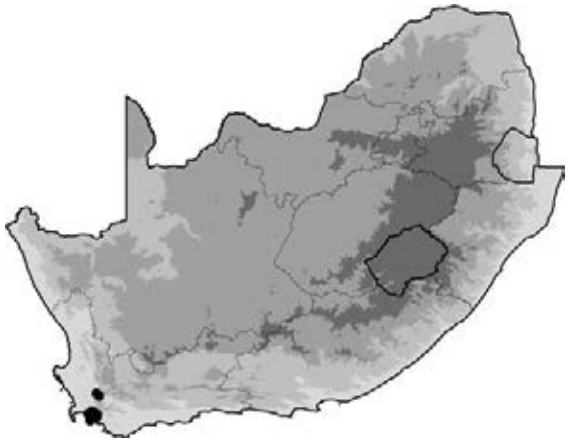
2. **Klattia flava** *(G.J.Lewis) Goldblatt*, The Woody Iridaceae: 108 (1993). *K. partita* var. *flava* G.J.Lewis: 51 (1941). Type: South Africa, [Western Cape], Landdrostkop, Dec., *Stokoe s.n.* (SAM [54461]; lecto., designated by Goldblatt: 108 (1993); NBG, PRE, SAM, isolecto.).

Shrubs 0.9–1.3 m high, with long straight stems. *Stem* simple or with a few branches produced in upper ⅓; leafy stems (2–)3–4 mm wide, 8–10 mm diam. near base. *Leaves* glaucous to pale green, sometimes densely papillose, 12–180(–210) × (3–)5–8 mm. *Inflorescence* with 10 to 20 flowers (5 to 10 flower pairs); foliage bracts with sheathing part translucent creamy yellow, apices green; spathes membranous, 16–20 mm long, outer somewhat larger than inner, bracts membranous and translucent, 12–14 mm long. *Flowers* transparent below, creamy yellow above and deep yellow on exserted part of limbs; perianth tube 4.5(–6.0) mm long; tepals 42–48 mm long, limbs ± 6–8 mm long, obtuse, outer ± 2 mm wide, spooned above, inner ± 1.4 mm wide, ± flat, slightly longer than outer, exserted from inflorescence bracts. *Filaments* 35–40 mm long, cream-coloured; anthers 7–8 mm long, reaching to within 1–5 mm of tepal tips, yellow; pollen yellow. *Ovary* ± 2.5 mm long; style 48–55 mm long, ultimately exceeding tepals by 3–4 mm, stigmatic lobes minute. *Capsules* narrowly ovoid, ± 7 × 3–4 mm at widest. *Seeds* pale grey, ± 7 × 2.5–3.0 mm. *Flowering time*: mid-November to December.

Distribution and ecology: centred in the Grabouw area of southwestern Western Cape, South Africa, in the Hottentots Holland and Groenland Mtns but also further north in the Bain's Kloof Mtns; on damp slopes, seeps and gullies, often near perennial streams above 800 m elevation, where summer cloud and precipitation are frequent.



Distribution of ***Klattia partita***.



Distribution of ***Klattia flava***.

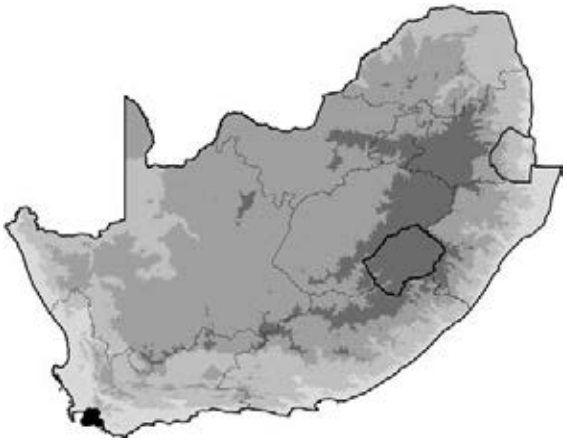
The flowers are pollinated by sunbirds, of which the Orange-breasted Sunbird is probably the most important, if not the only pollinator.

Diagnosis: *Klattia flava* is distinguished from the other species of *Klattia* by its bright yellow perianth and straight, somewhat glaucous, relatively narrow leaves, (3–)5–8 mm wide. It is evidently most closely related to *K. partita*, which has similar but narrower, deep green leaves, rarely exceeding 5 mm wide, and differently proportioned flowers with the perianth tube 3.4–4.0 mm long and the tepals 47–58 mm long versus the perianth tube ± 4.5 mm long and the tepals 42–48 mm long in *K. flava*. Moreover, the outer tepals are spooned at the apex in *K. flava*, and the style is exserted (1–)3–4 mm from the tepals, whereas the style in *K. partita* is usually 2–3 mm short of the tepal apices.

Leaves of populations of *Klattia flava* from Bain's Kloof, Landdrost Kop and Somerset Sneeukop have a densely papillate leaf surface, easily visible under low magnification, but plants from the Groenland Mountains to the east have smooth leaves, as does *K. partita*.

3. **Klattia stokoei** *L.Guthrie* in Annals of the Bolus Herbarium 3: 75 (1921); Pole Evans: t. 80 (1922); Goldblatt: 113 (1993). Type: South Africa, [Western Cape], Steenbras River Valley, eastern mountain slopes, *Stokoe s.n.* (BOL [16906], holo.; BOL, K, S, iso.).

Shrubs 0.5–1.2 m high. *Stem* simple or irregularly branched, leafy stems (3–)4–5 mm wide, 8–10 mm diam. Toward base. *Leaves* dark green, 9–15(–20) × (4–)7–14 mm, linear-lanceolate, becoming ± falcate below inflorescence, sometimes curving upward near tip. *Inflorescence* with 6 to 8 flowers (3 or 4 flower pairs), foliage bracts with sheathing part crimson-red, apices of outer bracts green, apices of inner reduced and usually entirely red; spathes membranous, 25–37 mm long, subequal, bracts membranous, transparent, 18–33 mm long, slightly shorter than spathes. *Flowers* transparent below, flushed reddish above, orange-red on exserted parts; perianth tube 2–5 mm long; tepals ± linear, limbs spathulate, obtuse to emarginate, exserted from inflorescence bracts, orange-red, 5.5–7.5 mm long, limbs 12–14 mm long, ± 1 mm wide just below apex, ± flat, inner slightly longer than outer, claws pale red fading to transparent toward base. *Filaments* ± 5 mm long, cream-coloured; anthers ± 7.5 mm long, exserted, reaching to within (2–)5–8 mm of tepal apices, yellow; pollen yellow. *Ovary* ± 2.5 mm long; style 5.7–7.8 mm long, exceeding tepals by 1–5 mm, stigmatic lobes minute. *Capsules* ± 6 mm long. *Seeds* unknown. *Chromosome number* 2*n* = 32. *Flowering time*: mid-December to early February.



Distribution of ***Klattia stokoei***.

Distribution and ecology: restricted to the Kogelberg Mtn complex of southwestern Western Cape, South Africa, extending from the ridges above Steenbras Dam in the west to Betty's Bay and the mountains above Kleinmond in the east; on damp south trending slopes, seeps and streambanks in peaty sand.

There are recorded visits of Malachite Sunbirds to plants near Pringle Bay.

Diagnosis: the most distinctive species in the genus, *Klattia stokoei* is immediately recognised by the large red bracts enclosing the inflorescence, and the bright red tepals. The leaves are also distinctive, comparatively wide, mostly 7–14 mm wide in the midline and usually somewhat falcate, unlike the narrow, linear leaves of *K. flava* and *K. partita*.

REFERENCES [See under 3. *Witsenia*]

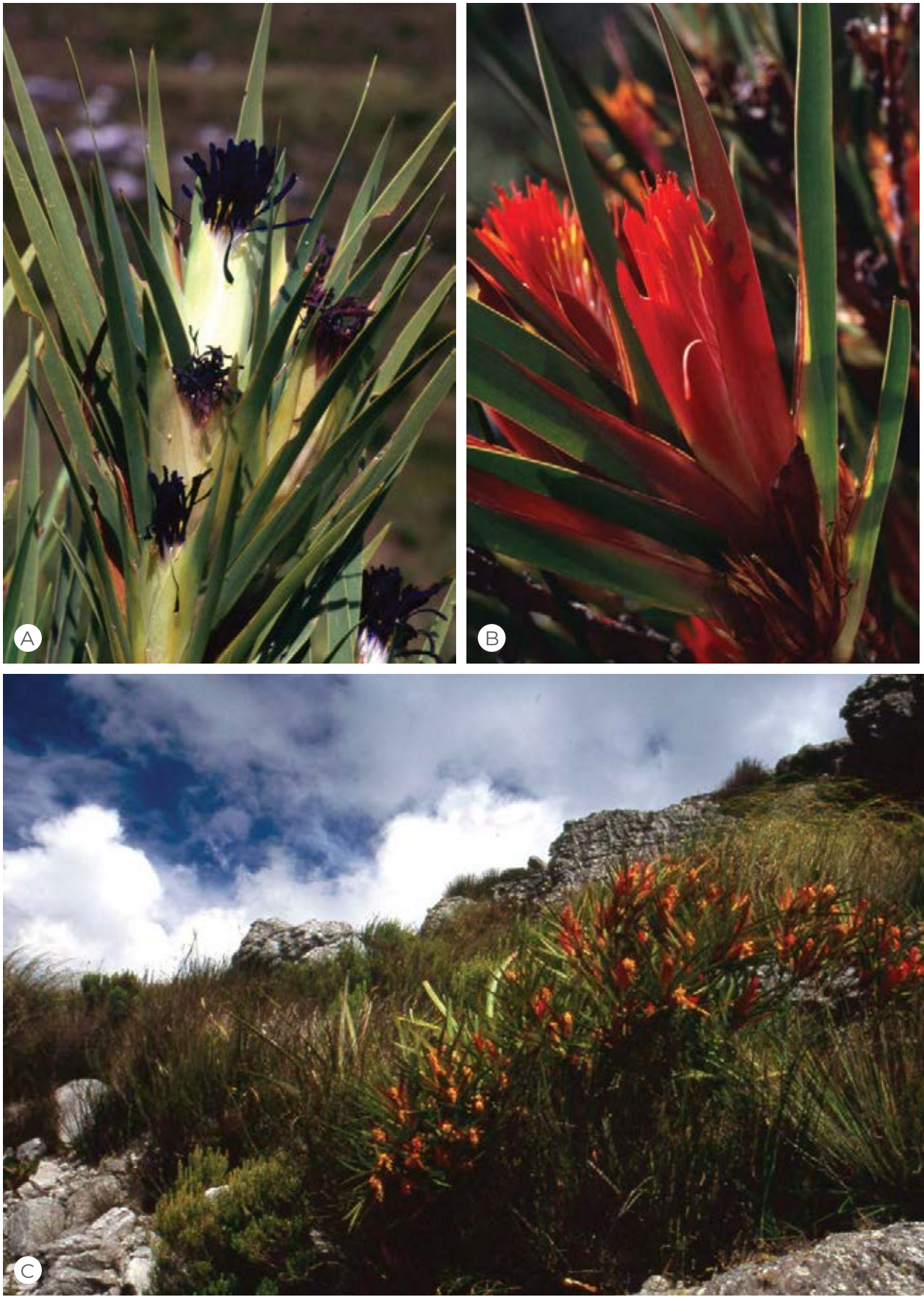


Plate 4: A, ***Klattia partita***, Kogelberg, WC; B & C, ***K. stokoei***, Gordon's Bay, WC.

4. Witsenia

Witsenia *Thunb.*, Nova genera plantarum: 33 (1782) [as *Witsena*]; Baker: 46 (1896). Type: *W. maura* (L.) Thunb.

Revisionary account: Goldblatt: 117–126 (1993).

Named after the Dutch Nicholas Witsen, counsellor to the Chief Magistrate of Amsterdam, and a patron of botany. Witsen financed the Swedish botanist. C.P. Thunberg's travels to South Africa and Japan and was rewarded in this commemoration.

Evergreen shrub with a woody caudex. *Stems* upright or inclined, compressed, becoming rounded below, brittle and woody (with secondary growth), marked with leaf scars, main axes simple, sparsely branched. *Leaves* sword-shaped, crowded apically, in 2 ranks. *Inflorescence* compound, upper lateral branches short, terminating in shortly stalked binate rhipidia, subtended by large green bracts, collectively forming a false panicle; binate rhipidia each 2-flowered, spathes large, leathery, pale green, floral bracts membranous, shorter than spathes. *Flowers* radially symmetric, sessile, long-lived, tubular, greenish and black with upper half of tepals yellow outside, tepals remaining erect throughout flowering, unscented, with nectar produced from septal nectaries; perianth tube elongate, widely cylindric; tepals obscurely clawed, limbs velvety-hairy outside. *Stamens* free, enclosed in flower; filaments inserted at mouth of tube, flattened, reaching to ± middle of tepal limbs; anthers oblong, connective pouched below around filament apex, splitting longitudinally. *Ovary* globose, domed above insertion of tepals, enclosing enlarged septal nectaries, locules with 2 ovules; style filiform, shortly exserted from flower, shortly 3-notched apically. *Capsules* narrowly ovoid, ± woody, with central axis separating from septa. *Seeds* tangentially compressed, shield-shaped, 1 per locule, smooth, surface granulate, testa often partially exfoliated. *Basic chromosome number x* = 16.

Species 1: local in southern Western Cape.

Witsenia includes just a solitary species, remarkable for its large, long-tubed flowers with the tube green to almost black outside. The short tepals remain closed thus covering the entrance to the tube, and the abaxial surfaces, those visible from outside, are densely covered with velvety yellow hairs. The only possible pollinators are animals strong enough to push their mouthparts past the closed tepals to reach the nectar. The most likely pollinators are sunbirds, and the Malachite Sunbird has been reported to visit *Witsenia* flowers. The shield-shaped seeds of *Witsenia*, with exfoliating seed coat, resemble those of *Nivenia*.

1. **Witsenia maura** *(L.) Thunb.*, Dissertatio generum novum: 234 (1782). *Antholyza maura* L.: 175 (1771). *Ixia disticha* Lam.: 333 (1789), illegitimate name for *A. maura* L. Type: South Africa, without precise locality, collector unknown, (LINN, holo.).

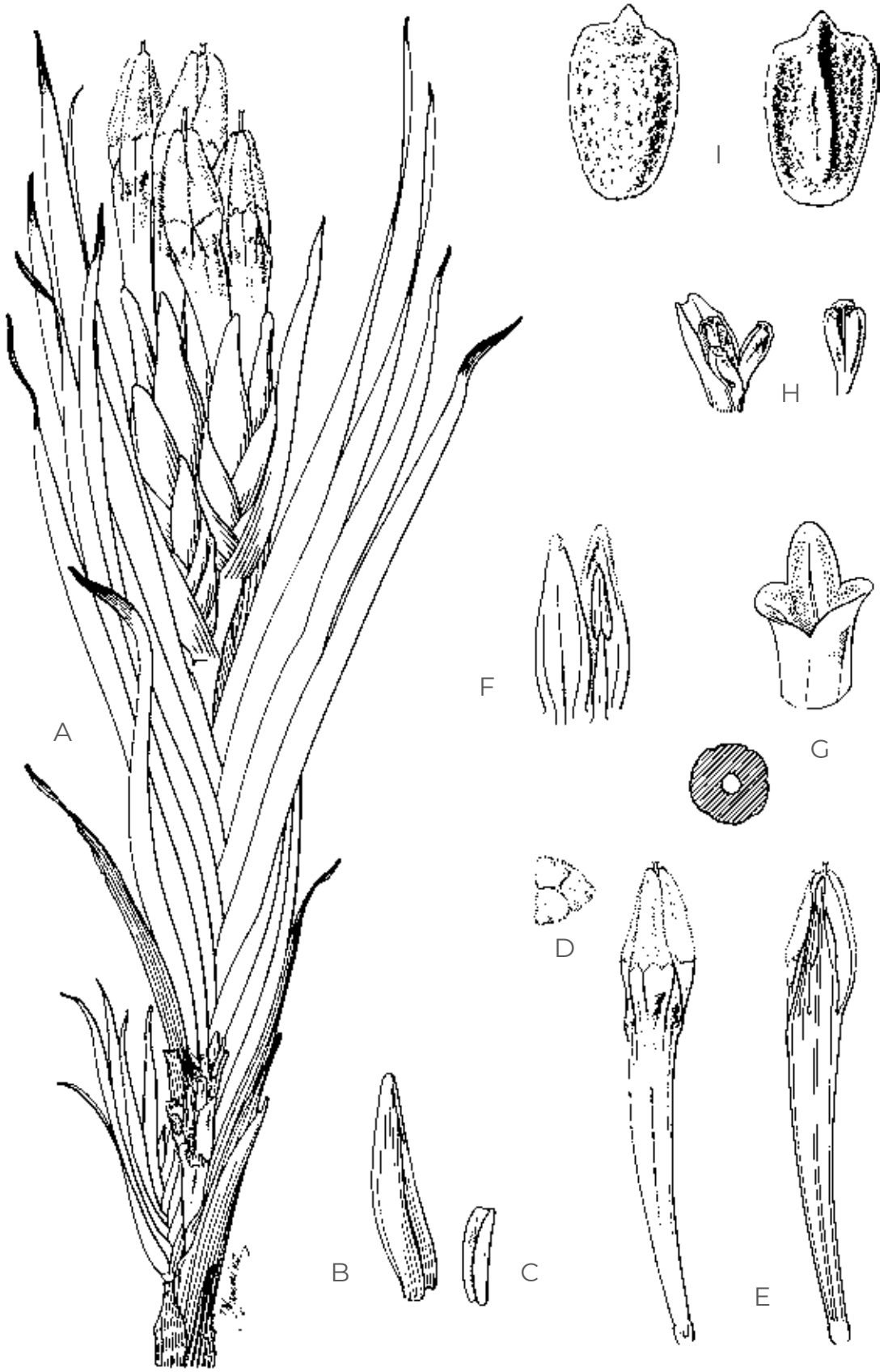
[*Witsenia tomentosa* Salisb.: 312 (1812), invalid name without description.]

Plants 1–3 m high, ± erect or sprawling in dense vegetation. *Stem* upright or inclined, simple or with a few branches, leafy part 3–5 mm wide, 10–15 mm diam. near base. *Leaves* narrowly lanceolate, 100–150 × 4–7 mm, dark green. *Inflorescence* with 8 to 16 flowers (4 to 8 flower pairs), each pair subtended by 3 to 5 acute bracts at base of each binate rhipidium, each with stalks 2–4 mm long; spathes 35–40 mm long, strongly emarginate, sheathing lower half of tube, floral bracts 2-keeled, 15–18 mm long, concealed by spathes. *Flowers* pale green below, dark green above shading to blackish at top of tube, tepals blackish in lower half, outer tepals densely villous and yellow in upper half, inner mostly concealed by outer, pale green, yellow and villous at tips where exposed; perianth tube 50–55 mm long, ± 3 mm wide at base, wider above bracts, 6 mm wide at apex, lower half usually filled with nectar; tepals lanceolate, ± erect, closed over stamens, 25–30 mm long, limbs 10–12 mm long, outer tepal limbs velvety-pubescent outside, inner tepals covered by outer except at apex, inner tepals pubescent at tips. *Filaments* ± 10 mm long; anthers oblong-linear, 5–6 mm long, appressed to inner surface of outer tepals, yellow; pollen yellow. *Style* extending 2–3 mm from tepals when receptive, later retracting, minutely 3-forked. *Capsules* narrowly obovoid, 9–12 mm long. *Seeds* 6–7 mm long, 1 per locule. *Flowering time*: mainly late spring and summer, October to December but also at other times.

Distribution and ecology: endemic to southern Western Cape, South Africa, extending from the southern Cape Peninsula through the Caledon District to at least the eastern end of the Riviersonderend Mtns and possibly the Langeberg at Swellendam; at low to middle elevations in marshy or peaty ground.

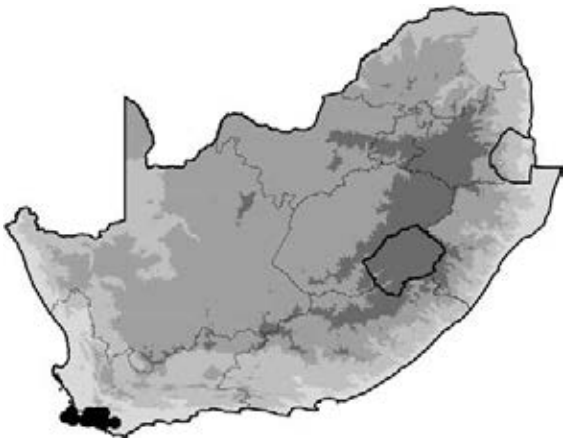
Flowers of *Witsenia maura* are adapted for pollination by sunbirds. The firmly closed tepals evidently prevent insects entering the flowers, thus limiting their access to both pollen and the nectar-filled lower perianth tube. Only Malachite Sunbirds seem strong enough to part the tepals with their beaks and this is the only pollinator so far noted visiting the flowers, which contain large quantities of sugary nectar of relatively low concentration.

Diagnosis: the shrubby evergreen habit and apical fans of leaves of *Witsenia maura* indicate a close relationship with *Klattia* and *Nivenia*, but the structure of the



Witsenia maura: A, flowering stem; B, outer bract; C, inner bract; D, flower from side and above; E, half-flower; F, inner and outer tepals showing attachment of stamen; G, stigma and diagrammatical section of style (shaded); H, fully and partially dehisced capsules; I, seed showing outer (left) and inner (right) surfaces.

inflorescence and the flower is so different from these two genera that it is difficult to accurately assess their interrelationships. The inflorescence in *Witsenia* is a false panicle with short lateral branches, each of which bears a pair of flowers arranged in a binate rhipidium, a pattern similar in basic organisation to that in some species of *Nivenia*. This is the putatively primitive inflorescence organisation for the woody Iridaceae and recalls the condition in some species of *Aristea*. Thus the inflorescence structure of *Witsenia* is probably fairly primitive, although the enlarged, leathery, apically notched spathes and bracts are unlike anything found in the other shrubby genera. Despite their obvious differences, similarities in the flowers of *Klattia* and *Witsenia* suggest the two genera are more closely related to one another than to *Nivenia*, namely the clawed tepals, flattened filaments inserted in a pouch at the bases of the anthers, and minutely trifid styles. *Klattia* is, however, very different from *Witsenia* in its crowded, head-like inflorescences, linear-spathulate tepals, short perianth tube, and enlarged leaves enclosing the inflorescences. The velvet pubescence on the tepals of *Witsenia* is unusual in Iridaceae. It is produced by densely arranged multicellular hairs containing yellow chromoplasts.



Distribution of ***Witsenia maura***.

EXCLUDED SPECIES

Witsenia magellanica (Lam.) Pers., Synopsis Plantarum 1: 42 (1805). *Ixia magellanica* Lam., Encyclopédie méthodique 3: 334 (Oct. 1789) = *Tapeinia pumila* (Forst.f.) Baill.

Witsenia pumila (Forst.f.) Vahl: 48 (1805). *Ixia pumila* Forst.f., Commentiones Societatis Regiae Scientiarum Gottingensis (1789) = *Tapeinia pumila* (Forst.f.) Baill.

Witsenia pyramidalis (Lam.) Pers., Enumeratio Plantarum 1: 42 (1805). *Ixia pyramidalis* Lamarck, Encyclopédie méthodique 3: 334 (1789) = *Lapeirousia pyramidalis* (Lam.) Goldblatt

[*Witsenia spicata* E.Mey. ex Baker in Journal of Botany, British and foreign 14: 267 (1876), invalid name only in synonymy = *Aristea racemosa* Baker]

REFERENCES

ADAMSON, R.S. 1931. On a new species of *Aristea*, with an account of the anatomy. *Transactions of the Royal Society of South Africa* 19: 373–378.

BAKER, J.G. 1876. New Aristeae and Sisyrinchia. *Journal of Botany, British and foreign* 14: 267–269.

BAKER, J.G. 1877 ['1878']. Systema Iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae.* George Bell & Sons, London.

BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.

BENTHAM, G. & HOOKER, J.D. 1883. *Genera plantarum* 3(2). Reeve and Co., London.

BROWN, N.E. 1933. *Nivenia* Vent. and *Nivenia* R.Br. *Transactions of the Royal Society of South Africa* 21: 259–270.

FORSTER, J.G.A. 1789. *Commentiones Societatis Regiae Scientiarum Gottingensis* 9: 21, t. 2.

GOLDBLATT, P. 1990. Phylogeny and classification of Iridaceae. *Annals of the Missouri Botanical Garden* 77: 607–627.

GOLDBLATT, P. 1993. *The Woody Iridaceae: Systematics, Biology and Evolution of* Nivenia, Klattia *and* Witsenia. Timber Press, Portland, OR.

GOLDBLATT, P. 1997. A new species of *Nivenia* (Iridaceae). *Bothalia* 27: 101–103.

GOLDBLATT P. & MANNING, J.C. 2007. *Nivenia argentea* misunderstood, and the new species *Nivenia inaequalis* (Iridaceae: Nivenioideae). *Bothalia* 37: 192–196.

GUTHRIE, L. 1921. In: Novitates Africanae. *Annals of the Bolus Herbarium* 3: 70–85.

GUTHRIE, L. 1925. In: Novitates Africanae. *Annals of the Bolus Herbarium* 4: 1–30.

KER GAWLER, J.B. 1804 ['1805']. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.

KER GAWLER, J.B. 1805. *Witsenia corymbosa*. Corymbose witsenia. *Curtis's Botanical Magazine* 23: t. 895.

KLATT, F.W. 1866. Revisio Iridearum (Conclusio). *Linnaea* 34: 537–689.

KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 335–404.

KLATT, F.W. 1894 ['1895']. Irideae. In Th. Durand & H. Schinz, *Conspectus florae africae* 5: 143–230. Jardin botanique de l'Etat, Bruxelles etc.

LAMARCK, J.B.A.P.M. de. 1789–1792. *Encyclopédie méthodique. Botanique*, vol. 3. Panckoucke, Paris.

LEWIS, G.J. 1934. *Nivenia concinna. Flowering Plants of South Africa* 14: t. 548.

LEWIS, G.J. 1941. Iridaceae. New genera and species and miscellaneous notes. *Journal of South African Botany* 7: 19–59.

LINNAEUS, C. 1771. *Mantissa plantarum altera*. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 ('1781'). *Supplementum plantarum*. Braunschweig, Orphanotropheus.
OBERMEYER, A.A. 1967. *Nivenia stokoei*. *Flowering Plants of Africa* 38: t. 1504.
PERSOON, H. 1805. *Enumeratio Plantarum* volume 1. C.F. Cramer, Paris.
POLE EVANS, I.B. 1922. *Klattia stokoei* L.Guthrie. *Flowering Plants of South Africa* 2: t. 80.
REICHENBACH, H.G. 1828. *Conspectus regni vegetabilis*, part 1.
REICHENBACH, H.G. 1836. *Witsenia corymbosa* Ker. *Flora Exotica* 1: t. 24.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium*, vol. 1. J.G. Cotta, Stuttgart.
SALISBURY, R.A. 1812. On the cultivation of rare plants, etc. *Transactions of the Horticultural Society of London* 1: 261–366.
SPRENGEL, K. 1824. *Systema vegetabilium*, vol. 1. Dietrich, Göttingen.
THUNBERG, C.P. 1782. *Nova genera plantarum*. Edman, Uppsala.
THUNBERG, C.P. 1824. *Flora capensis* [edn 1c]. Bonnier, Copenhagen.
VAHL, M. 1805. *Enumeratio plantarum*, vol. 2. N. Möller. Copenhagen.
VENTENAT, E.P. 1808. *Decas Generum Novorum*. E. Dufarb, Paris.
WEIMARCK, H. 1940. A revision of the genus *Nivenia* Vent. *Svensk Botanisk Tidskrift* 34: 356–372.



Plate 5: ***Witsenia maura***, Cape Peninsula, WC.

3. Subfamily **CROCOIDEAE**

Crocoideae *G.T.Burnett*, Outlines of botany: 451 (1835) [as Crocideae]. Type: *Crocus* L.

Ixioideae Klatt in Linnaea 34: 543 (1866) [as subordo Ixieae].

Plants deciduous or rarely evergreen geophytes. *Rootstock* a corm (rarely corm vestigial and rootstock a rhizome), producing rooting from lower half or base, axillary or terminal in origin. *Leaves* several, basal and cauline, the lowermost bladeless sheathing cataphylls; foliage leaves unifacial (isobilateral), plane, ribbed or H- or X-shaped in cross section or oval to terete, with or without longitudinal grooves, with multiple (*Tritoniopsis*) or a single main vein; margins often thickened, hyaline when dry, or raised as wings at right angles to surface; marginal anatomy various, sometimes with marginal vein and subepidermal sclerenchyma or with columnar epidermal cells and lacking marginal vein. *Stem* usually aerial, branched or not, or subterranean, usually terete, occasionally angled, or winged. *Inflorescence* a spike or rarely flowers solitary on branches, always subtended by a pair of opposed bracts at ovary base, thus without pedicels. *Flowers* long lasting, mostly zygomorphic, or radially symmetric, with septal nectaries; tepals united in a tube. *Stamens* unilateral or symmetrically arranged; filaments mostly free, or united; anthers loculicidal and extrorse to latrorse. *Ovary* inferior; style slender, dividing into 3 slender branches (rarely ± undivided); sometimes each deeply divided. *Fruit* a capsule. *Seeds* angular to globose, winged in some genera. *Pollen grains* usually monosulcate-operculate with (1)2-banded operculum, rarely trisulcate or zonasulculate, exine mostly perforate-scabrate, rarely reticulate. *Basic chromosome number x* = ?16, with many other base numbers in different genera.

Genera 32, 28 in southern Africa; species ± 1 170, 913 in southern Africa; in three tribes Ixieae, Tritoniopsideae and Watsonieae.

REFERENCES

BURNETT, G.T. 1835. *Outlines of botany*. Churchill, London
KLATT, F.W. 1866. Revisio Iridearum (Conclusio). *Linnaea* 34: 537–689.

Key to Tribes:

1a Corm development axial, the corm formed from basal internodes of current flowering stem and stem thus inserted apically, or rootstock a rhizome . . . . . .3. *Ixieae*
1b Corm development axillary, the corm formed from an axillary bud at the base of current flowering stem and stem thus inserted at base of new corm:
2a Inner floral bract longer than outer and not forked or notched apically; leaves plane, usually with 2 or more major veins (unless very narrow) and without a thickened midrib; style branches undivided. . . . . 1. *Tritoniopsideae*
2b Inner floral bract usually shorter than outer, usually with 2 prominent veins and forked or notched apically or sometimes deeply to fully divided; leaves plane, corrugately ridged or terete, when plane with an evident main vein [midrib]; style branches usually deeply divided, sometimes notched apically or undivided . . . . . .2. *Watsonieae*

Keys to genera are placed after their respective tribal descriptions

Tribe 1. **Tritoniopsideae**

Tritoniopsideae *Goldblatt & J.C.Manning* in Goldblatt et al. in Aliso 22: 408 (2006). Type: *Tritoniopsis* L.Bolus

Subtribe *Exohebeinae* G.J.Lewis ex Goldblatt in Goldblatt: 442 (1971). Type: *Tritoniopsis* L.Bolus

Plants with axillary corm development, tunics fibrous; flowering stem always well developed. *Leaves* with multiple major veins and with subepidermal sclerenchyma associated with a marginal vein. *Inflorescence* a spike; inner bract exceeding outer bract, not forked apically or 2-keeled. *Flowers* usually zygomorphic with stamens unilateral, rarely actinomorphic; tepals usually gaping gradually before anthesis; stamens often diverging after dehiscence; style branches undivided; ovules hypotropous; seed epidermal cell outlines prominent; ovular vascular trace intact. *Basic chromosome number x* = ?16.

Genera 1, only *Tritoniopsis* (23 spp.): mainly western South Africa but as far east as East London in Eastern Cape.

5. **Tritoniopsis**

Tritoniopsis *L.Bolus* in South African Gardening and Country Life 19: 123 (1929). Type: *T. lesliei* L.Bolus

Anapalina N.E.Br.: 274 (1932). Type: *A. triticea* (Burm. f.) N.E.Brown = *Tritoniopsis antholyza* (Lam.) Goldblatt

Tanaosolen N.E.Br.: 262 (1932). Type: *T. nudus* N.E.Br. = *Tritoniopsis nervosa* (Baker) G.J.Lewis

Exohebea R.C.Foster: 36 (1939). Type: *E. parviflora* (Jacq.) R.C.Foster = *Tritoniopsis parviflora* (Jacq.) G.J.Lewis

Revisionary accounts: G.J.Lewis: 319–355 (1959) & 51–72 (1960); Goldblatt: 577–582 (1990); Manning & Goldblatt: 175–181 (2001).

Alluding to the fancied resemblance of the type species to the African genus *Tritonia*, and *opsis* from the Greek suffix, looking like.

Deciduous or ± evergreen perennials. *Corm* depressed-globose, axillary in origin, often deep-seated; tunics of matted, coarse to medium-textured fibres often in a dense mass and usually forming a collar. *Cataphylls* 2 or 3. *Leaves* several, mostly basal, in 2 ranks, usually partly or entirely dry at flowering, blade linear to lanceolate or ovate, sometimes abruptly narrowed below into a slender false petiole, cauline leaves usually reduced and entirely sheathing, mostly scale-like, rarely attenuate-involute; marginal vein present. *Stem* simple or few-branched. *Inflorescence* a spike, spirally twisted at anthesis; bracts leathery, becoming dry and brown at flowering, fairly short, inner longer than the outer and acute not forked. *Flowers* zygomorphic or rarely actinomorphic, long-lived, pink to purple or red, or white, yellow, brown or cream-coloured, lower tepals usually with contrasting markings, sometimes scented; with nectar from septal nectaries; perianth tube short to long, cylindric, funnel-shaped or narrow below and broadly tubular above; tepals subequal, or unequal with dorsal largest, the lower tepals often forming a prominent lip and sometimes markedly clawed. *Stamens* unilateral and arcuate or horizontal, rarely symmetrically disposed and erect; filaments inserted near top or well within perianth tube, recurving after dehiscence; anthers often apiculate. *Style* filiform, 3-branched distally, branches short or cuneate, sometimes forked or shortly 2-lobed at the tips. *Capsules* ovoid to globose, leathery, often somewhat to much inflated. *Seeds* tetrahedral, narrowly or conspicuously winged on angles (rarely 2-winged at opposite ends), rugose or irregularly sculpted on faces, with chalazal crest; coat somewhat spongy, surface cells prominent. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number x* = 16, also 15 and possibly 17.

Species 23: South Africa, centred in the winter-rainfall region, extending from Nieuwoudtville in the north to East London in the east, mainly in stony, sandstone-derived soils in fynbos.

Tritoniopsis is taxonomically isolated within Crocoideae and molecular phylogenetic analysis places it sister to the rest of the subfamily. The genus is distinguished by its short, leathery floral bracts with the inner bract longer than the outer and not apically forked, and in several species ± petiolate leaves with more than one vein, thus lacking a definite main vein, unless very narrow and then with only one vein developed. The unique bracts and leaves led Lewis (1954) to place the genus in the separate subtribe Exohebeinae (Goldblatt, 1971). The flowers in *Tritoniopsis* are extremely variable in form and colour, but are markedly and uniquely herkogamous, with the stamens recurving strongly after anther dehiscence. In many species the anthers are prominently apiculate. In most species (*T. nervosa* excepted), the tepals separate from one another in the



TRITONIOPSIS. T. toximontana: A, corm, leaves and flowering stems; B, front view of flower (top) and half-flower (bottom); C, dehisced capsule; D, seed. ***T. lesliei***: E, flower. ***T. parviflora***: F, flower front view (left) and side view (right). ***T. caffra***: G, flower side view (top) and front view (bottom). ***T. unguicularis***: H, flower side view (top) and front view (bottom). ***T. nervosa***: I, flower, side view.

bud stage well before the flowers expand, unlike all other Iridaceae, in which the tepals remain joined until the flower actually opens.

Species of *Tritoniopsis* are adapted to a wide range of pollination systems (Manning & Goldblatt, 2005), including bimodal systems that use pollinators of two classes. The short-tubed species are mostly pollinated by bees and those with long, slender tubes mainly by long-proboscid flies or in *T. nervosa* by moths. The red-flowered *T. leslei*, with salver-shaped, radially symmetric flowers, is probably pollinated by the butterfly *Aeropetes*. Other red-flowered species, with zygomorphic flowers, are adapted for pollination by sunbirds but some may also be pollinated by *Aeropetes* butterflies. The light, spongy seeds with winged angles are wind-dispersed.

The species were initially placed in three different genera, with *Tritoniopsis* restricted to *T. leslei*, unique in the alliance in having actinomorphic flowers; *Anapalina* including those species with large, bright red flowers with an elongate perianth tube, now understood to be adapted for pollination by sunbirds; and *Exohebea* comprising species with smaller, mostly short-tubed flowers. *Exohebea* was later united with *Tritoniopsis* (Phillips, 1951) and the genus subsequently expanded to include *Anapalina* (Goldblatt, 1990).

Key to species

1a Basal leaves with blade abruptly constricted into a wiry petiole; cauline leaves all alike, relatively long, attenuate and firmly involute; capsules woody (sect. *Aristatae*):
2a Plants up to 300 mm high; flowers pale pink with slender, subcylindric perianth tube; floral bracts lanceolate-attenuate, 25–35 mm long. . . . . 2. *T. flexuosa*
2b Plants 400–700 mm high; flowers red or scarlet with dimorphic perianth tube, slender lower portion abruptly expanded into broadly cylindric upper portion; floral bracts oblong-lanceolate, 10–15 mm long . . . . . .1. *T. triticea*
1b Basal leaves linear to lanceolate, rarely narrowed below into slender petiole; upper cauline leaves reduced to small bract-like structures; capsules leathery and often inflated:
3a Perianth tube dimorphic, with slender lower portion abruptly expanded into broadly cylindric upper portion; flowers red or dark reddish pink (sect. *Anapalina*):
4a Dorsal tepal spathulate, ± twice as long as the others; upper lateral tepals adnate to the dorsal for 3–8 mm; anthers obtuse:
5a Leaves not narrowed and subpetiolate below, reaching ± halfway to base of spike; flowers with conspicuous dark purple or black blotch in tepal sinuses; upper lateral tepals adnate to dorsal tepal for 3–5 mm; filaments 40–45 mm long. . . . . 22. *T. intermedia*
5b Leaves narrowed and subpetiolate below, reaching ± to base of spike; flowers with or without small dark markings; upper lateral tepals adnate to dorsal tepal for 6–8 mm; filaments 33–38 mm long . . . . . .23. *T. caffra*
4b Dorsal tepal oblong to spathulate, slightly longer than the others; upper lateral tepals adnate to dorsal for up to 2 mm; anthers acute or apiculate:
6a Leaves in a basal fan, not narrowed and subpetiolate below, 8–20 mm wide with 3 to 5(6) veins; tepals linear-oblanceolate, dorsal 22–30 × 4–5 mm; anthers yellow, obtuse or acute; capsules strongly inflated, 20–40 mm long . . . . . 21. *T. antholyza*
6b Leaves narrowed and subpetiolate or petiolate below, 5–8(–10) mm wide with 2 or 3 veins; tepals oblanceolate to oblong or obovate, dorsal 15–20 × 6–10 mm; anthers red to purple, apiculate; capsules not or slightly inflated, 9–16 mm long:
7a Flowers carmine to deep pinkish red or purple; tepals oblong to obovate, dorsal 8–10 mm wide; filaments relatively short, 20–23 mm long, shortly exserted from the tube; capsule smooth, ± 16 mm long . . . . . 20. *T. pulchra*
7b Flowers scarlet; tepals oblanceolate, dorsal ± 6 mm wide; filaments ± 28 mm long, well exserted from the tube; capsules rugose-verrucose, 9–16 mm long. . . . . 19. *T. williamsiana*
3b Perianth tube cylindric or funnel-shaped and widening gradually to apex; flowers pink, white or yellow:
8a Flowers yellow or cream-coloured to white, rarely flushed pink or purple, fragrant; filaments 3–14 mm long with yellow anthers 3–5 mm long, with reduced apiculus up to 0.5 mm long (sect. *Schweiggera*):
9a Perianth tube slender and subcylindric, 30–40 mm long. . . . . .13. *T. nervosa*
9b Perianth tube short, 3–5 mm long:
10a Flowers strongly bilabiate, lower three tepals fused basally for 3–4 mm to form a distinct palate; filaments 12–14 mm long:
11a Perianth creamy white with apices of all tepals and outer surface of midline flushed dark brownish pink; tepals linear, dorsal 2.0–2.5 mm wide, upper laterals ± 1.5 mm wide; filaments 15–16 mm long 18. *T. cinnamomea*
11b Perianth yellow with tube and three lower tepals flushed maroon or purple in basal half; dorsal tepal spathulate-oblanceolate, 3–6 mm wide, upper laterals 2–5 mm wide; filaments 12–14 mm long . . . 17. *T. parviflora*
10b Flowers weakly bilabiate, lower three tepals fused for up to 2.5 mm, not forming a distinct palate; filaments 3–10 mm long:
12a Stem relatively robust, 4–5 mm diam.; tepals 5–6 mm wide; filaments ± 10 mm long. . . . . 15. *T. flava*
12b Stem slender, 1.5–4.0 mm diam.; tepals 2–4 mm wide; filaments 3–7 mm long:
13a Flowers strongly bicoloured, yellow with basal half of lower tepals maroon; leaves contracted into semi-terete pseudopetiole 30–35 mm long; dorsal tepal 14–16 × 3–4 mm. . . . . .16. *T. bicolor*

13b Flowers not bicoloured, white to pale yellow, lower tepals at most flushed purplish at base; leaves not obviously pseudopetiolate; dorsal tepal 10–13 × 2–3 mm. . . . . 14. *T. unguicularis*
8b Flowers pink to red, rarely yellow in one species, unscented; filaments 12–20 mm long with yellow to lilac anthers (4–)5–10 mm long, with well-developed apiculus 0.5–2.0 mm long (sect. *Tritoniopsis*):
14a Flowers scarlet, actinomorphic, widely funnel-shaped or salver-shaped with tepals subequal or outer slightly wider than inner; stamens central . . . . . 5. *T. lesliei*
14b Flowers pink or rarely yellow, zygomorphic, ± bilabiate with dorsal tepal larger than others; stamens arcuate:
15a Perianth tube (20–)30–70 mm long, ± as long as to much longer than the dorsal tepal or rarely slightly shorter; outer bracts (12–)15–50 mm long . . . . . 4. *T. revoluta*
15b Perianth tube up to 20 mm long, shorter than the dorsal tepal; outer bracts 7–12 mm long:
16a Basal leaves in a fan with longitudinally folded, overlapping sheaths and lanceolate blades, 8–25 mm wide with 4 to 8 veins:
17a Stem less than 0.5 m tall; flowers cream-coloured to pink . . . . . 11. *T. latifolia*
17b Stem 1 m or more tall; flowers yellow. . . . . 12. *T. nemorosa*
16b Basal leaves not in a distinct fan, with slender sheaths and linear to narrowly lanceolate blades, 2–7 mm wide with 1 to 3(4) veins:
18a Basal foliage leaves 1 or 2, distinctly petiolate; perianth tube 20–21 mm long; plants from Gifberg . . . . . 3. *T. toximontana*
18b Basal foliage leaves not petiolate; perianth tube mostly less than 20 mm long; plants from south of Cederberg:
19a Spike very long and densely many-flowered, 150–400 mm long, longer than the non-flowering part of the stem; stem stiffly erect, (1.5)2.0–3.0 mm diam., flowering from near base; bracts conspicuously apiculate. . . . . 10. *T. elongata*
19b Spike lax or dense but always shorter than the non-flowering part of the stem; stem sometimes branched, not flowering from near base; bracts obtuse to acute or sometimes shortly apiculate:
20a Flowers larger, dorsal tepal (20–)23–33 × 5–8(–12) mm; tepals clawed in basal half and recurved in distal half:
21a Stem 300–600 mm tall, unbranched; perianth tube 6–11 mm long; bracts somewhat soft-textured, pale brown. . . . . 8. *T. lata*
21b Stem 150–300 mm tall, unbranched or closely branched with up to three short branches; perianth tube (10–)15–18 mm long; bracts firm and leathery, dark brown . . . . . 7. *T. pulchella*
20b Flowers smaller, dorsal tepal 16–28 × 2–6 mm; tepals clawed in lower ⅔ and recurved only in distal ⅓:
22a Stem unbranched; spike usually dense; bracts firm and leathery; flowers dusty pink; anther apiculus up to 1 mm long; style branches up to 2 mm long; capsules inflated, 20–25 × 10–15 mm; coastal lowland species . . . . . 9. *T. dodii*
22b Stem usually laxly branched; spike usually lax; bracts soft-textured; flowers clear pink; anther apiculus 1–2 mm long; style branches 3–4 mm long; capsules not much inflated, pale with dark bands along sutures, (6–)8–12(–15) × 8–10 mm; mainly montane species . . . . . 6. *T. ramosa*

Sect. 1. **Aristatae** *J.C.Manning & Goldblatt*, new section. Type: *Tritoniopsis triticea* (Burm.f.) N.E.Br.

Plants unbranched. *Leaves* elliptic to narrowly lanceolate, abruptly contracted into wiry, terete pseudopetiole often ± as long as blade; cauline leaves all alike, linear-attenuate, closely sheathing in lower part with upper part closely involute and appearing terete. *Flowers* pink or red, unscented; perianth tube 20–40 mm long, slender throughout or dimorphic and abruptly expanded into a broadly cylindric upper part. *Filaments* 12–15 mm long; anthers 5–6 mm long, shortly or conspicuously apiculate, yellow or lilac to purple. *Capsules* woody, not or slightly inflated.

Species 2: southwestern Western Cape, South Africa.

This small section includes two species with similar vegetative features, notably a solitary basal leaf with ovate to narrowly lanceolate blade and conspicuous, wiry petiole, and several cauline leaves, all linear-attenuate and either scarcely or closely sheathing at the base but slender and tightly involute above. The capsules are woody and relatively small. The flowers of the two species are very different, representing adaptation to pollination either by long-proboscid flies or a combination of sunbirds and butterflies. Although the vegetative similarity between the two species was known, the differences in their flowers resulted in their segregation in separate genera until *Anapalina* and *Tritoniopsis* were combined (Goldblatt, 1990).

1. **Tritoniopsis triticea** *(Burm.f.) Goldblatt* in South African Journal of Botany 56: 580 (1990). *Ixia triticea* Burm.f.: 1 (1768). *Antholyza triticea* (Burm.f.) N.E.Br.: 136 (1929). *Anapalina triticea* (Burm.f.) N.E.Br.: 275 (1932). Type: South Africa, without precise locality or collector (G: Herb. Burman, holo.).

Antholyza lucidior L.f.: 96 (1782). *Watsonia lucens* Pers., illegitimate superfluous name for *A. lucidior* L.f. (1782). *Watsonia lucidior* (L.f.) Eckl.: 36 (1827). *Homoglossum lucidior* (L.f.) Baker: 161 (1877). *Gladiolus lucidior* (L.f.) Baker: 227 (1892). Type: South Africa, without precise locality, *Thunberg s.n. LINN 60.9* (LINN, holo.).

Antholyza burchellii N.E.Br. in Bulletin of Miscellaneous Information Kew 1929: 136 (1929), new synonym. *Anapalina burchellii* (N.E.Br.) N.E.Br.: 275 (1932). *Tritoniopsis burchellii* (N.E.Br.) Goldblatt: 580 (1990). Type: South Africa, [Western Cape], between Donkerhoek and Houw Hoek Mtns, *Burchell 8013* (K, holo.).

[*Watsonia pottbergensis* Eckl.: 36 (1827), invalid name without description.]

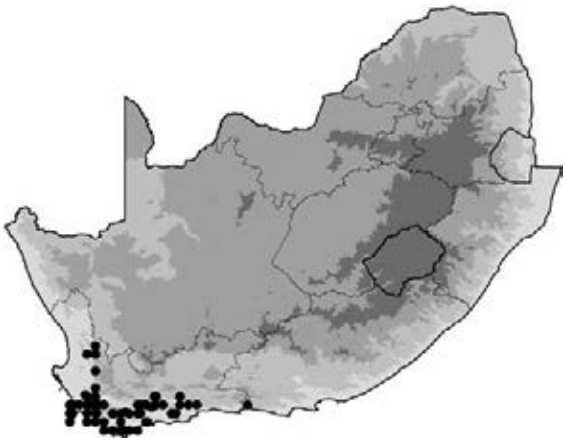
[*Watsonia tigrina* Eckl.: 36 (1827), invalid name without description.]

Plants 400–750 mm high. *Corm* 25–40 mm diam., tunics of densely matted fibres, with thick collar. *Stem* stout, often ± flexuose, unbranched, 2.5–4.0 mm diam. *Basal leaf* usually 1, dry at flowering, contracted abruptly into slender, terete pseudopetiole 200–300 mm long, blade lanceolate to linear-lanceolate, 200–350 × 7–11 mm, acute, obliquely cuneate at base, with 2 or 3 veins; cauline leaves 6 to 8, ± loosely overlapping, dry and brown, linear-attenuate, entirely free, closely involute and appearing terete, (50–)100–300 mm long, uppermost closely associated with spike. *Spike* compact, densely many-flowered, 80–140 mm long; bracts dry brown at flowering, leathery, oblong or oblong-lanceolate, outer bracts 10–15 mm long, acute or subobtuse, inner up to 10 mm longer than outer. *Flowers* zygomorphic, bright red or scarlet, 3 lower tepals sometimes with dark red or black median mark in lower part, unscented; perianth tube dimorphic, geniculate, slender and erect below abruptly widened at bend, cylindric and ascending or horizontal above, 25–40 mm long with lower part 8–15 mm long; tepals unequal, dorsal largest, suberect at first but later reflexed, others recurved and ± twisted or coiled, dorsal oblanceolate, 15–25 × 5–8 mm, upper lateral tepals elliptic to oblong, 12–20 × 5–7 mm, lower tepals ± as long as upper laterals or slightly shorter, 10–18 mm long. *Filaments* arcuate but later recurving, inserted at base of upper part of tube, 20–37 mm long; anthers yellow, 6–10 mm long with short apiculus 0.5–1.0 mm long, submedifixed. *Style* 30–60 mm long, dividing just below anther apices, branches 1.5–2.0 mm long. *Capsules* ellipsoid or obovoid, woody, 12–14 × 8–10 mm long. *Seeds* 5–6 mm long, winged at apex and base. *Chromosome number* 2*n* = 34 (Goldblatt 1971). *Flowering time*: January to April.

Distribution and ecology: widely distributed through the coastal mountains of Western Cape, South Africa, from the Cederberg and the Piketberg to the Hottentots Holland and Cape Peninsula and along the Langeberg as far as Mossel Bay; on rocky granite and sandstone slopes or sometimes dry shale.

The species is adapted to pollination by sunbirds, including the Orange-breasted and Lesser Double-collared Sunbirds, as well as the Mountain Pride butterfly, *Aeropetes tulbaghia* (Satyridae).

Diagnosis: one of two species with a solitary, petiolate basal leaf and long-attenuate cauline leaves, *Tritoniopsis triticea* is a robust species with stems 400–750 mm high and compact spikes of red flowers with dimorphic perianth tube 25–40 mm long. The mouth of the tube is not evidently oblique and the tepals are not markedly unequal, the dorsal and often the laterals only slightly larger than the lower three. All the tepals are ultimately strongly reflexed and often twisted during the female phase of flowering. The relatively small, woody capsules 12–14 mm long are also distinctive. Flower size is variable, with larger-flowered populations especially common between Paarl and Stellenbosch. Such large-flowered forms, with the perianth tube 30–40 mm long and tepals usually more than 20 mm long and only rarely with dark markings, were segregated by Lewis (1959) as *Anapalina burchellii*, but we are unable to maintain this distinction in the face of the considerable variation among populations in all these features and without any associated ecological or geographical differences.



Distribution of ***Tritoniopsis triticea***.

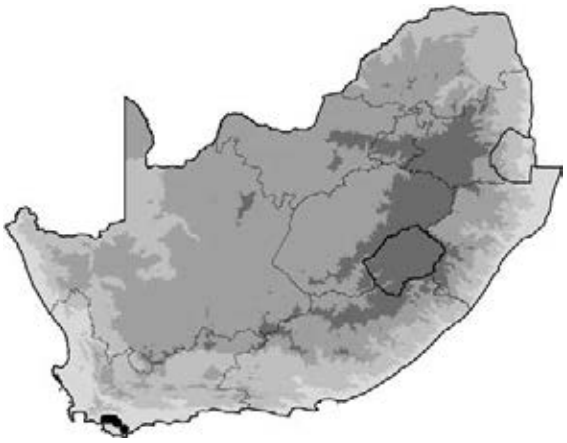
2. **Tritoniopsis flexuosa** *(L.f.) G.J.Lewis* in Journal of South African Botany 25: 352 (1959). *Gladiolus flexuosus* L.f.: 96 (1782). *Sphaerospora flexuosa* (L.f.) Klatt: 726 (1864). *Acidanthera flexuosa* (L.f.) Baker ex C.D.Bouché & Wittm.: 15 (1876). *Exohebea flexuosa* (L.f.) G.J.Lewis: 4 (1952). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* (UPS–THUNB, lecto., designated by Lewis: 5 (1952); LINN, isolecto.).

Plants 150–300 mm high. *Corm* 15–20 mm diam.; tunics of densely matted fibres, with thick collar. *Stem* slender, flexuose, unbranched. *Basal leaf* 1, dry at flowering, contracted abruptly into slender, terete pseudopetiole 25–70 mm long, blade elliptic to ovate-lanceolate, 30–55 × 10–20 mm, acute or obtuse, truncate or cuneate at base, sometimes obliquely so, with 2 veins, margins ± undulate or crisped; cauline leaves 4 or 5, ± overlapping, dry and brown, linear-attenuate, closely sheathing below, distally closely involute, appearing terete, free part 10–60 mm long, uppermost grading into floral bracts. *Spike* short, compact, densely 3- to 7-flowered, 20–40 mm long; bracts dry and reddish brown at flowering, leathery, lanceolate, outer 25–35 mm long,

attenuate, obscurely 2-keeled, inner firm-papery, up to 5 mm longer than outer, acuminate. *Flowers* zygomorphic, pale pink, lower 3 tepals and sometimes also upper tepals with dark red median streak, unscented; perianth tube subcylindric, straight or slightly curved, slightly widened to throat, 34–38 mm long; tepals unequal, dorsal largest, slightly ascending and recurved above, others directed forward below and recurved distally, dorsal oblanceolate, 25–30 × 5–8 mm, narrowed below, upper laterals 20–26 × 2.5–4.0 mm, lower tepals as long as upper laterals but usually slightly narrower, joined to one another for 4–8 mm. *Filaments* arcuate but later recurving, 12–15 mm long; anthers 5–6 mm long, lilac or purple, with recurved, usually bifid apiculus ± 2 mm long. *Style* 50–55 mm long, dividing just below anther apices, branches 3–4 mm long. *Capsules* ellipsoid, woody, 15–22 × 8 mm long. *Seeds* tetrahedral, ± 5 × 3 mm, shortly winged on angles. *Chromosome number* 2*n* = ± 32 (or 30). *Flowering time*: January to February.

Distribution and ecology: a very local endemic of the Overberg, Western Cape, South Africa, known from a few locations between Caledon and Bredasdorp; in hard, stony clay in renosterveld shrubland.

The long-tubed pink flowers resemble those of *T. revoluta* and *T. toximontana* and are likewise assumed to be adapted for pollination by long-proboscid flies in the absence of recorded observations.



Distribution of ***Tritoniopsis flexuosa***.

Diagnosis: a distinctive species with a short, compact spike of long-tubed, pink flowers with long, attenuate bracts 25–35 mm long. The solitary basal leaf, dry at flowering, has a conspicuous long false petiole and relatively small, elliptic to ovate-lanceolate blade 30–55 mm long with crisped or undulate margins. The cauline leaves are linear-attenuate, ± overlapping and concealing the stem, closely sheathing below with the distal free portion involute and appearing terete. The uppermost cauline leaves are closely associated with the flowering spike and grade into the floral bracts.

Sect. 2. **Tritoniopsis**

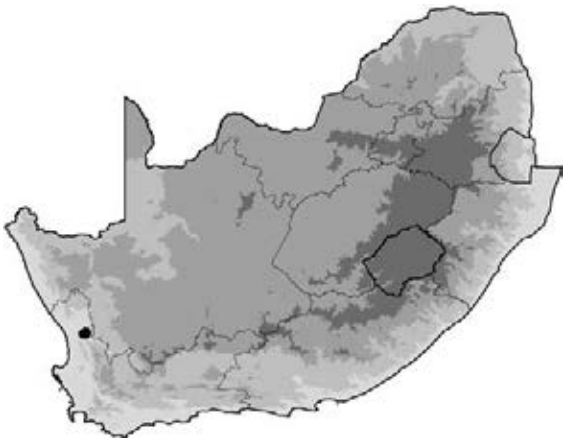
Plants usually branched. *Leaves* linear to narrowly lanceolate, rarely contracted into a wiry, terete pseudopetiole; lower cauline leaves leaf-like, upper reduced and bract- or scale-like. *Flowers* usually pink, rarely red or yellow, unscented; perianth tube short or long, 5–70 mm long, slender throughout or slightly expanded apically. *Filaments* 12–20 mm long; anthers 5–10 mm long, shortly or prominently apiculate, yellow or lilac to purple. *Capsules* leathery, inflated.

Species 10: Western Cape, South Africa.

This section, which includes most of the pink-flowered species of *Tritoniopsis*, is characterised by the upper cauline leaves reduced to bracts or scales, stems often branched, and unscented flowers with a ± funnel-shaped perianth tube scarcely or slightly and evenly widened toward the mouth. The capsules are leathery and ± inflated.

3. **Tritoniopsis toximontana** *J.C.Manning & Goldblatt* in Bothalia 31: 178 (2001). Type: South Africa, Western Cape, Gifberg, near top of pass, sheltered sandstone slope in arid fynbos, 22 Mar. 2000, *Manning 2234* (NBG, holo,; K, PRE, iso.).

Plants 300–650 mm high. *Corm* 30–50 mm diam.; tunics of densely matted fibres, with thick collar. *Stem* slender, straight or slightly flexuose, usually unbranched, rarely with one or two short branches, 1.0–1.5 mm diam. *Basal leaves* 1 or 2, dry at flowering, contracted abruptly into terete pseudopetiole 100–150 mm long, blade linear-lanceolate, 200–300 × 5–10 mm, attenuate, oblique at base, 3-veined, abaxial vein diverging first; cauline leaves 3, reddish brown, lanceolate, clasping throughout, lowermost up to 60 mm long, upper reduced and bract-like. *Spike* laxly 5- to 9(–12)-flowered, 300–600 mm long, lateral spikes 1-flowered; bracts green at base, dry and flushed pink in upper half at flowering, ± membranous, oblong, outer 10–12 mm long, acute, inner 14–16 mm long, acuminate. *Flowers* zygomorphic, pale pink, three 3 tepals each with dark red median streak outlined in white and flanked at base by dark pink streak and upper laterals usually with darker median streak near apices, mouth of tube and bases of filaments flushed dark red, unscented; perianth tube subcylindric, straight or slightly curved, slightly widened to throat, 20–21 mm long; tepals unequal, dorsal largest, slightly ascending and recurved above, others directed forward below and recurved above, dorsal oblanceolate, 23–25 × 7–9 mm, narrowed below, upper laterals 22–25 × 3.5–5.0 mm, lower tepals as long as upper laterals but usually slightly narrower, joined



Distribution of ***Tritoniopsis toximontana***.

to one another for 5–6 mm. *Filaments* arcuate but later recurving, 13–15 mm long; anthers purple, 5–6 mm long with recurved, usually bifid apiculus ± 2 mm long. *Style* 35–37 mm long, dividing just below anther apices, branches 3–4 mm long. *Capsules* ovoid to ellipsoid, inflated, 15–23 × 10 mm long. *Seeds* ± 6 × 4 mm, winged on angles. *Flowering time*: March to early May.

Distribution and ecology: endemic to the Gifberg and Matsikamma Mtns of Western Cape, South Africa, and quite common on the summit plateau; in sandstone outcrops in sheltered situations, often on cooler slopes.

The leaves are dry at flowering time or sometimes those of the next season's growth are emergent.

The pink, long-tubed flowers are pollinated by a combination of *Amegilla* bees (Anthophorinae) and long-proboscid nemestrinid flies in the genus *Prosoeca*.

Diagnosis: recognised by its one or two distinctly petiolate leaves with terete pseudopetiole, simple or branched stems with relatively soft-textured, acute bracts 10–12 mm long and pink flowers with moderately long, slender perianth tube 20–21 mm long.

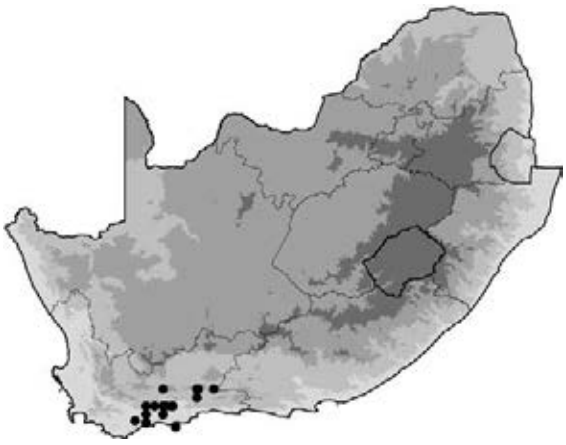
4. **Tritoniopsis revoluta** *(Burm.f.) Goldblatt* in Wijnands & Goldblatt in Candollea 47: 364 (1992). *Antholyza revoluta* Burm.f.: 1 (1768). *Homoglossum revolutum* (Burm.f.) Baker: 161 (1877). *Anapalina revoluta* (Burm.f.) N.E.Br.: 275 (1932). Type: South Africa, without precise locality or collector, drawing by J.C. Cuno in HS 1877, fol. 19, Utrecht University Library [lecto., designated by Goldblatt in Wijnands & Goldblatt: 364 (1992)].

   Gladiolus apiculatus F.Bolus: 106 (1917). *Hebea apiculata* (F.Bolus) L.Bolus: 123 (1929). *Exohebea apiculata* (F.Bolus) R.C.Foster: 36 (1939). *Tritoniopsis apiculata* (F.Bolus) G.J.Lewis: 353 (1959). Type: South Africa, [Western Cape], Langeberg, Vrijersberg, 1 500 ft [460 m], *Muir 2016* (BOL, holo.).

   Tritoniopsis apiculata var. *minor* G.J.Lewis: 355 (1959), new synonym. Type: South Africa, [Western Cape], south slopes of Swartberg Pass, *T.M. Salter 3126* (BOL, holo.).

Plants 200–400(–500) mm high. *Corm* 35–65 mm diam.; tunics of densely matted fibres, with long fibrous collar. *Stem* slender to moderately stout, suberect, simple or rarely with 1 or 2 short suberect branches, 2–3 mm diam. *Basal leaves* 1 to 3, dry at flowering, blades lanceolate to linear-lanceolate, 150–320 × 5–20 mm, acuminate, (2)3- to 5-veined, narrowed below (not pseudopetiolate); cauline leaves 4 or 5, lowermost small, leaf-like or subulate and clasping, upper 1 or 2 bract-like, dry and reddish brown. *Spike* moderately densely or laxly 3- to 10-flowered, 20–160 mm long, lateral spikes 1- to 3-flowered; bracts dry, brown, leathery, lanceolate, (12–)15–50 mm long, acute to acuminate, inner up to 9 mm longer than outer. *Flowers* zygomorphic, pale to deep salmon-pink or mauve-pink, lower tepals with red median streak or line, unscented; perianth tube subcylindric or widening slightly and evenly from near base, straight or slightly curved, (20–)40–70 mm long; tepals unequal, dorsal arched over stamens and recurved distally, oblanceolate, 25–40 × 6–10 mm, obtuse or subacute, others suberect but recurved in distal half, oblanceolate-spathulate, 18–35 × 4–8 mm, lower 3 joined for 4–8 mm. *Filaments* arched, later suberect, 15–20 mm long; anthers 8–10 mm long, purple, with recurved bipartite apiculus 1.5–2.0 mm long. *Style* (30–)60–90 mm long, dividing shortly below or beyond anther tips, branches 5–7 mm long. *Capsules* inflated, ellipsoid or ovoid, 20–30 × 10–12 mm. *Seeds* up to 8 mm long, usually broadly winged on angles at base and apex and narrowly so laterally. *Flowering time*: March to May.

Distribution and ecology: scattered along the lower slopes of the coastal and inland mountains of Western Cape, South Africa, from Bredasdorp and the Potberg, along the Langeberg from Tradouws Pass to Herbertsdale and on the southern slopes of the Swartberg between Ladismith and Oudtshoorn; on clay or loamy soils in renosterveld or fynbos, up to 1 000 m elevation.



Distribution of ***Tritoniopsis revoluta***.

Populations from the coastal lowlands between Bredasdorp and Potberg and from the Swartberg have smaller flowers with shorter tubes 20–35 mm long, while those from the western and eastern Langeberg consistently have the largest flowers, with tubes 50–70 mm long. Populations from Gysmanshoek in the central Langeberg are variable for tube length. The marked inter-population variation in tube length appears to represent adaptation to local pollinator faunas. Long-tubed forms are pollinated by the long-proboscid flies *Prosoeca ganglbaurii* and *P. longipennis* and shorter-tubed forms at least partially by bees but probably also by local long-proboscid flies.

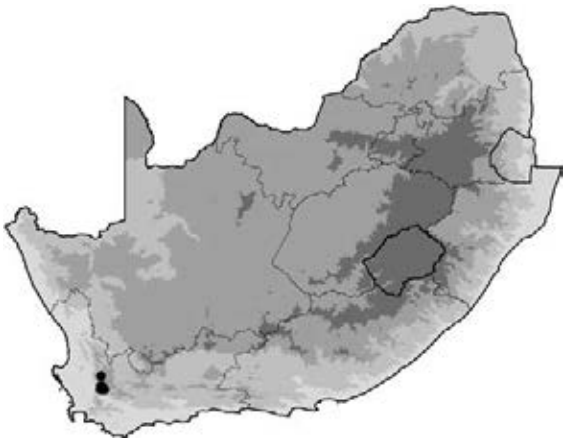
Diagnosis: Tritoniopsis revoluta is recognised by the long-tubed pink flowers with slender perianth tube (25–)40–70 mm long and ± as long as or usually much longer than the dorsal tepal, 20–40 mm long, and the long bracts, the outer (12–)15–50 mm long.

5. **Tritoniopsis lesliei** *L.Bolus* in South African Gardening and Country Life 19: 123 (1929). Type: South Africa, [Western Cape], Ceres, *Leslie s.n. NBG417/27* (BOL, holo.).

Plants 350–650 mm high. *Corm* 15–20 mm diam.; tunics of densely matted fibres, with long fibrous collar. *Stem* slender, suberect, with 1 or 2 slender, suberect branches, 1–2 mm diam. *Basal leaves* 3 to 5, dry at flowering, blade linear to linear-lanceolate, 130–250 × 3–5 mm, acuminate, with 1 or 2 veins, narrowed into a slender pseudopetiole ± as long as the blade; cauline leaves 3 to 5, lowermost leaf-like with blade up to 80 mm long, upper reduced and bract-like, entirely clasping, acuminate, dry and reddish brown. *Spike* laxly 3- to 7(–10)-flowered, 70–150 mm long, lateral spikes 1- to 3-flowered; bracts dry and brown, leathery, lanceolate, 12–16 mm long, acute to acuminate, inner oblong, as long as or slightly longer than outer. *Flowers* actinomorphic, suberect, bright red, unscented; perianth tube slender, subcylindric, 20–25 mm long, expanded in upper 2–3 mm; tepals subequal or outer slightly broader, suberect below, spreading in distal half, forming a wide cup, shortly and broadly clawed near base, obtuse or subacute, 18–28 mm long, outer oblong or obovate, 7–12 mm wide, inner oblong or oblanceolate, 7–9 mm wide. *Filaments* central, erect, later slightly arcuate, 16–19 mm long; anthers 6–7 mm long, reddish, with apiculus 0.5 mm long. *Style* erect, 30–35 mm long, dividing below base of anthers, branches 3–4 mm long. *Capsules* inflated, ovoid, 12–18 × 7–10 mm. *Seeds* up to 6 mm long, narrowly winged on angles. *Chromosome number* 2*n* = 32. *Flowering time*: February to April.

Distribution and ecology: a narrow endemic so far known only from the southern foot of the Skurweberg near Ceres in Western Cape, South Africa; in marshy ground along streams and seeps at ± 900 m elevation.

The distinctive flowers are adapted for pollination by butterflies.



Distribution of ***Tritoniopsis lesliei***.

Diagnosis: unique in the genus in its bright red, actinomorphic, almost salver-shaped flowers with slender perianth tube 18–28 mm long, and spreading tepals forming a shallow bowl. The style is relatively short, dividing just below the anthers.

6. **Tritoniopsis ramosa** *(Eckl. ex Klatt) G.J.Lewis* in Journal of South African Botany 25: 326 (1959). *Antholyza ramosa* Eckl. ex Klatt: 733 (1864). *Gladiolus ramosus* (Eckl. ex Klatt) N.E.Br.: 27 (1928), illegitimate homonym, not *G. ramosa* L. (1762). *Exohebea ramosa* (Eckl. ex Klatt) R.C.Foster: 39 (1939). Type: South Africa, [Western Cape], mountains near Caledon and Genadendal, *Ecklon & Zeyher Irid 70* [G, lecto., designated by G.J.Lewis: 328 (1959); MO, isolectotype).

Tritonia nervosa Baker: 864 (1901), illegitimate homonym, not *T. nervosa* Klatt (1882), new synonym. Type: South Africa, [Western Cape], Outeniqua Mtns, Montagu Pass, *Rehmann 86* (Z, holo.).

Tritoniopsis ramosa var. *robusta* G.J.Lewis in Journal of South African Botany 25: 330 (1959), new synonym. Type: South Africa, [Western Cape], Grootvadersbos, lower mountain slopes, *G.J. Lewis 5447* (NBG, holo).

Tritonia unguiculata Baker: 196 (1892), new synonym. *Gladiolus unguiculatus* (Baker) N.E.Br.: 27 (1928), illegitimate homonym, not *G. unguiculatus* Baker (1877). *Hebea unguiculata* (Baker) L.Bolus: 123 (1929). *Exohebea unguiculata* (Baker) R.C.Foster: 39 (1939). *Tritoniopsis ramosa* var. *unguiculata* (Baker) G.J.Lewis: 329 (1959). Type: South Africa, without precise locality, *Kitching s.n.* (K, holo.).

[*Hebea ramosa* Eckl.: 43 (1827), invalid name without description.]

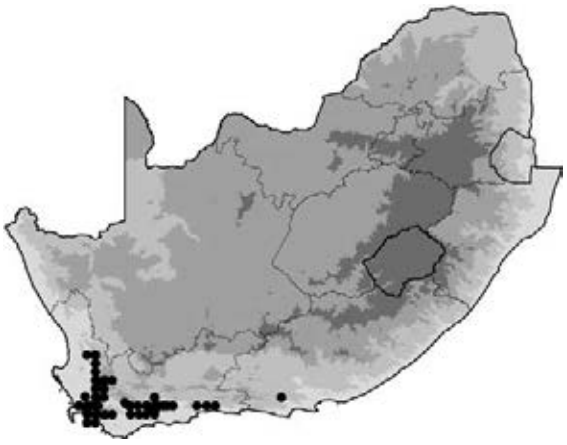
Plants 120–500 mm high. *Corm* 18–30 mm diam.; tunics of densely matted fibres, with short or long collar. *Stem* decurved at base then suberect or erect, simple or usually branched with up to 4 suberect or rarely divaricate

branches, short to half as long as stem, slender or relatively robust. *Basal leaves* 3 to 6, green or dry at flowering, blade linear-lanceolate or lanceolate, 100–250 × 2–8(–12) mm, acuminate, narrowed and pseudopetiolate below, with 1 or 2(4) veins; cauline leaves 3 to 6, lower 1 to 3 subulate, upper 1 or 2 bract-like, brown. *Spike* laxly or moderately densely 4- to 18-flowered, 50–180 mm long, lateral spikes shorter, 1- to 8-flowered; bracts greenish at base, dry and brown above, soft-textured or leathery, oblong or ovate, outer 5–10 mm long, acute or obtuse or shortly apiculate, inner slightly longer. *Flowers* zygomorphic, pale to deep pink, lower 3 tepals with red median streak flanked by white streaks, unscented; perianth tube narrowly funnel-shaped, 7–15(–20) mm long; tepals unequal, dorsal larger, arched over stamens, oblanceolate-spathulate, clawed in lower ⅔, 20–28 × (3–)4–6 mm, obtuse or emarginate, other tepals recurved in distal ⅓, 20–25 × 3–5 mm, upper laterals joined to lower laterals for ± 1 mm and lower 3 joined at base for 5–7 mm. *Filaments* arcuate, later recurved, 15–18 mm long; anthers 5–7 mm long, pink or lilac, with acuminate, recurved apiculus 1.0–1.5 mm long. *Style* 24–28 mm long, dividing opposite upper half or beyond anthers, branches 3–4 mm long. *Capsules* ellipsoid to obovoid, slightly inflated, (6–)8–12(–15) × 8–10 mm, pale or greenish with dark bands along the sutures. *Seeds* tetrahedral, 3–4 mm long, narrowly winged on angles. *Flowering time*: mainly January to April.

Distribution and ecology: relatively widespread through the coastal mountains of Western Cape, South Africa, extending from the Cederberg and Cold Bokkeveld to the Kogelberg and from the Riviersonderend Mtns and Langeberg to the Outeniqua Mtns, and the Kouga Mtns in Eastern Cape; on sandy, rocky or seasonally marshy sandstone slopes, from 600–1 500 m elevation.

The species is pollinated by long-tongued solitary bees (Apidae: Anthophorinae).

Diagnosis: a variable species with moderately sized pink flowers with perianth tube 7–15(–20) mm long and narrow tepals, the dorsal 20–28 × (3–)4–6 mm and the lower tepals 3–5 mm wide. The capsules are diagnostic for the species, being unusually small, (6–)8–12(–15) × 8–10 mm, and pale or greenish with dark bands along the sutures. Flowering plants are sometimes less easily identified. Typical forms with laxly branched stems are readily recognised but unbranched plants are more difficult to place. It is separated from *T. laxa* by the generally smaller flowers with narrower tepals; from *T. pulchella* by the mostly shorter perianth tube and more slender stems; and from *T. dodii* by the usually softer bracts and the conspicuously apiculate anthers.



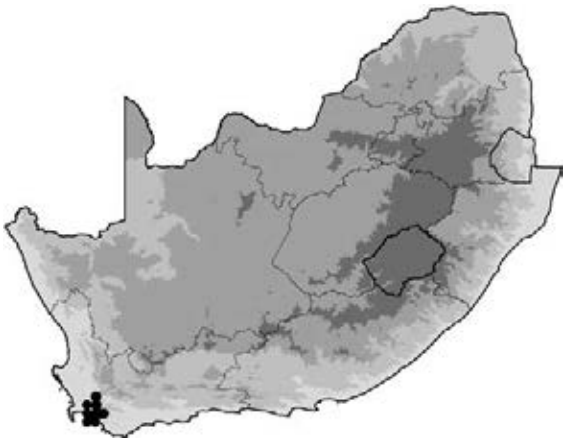
Distribution of ***Tritoniopsis ramosa***.

Populations with a longer perianth tube, 13–20 mm long, were distinguished from the typical variety with perianth tube 7–10 mm long as var. *unguiculata* by G. J.Lewis (1959) but the species is very variable for this character even in one locality, probably as an adaptation to the local pollination fauna. There is a trend for longer-tubed populations in the southern Cape east of the Hottentots Holland Mtns, but this is not consistent. Collections of relatively robust plants from the Langeberg near Swellendam, with leaves up to 12 mm wide and perianth tube 12–15 mm long, were separated as var. *robusta* G.J.Lewis (1959) but represent only one extreme in the variation recorded in the species.

7. **Tritoniopsis pulchella** *G.J.Lewis* in Journal of South African Botany 25: 331 (1959). Type: South Africa, [Western Cape], Bain's Kloof, 2 000 ft [600 m], *Compton 16929* (NBG, holo.).

Plants 100–300 mm high. *Corm* 15–35 mm diam.; tunics of densely matted fibres, with short collar. *Stem* decurved at base then suberect or erect, simple or with 1 to 3 short, suberect branches, (1)2–3 mm diam. *Basal leaves* 5 to 7, usually green at flowering, blades linear or linear-lanceolate, 100–180 × 2–8 mm, acuminate, narrowed below, with 1 or 2(3) veins; cauline leaves 3 to 5, lower 1 or 2 like the basal but smaller, upper 1 or 2 brown and bract-like. *Spike* moderately densely ± 8- to 16-flowered, 50–120 mm long; bracts dry and dark reddish or blackish brown, leathery, oblong, outer 8–12 mm long, acute or often apiculate, inner slightly longer, obscurely 2-keeled. *Flowers* zygomorphic, salmon or pink, lower 3 tepals with red median lozenge or streak flanked by white streaks, unscented; perianth tube narrowly funnel-shaped, (10–)15–18 mm long; tepals unequal, dorsal larger, arched over stamens, oblanceolate-spathulate, clawed in lower half, 23–25 × 5–8 mm, obtuse or truncate, other tepals recurved in distal half, 16–20 × 4–5 mm, upper laterals joined to lower laterals for ± 1 mm and lower 3 tepals joined at base for 5–7 mm. *Filaments* arcuate, later recurved, 17–25 mm long; anthers 6–7 mm long, pink or lilac, with acuminate or bifid, often recurved apiculus 1–2 mm long. *Style* 27–33 mm long, dividing opposite upper half of anthers or beyond, branches 4–5 mm long. *Capsules* ovoid, inflated, 15–18 × 10–12 mm, rugulose-verrucose. *Seeds* tetrahedral, up to 6 mm long, winged on angles and rugose on faces. *Flowering time*: (December) January to February (April).

Distribution and ecology: a montane species endemic to Western Cape, South Africa, extending from Bain's Kloof



Distribution of ***Tritoniopsis pulchella***.

along the Hottentots Holland Mtns to Kogelberg and the Riviersonderend Mtns; on seasonally moist sandy flats, 600–1 000 m elevation, flowering only after fire.

Diagnosis: a short species up to 300 mm high, with the stem simple or often with up to three short suberect branches, and a spike of salmon- or rose-pink flowers with a moderately long perianth tube (10–)15–17 mm long and dark blackish brown, leathery bracts. The basal leaves are narrowly lanceolate, usually with 1 or 2 (rarely 3) veins, and the lowermost cauline leaf resembles the basal leaves in having a well-developed blade. We have seen only a single collection of capsules and these are highly distinctive, inflated and irregularly wrinkled-warty. This remains to be confirmed when additional material is collected and if so is diagnostic for the species. Similar warty capsules are otherwise known only in *Tritoniopsis williamsiana* but are less inflated in that species.

8. **Tritoniopsis lata** *(L.Bolus) G.J.Lewis* in Journal of South African Botany 25: 335 (1959). *Hebea lata* L.Bolus: 106 (1930). *Exohebea lata* (L.Bolus) R.C.Foster: 38 (1939). Type: South Africa, [Western Cape], Houw Hoek Mtns, 1800 ft [550 m], *H. Bolus 18914* (BOL, holo.).

Hebea lata var. *longibracteata* L.Bolus: 107 (1930), new synonym. *Exohebea lata* var. *longibracteata* (L.Bolus) R.C.Foster: 38 (1939). *Tritoniopsis lata* var. *longibracteata* (L.Bolus) G.J.Lewis: 337 (1959). Type: South Africa, [Western Cape], southern slopes of Drakensteinberg near Bain's Kloof, 1 600 ft [490 m], *H. Bolus 4069* (BOL, holo.).

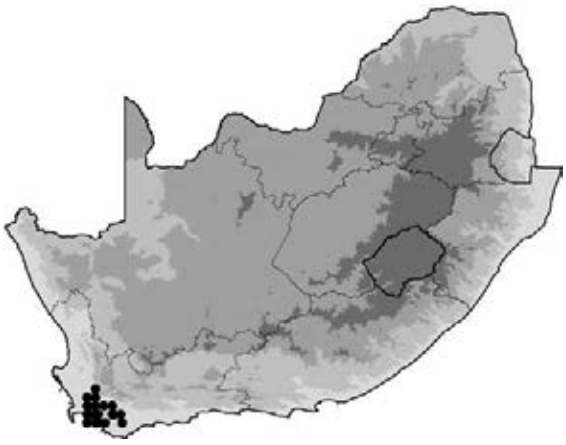
Tritoniopsis pulchella var. *alpina* G.J.Lewis: 333 (1959), new synonym. Type: South Africa, [Western Cape], Klein Winterhoek, south slopes, among rocks, 6 000 ft [1 800 m], *E. Esterhuysen 13758* (BOL, holo.).

Plants 300–700 mm high. *Corm* 30–60 mm diam.; tunics of densely matted fibres, with long collar. *Stem* erect, unbranched or rarely with single short erect branch, 2.0–3.5 mm diam. *Basal leaves* 1 to 3, usually green at flowering, blade linear or linear-lanceolate, 150–600 × 3–8 mm, acuminate, narrowed below, with 3 or 4 veins; cauline leaves 3 to 5, lower 2 or 3 subulate, upper 1 or 2 reduced to scales or vestigial. *Spike* moderately densely ± 5- to 18-flowered, 70–150 mm long; bracts dry and brown, leathery or papery and fairly soft, oblong or ovate-oblong, outer 6–16 mm long, acute or mucronulate, inner slightly longer. *Flowers* zygomorphic, pale to deep pink, lower 3 tepals with red median lozenge or streak flanked by white streaks, unscented; perianth tube narrowly funnel-shaped, 6–11 mm long; tepals unequal, dorsal larger, arched over stamens, recurved apically, oblanceolate-spathulate, clawed in lower half, 23–33 × 5–8(–12) mm, obtuse, other tepals recurved in distal half, 18–25 × 5–9 mm, upper laterals joined to lower laterals for ± 1 mm and lower 3 tepals joined at base for 5–7 mm. *Filaments* arcuate, later diverging, (15–)17–20 mm long; anthers 5–7 mm long, pink or yellow, with acuminate or bifid, often recurved apiculus 1–2 mm long. *Style* 26–28 mm long, dividing opposite middle of anthers, branches 3–4 mm long. *Capsules* ovoid, slightly inflated, 15–20 × 8–10 mm. *Seeds* up to 5 mm long, winged on angles. *Chromosome number* 2*n* = 32. *Flowering time*: (February) April to May.

Distribution and ecology: a montane species endemic to Western Cape, South Africa, extending from the Witzenberg and Bain's Kloof south along the coastal mountains to the Kleinrivier, Bredasdorp and Riviersonderend Mtns; on rocky, south-facing sandstone slopes. The species is absent from the Cape Peninsula.

The flowers are pollinated by long-tongued solitary bees (Apidae: Anthophorinae).

Diagnosis: distinguished from similar short-tubed, pink-flowered species by its mostly larger, candy-pink flowers, the dorsal tepal 23–33 × 5–8(–12) mm and the filaments 15–20 mm long with conspicuously apiculate anthers, and the relatively long style branches 3–4 mm long. The tepals are clawed in the basal half and recurved distally, giving the flowers a rather open



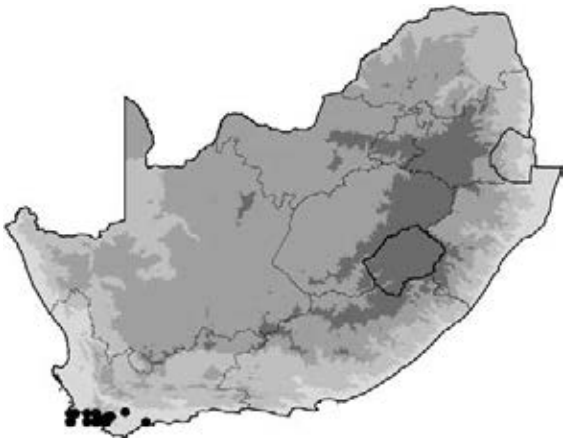
Distribution of ***Tritoniopsis lata***.

appearance, with the lower tepals almost as wide as the upper. The stems are mostly 300–600 mm high and unbranched (rarely with a solitary short erect branch). Smaller-flowered forms can be confused with *T. dodii*, a coastal lowland species with dusty pink flowers with narrower tepals, very shortly apiculate anthers, and short style branches up to 2 mm long.

Plants from the northern part of the range, between Du Toit's Kloof and Ceres, with slightly narrower tepals, the dorsal 5–8 mm vs. 7–12 mm wide, and bracts up to 16 mm long vs. up to 13 mm, were segregated as var. *longibracteata* by G.J.Lewis (1959), but these differences are insignificant. Plants from Klein Winterhoek near Tulbagh with unbranched stems up to 650 mm tall and flowers with the perianth tube ± 10 mm long were described as *Tritoniopsis pulchella* var. *alpina* G.J.Lewis (1959). Both the tall stems and the short perianth tubes are anomalous for that species, as are the relatively soft-textured bracts, but all these features are consistent with *T. lata*. After examining the type and a later collection from the same locality we conclude that these plants are better included in *T. lata*.

9. **Tritoniopsis dodii** *(G.J.Lewis) G.J.Lewis* in Journal of South African Botany 25: 345 (1959). *Hebea dodii* G.J.Lewis: t. 549 (1934). *Exohebea dodii* (G.J.Lewis) R.C.Foster: 37 (1939). Type: South Africa, [Western Cape], [Cape Peninsula], Cirkels Vlei, *Salter 2986* (BOL, holo.).

Plants 200–550 mm high. *Corm* 30–50 mm diam.; tunics of densely matted fibres, with long collar. *Stem* erect, unbranched or rarely with a solitary short erect branch, 2.0–2.5 mm diam. *Basal leaves* 1 to 3, usually green at flowering, blade linear or linear-lanceolate, 150–350 × 3–6(–)8 mm, acuminate, narrowed below, with 2 or 3(4) veins; cauline leaves 3 to 5, lowest linear and leaf-like, concealed by collar, upper 2 to 4 reduced to scales or vestigial. *Spike* moderately to densely ± 5- to 22-flowered, 5–120 mm long; bracts dry and brown, leathery or cartilaginous, ovate or oblong, outer 7–11 mm long, acute or obtuse, rarely mucronulate, inner slightly longer. *Flowers* zygomorphic, dingy or brownish pink sometimes tipped with crimson, the lower three tepals with red median lozenge or streak, unscented; perianth tube narrowly funnel-shaped, 5–8 mm long; tepals unequal, dorsal larger, arched over stamens, apically recurved, oblanceolate-spathulate, clawed in lower ⅔, 20–23 × 3–5 mm, obtuse or emarginate, other tepals suberect and recurved in distal ⅓, 16–20 × 2–4 mm, upper laterals joined to lower laterals for ± 1 mm and lower 3 tepals joined at base for 3–5 mm. *Filaments* arcuate, later diverging, 12–14 mm long; anthers yellow, 4–6 mm long with short apiculus 0.5–1.0 mm long. *Style* ± 20 mm long, dividing opposite base to middle of anthers, branches 1.5–2.0 mm long. *Capsules* ovoid or subglobose, inflated, 20–25 × 10–15 mm. *Seeds* up to 6 mm long, winged on angles. *Chromosome number 2n* = 30. *Flowering time*: usually February to April but also at other times.



Distribution of ***Tritoniopsis dodii***.

Distribution and ecology: a coastal lowland species form Western Cape, South Africa, described from the southern Cape Peninsula but now collected further east from Hermanus to Bredasdorp inland to Caledon; on sandy or gravelly flats in lowland fynbos.

Diagnosis: a somewhat variable species, *Tritoniopsis dodii* typically has a short, compact spike but includes forms with more lax, subsecund spikes. It is recognised essentially by its unbranched stems and short-tubed, pink flowers with narrow tepals clawed in the lower two thirds, the dorsal tepal 20–23 × 3–5 mm, the anthers only shortly apiculate, and the style branches up to 2 mm long. The flowers are typically rather dingy pink, with the tepals erect below and recurved only in the distal third, thus essentially like those of *T. elongata*, which is distinguished by its much longer spike, the flowering portion much longer than the non-flowering stem. Hybrids with *T. parviflora* have been recorded near Hermanus.

10. **Tritoniopsis elongata** *(L.Bolus) G.J.Lewis* in Journal of South African Botany 25: 344 (1959). *Hebea elongata* L.Bolus: 106 (1930). *Exohebea elongata* (L.Bolus) R.C.Foster: 37 (1939). Type: South Africa, [Western Cape], Daljosephat, hills 600 ft [200 m], *Tyson 853* (SAM, holo.).

Plants 150–500 mm high. *Corm* 25–60 mm diam.; tunics of densely matted fibres, with long collar. *Stem* flexed outward at ground level and then stiffly erect or inclined, unbranched, (1.5)2.0–3.0 mm diam. *Basal leaves* 4 or 5, dry and fragmented at flowering, in a basal fan, blades linear-lanceolate, 100–220 × 4–8 mm, acuminate, with 3 or 4 veins, not narrowed to a pseudopetiole below, firm-textured; cauline leaves 2 or 3, lowermost subulate and concealed in collar, uppermost vestigial and scale-like. *Spike* moderately densely ± 12- to 40-flowered, 150–400 mm long; bracts dry and brown, cartilaginous with membranous margins, oblong or ovate-oblong, 7–13 mm long, conspicuously apiculate, inner slightly longer. *Flowers* zygomorphic, dull dingy pink with dark reddish veins, unscented;

perianth tube narrowly funnel-shaped, 6–11 mm long; tepals unequal, dorsal slightly larger, arched over stamens, oblanceolate-spathulate, clawed in lower ⅔, 20–25 × 3–4 mm, obtuse, other tepals suberect and recurved distally, 15–18 × 2.5–4.0 mm, upper laterals connate to lower laterals for ± 1 mm and lower 3 tepals joined at base for 3–5 mm. *Filaments* arcuate, later suberect, 13–16 mm long; anthers 6–7 mm long, yellow with small apiculus up to 1 mm long. *Style* 18–23 mm long, dividing opposite middle of anthers, branches ± 2 mm long. *Capsules* ovoid to subglobose, inflated, 25–35 × 10–15 mm. *Seeds* up to 10 mm long, winged on angles. *Flowering time*: (January) March to April.

Distribution and ecology: a narrow endemic of Western Cape, South Africa, known from a few populations between Gouda and Paarl, with a single outlying collection from the southern foot of the Riviersonderend Mt near Greyton; on hard gravelly or stony slopes in open fynbos or transitional fynbos-renosterveld.

The flowers are pollinated by honeybees and long-tongued bees in the genus *Amegilla* (Apidae: Anthophorinae).

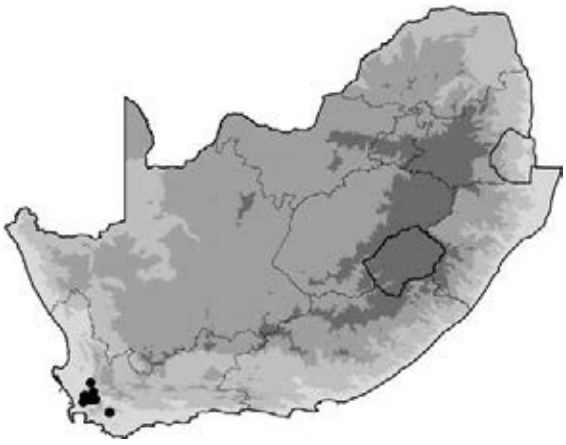
Diagnosis: distinguished from other species with similar, relatively small, pink flowers with narrow tepals, by the stiff stems, mostly 2–3 mm diam., bearing numerous dingy or brownish pink flowers from near the base of a long spike much longer than the non-flowering part of the stem, and by the conspicuously apiculate bracts that are hard and cartilaginous at flowering time. The leaves are dry and fragmented at flowering time, although the leaves from the next season may be emergent. The species can be confused with *T. dodii*, which has similar flowers but much fewer, in a short spike much shorter than the non-flowering part of the stem, and typically obtuse or acute, rarely shortly apiculate, bracts. Populations from the western lowlands have a perianth tube 6–8 mm long but the isolated population from near Greyton has a slightly longer tube 10–11 mm long and was collected in flower in January and February.

11. **Tritoniopsis latifolia** *G.J.Lewis* in Journal of South African Botany 25: 333 (1959). Type: South Africa, [Western Cape], Pakhuis Mtns, above 3 500 ft [1 067 m], *Leipoldt 3580* (BOL, holo.).

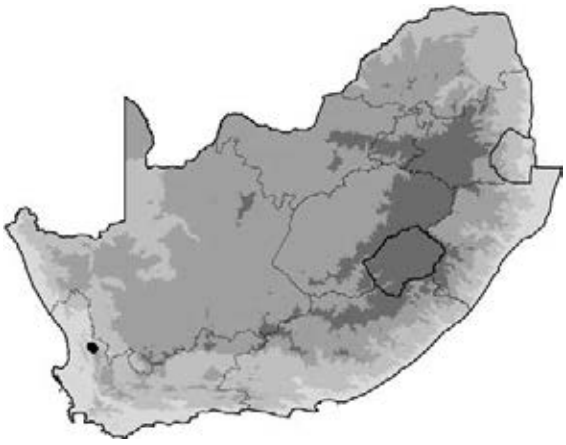
Plants 120–350 mm high. *Corm* ± 40 mm diam.; tunics of densely matted fibres, with long collar. *Stem* usually with 2 or 3 short, suberect branches, 1.5–4.0 mm diam. *Basal leaves* 4 or 5, green at flowering, in a fan with longitudinally folded, overlapping sheaths, blades lanceolate, 80–250(–40) × 8–25 mm, acuminate, with 4 to 6 veins (not narrowed to a pseudopetiole below), firm-textured; cauline leaves 2 to 4, lowermost leaf-like but much smaller, upper 2 or 3 reduced and subulate. *Spike* moderately densely or laxly ± 6- to 12-flowered, 70–120 mm long, lateral spikes up to 5-flowered; bracts dry and brown, leathery, oblong, outer 8–12 mm long, acute or apiculate, inner slightly longer. *Flowers* zygomorphic, pale or creamy pink, lower 3 tepals with red median streak or line, unscented; perianth tube narrowly funnel-shaped, 8–10 mm long; tepals unequal, dorsal slightly larger, arched over stamens, oblanceolate-spathulate, clawed in lower half, 20–25 × 3–5 mm, obtuse or truncate-emarginate, other tepals suberect, 17–20 × 3–4 mm, lower 3 tepals joined at base for 2–5 mm. *Filaments* arcuate, later suberect, 12–14 mm long; anthers 5.0–5.5 mm long, yellow, with small bifid apiculus 0.5 mm long. *Style* 20–22 mm long, dividing opposite middle of anthers, branches 2.0–2.5 mm long. *Capsules* ovoid, inflated, 20–25 × 10–15 mm. *Seeds* unknown. *Flowering time*: December to January.

Distribution and ecology: endemic to the Pakhuis Mtns and northern Cederberg north of Heuningvlei in Western Cape, South Africa; in rocky outcrops, around 800 m elevation.

Diagnosis: a short, relatively stout species with a basal fan of broad, lanceolate leaves, 8–25 mm wide with 4 to 6 veins, and shortly branched flowering stems up to



Distribution of ***Tritoniopsis elongata***.



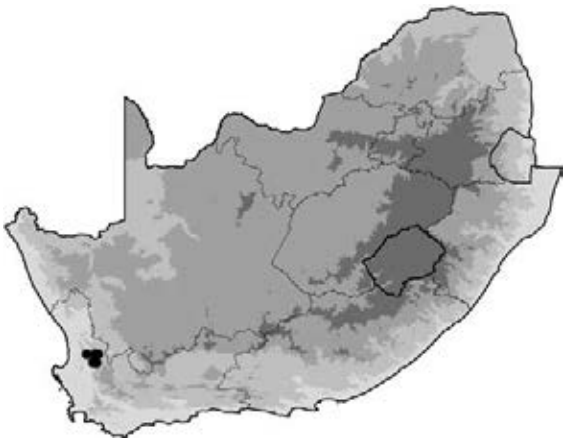
Distribution of ***Tritoniopsis latifolia***.

350 mm tall, with pale to creamy pink flowers, the lower tepals marked with a red median streak or line, and tube 8–10 mm long. The yellow anthers are 5.0–5.5 mm long and shortly apiculate. The broad leaves with overlapping sheaths distinguish *Tritoniopsis latifolia* from others with similar pink flowers. The foliage is remarkably similar to another Cederberg endemic, *T. nemorosa*, which has taller stems a metre or more high and yellow flowers similar in shape but with a slightly shorter tube 7–8 mm long.

12. **Tritoniopsis nemorosa** *(E.Mey. ex Klatt) G.J.Lewis* in Journal of South African Botany 25: 337 (1959). *Antholyza nemorosa* E.Mey. ex Klatt: 346 (1882). *Gladiolus nemorosus* (E.Mey. ex Klatt) N.E.Br.: 27 (1928). *Hebea nemorosa* (E.Mey. ex Klatt) L.Bolus: 123 (1929). *Exohebea nemorosa* (E.Mey. ex Klatt) R.C.Foster: 38 (1939). Type: South Africa, [Western Cape], Olifants River Valley, *Drège 1578* (P, holo.).

[*Schweiggera nemorosa* E.Mey., manuscript name in herb. Drège.]

Plants 1 000–1 500 mm high. *Corm* 30–50 mm diam.; tunics of densely matted fibres, with long collar. *Stem* robust, usually with 2 or 3 short, spreading branches, 5–8 mm diam. *Basal leaves* 5 to 7, green at flowering, in a fan with longitudinally folded, overlapping sheaths, blades lanceolate, 150–350 × 9–25 mm, acuminate, with 5 to 7 veins, not narrowed to a pseudopetiole below, firm-textured; cauline leaves 3 to 5, lower 1 or 2 leaf-like but much smaller, upper 2 or 3 reduced, subulate or scale-like. *Spike* moderately densely or laxly ± 15- to 25-flowered, 250–350 mm long, lateral spikes up to 5-flowered; bracts dry and brown or greenish brown, leathery, oblong or oblong-ovate, outer 6–9 mm long, obtuse or acute, inner slightly longer. *Flowers* zygomorphic, yellow, lower 3 tepals with dark brown median lozenge-shaped streak or line, unscented; perianth tube funnel-shaped, 7–8 mm long; tepals unequal, dorsal slightly larger, arched over stamens, recurved apically, oblong-spathulate, clawed in lower half, 20–25 × 6–8 mm, obtuse or truncate, other tepals suberect and recurved distally, 18–20 × 5–6 mm, lower 3 tepals joined at base for ± 4 mm. *Filaments* arcuate, later suberect, 12–15 mm long; anthers 7–9 mm long, yellow, with bifid apiculus 1 mm long. *Style* 20–23 mm long, dividing opposite middle of anthers, branches 2.5–3.0 mm long. *Capsules* ovoid, inflated, 20–30 × 10–15 mm. *Seeds* 6–8 mm long, winged on angles. *Flowering time*: November to December.



Distribution of ***Tritoniopsis nemorosa***.

Distribution and ecology: a narrow endemic of the Cederberg, between Clanwilliam and Citrusdal in Western Cape, South Africa; on rocky sandstone slopes and outcrops, from 300–700 m elevation, flowering mainly after fire.

Diagnosis: a robust species with stout, shortly branched flowering stems a metre or more tall, and a basal fan of overlapping, lanceolate leaves, 9–25 mm wide with 5 to 7 veins. The short-tubed, bright yellow flowers have the lower tepals marked with a brown median streak or line. The yellow anthers are 7–9 mm long, with a bifid apiculus ± 1 mm long. The yellow flowers with relatively short, obtuse to subacute bracts suggest a possible relationship with species in sect. *Schweiggera*, but the branched stem, lack of floral fragrance, and long anthers are anomalous there.

Sect. 3. **Schweiggera** *(E.Mey. ex Baker) G.J.Lewis* in Journal of South African Botany 23: 323 (1959). *Gladiolus* subg. *Schweiggera* E.Mey. ex Baker: 178 (1877). Type: *Tritoniopsis parviflora* (Jacq.) G.J.Lewis

Plants unbranched. *Leaves* linear to lanceolate, sometimes narrowed into linear pseudopetiole much shorter than blade; upper cauline leaves reduced to small scales; bracts usually short and obtuse. *Flowers* white or cream-coloured to yellow, sometimes flushed pink on reverse, lower tepals sometimes bicoloured with basal portion purple, fragrant. *Filaments* 3–14 mm long; anthers 3–5 mm long, shortly apiculate, yellow. *Capsules* leathery, inflated.

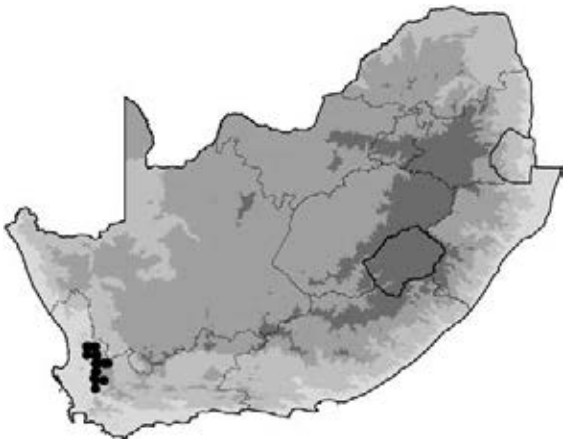
Species 6: Western Cape, South Africa.

A small group of species defined by the often relatively small, white or cream-coloured to yellow flowers with short, yellow anthers 3–5 mm long lacking a prominent apiculus, and always with a strong herbaceous or spicy/acrid fragrance. The upper cauline leaves are reduced to small, scale-like structures, and the floral bracts are short and acute or obtuse.

13. **Tritoniopsis nervosa** *(Baker) G.J.Lewis* in Journal of South African Botany 25: 351 (1959). *Morphixia nervosa* Baker: 237 (1876). *Tritonia nervosa* (Baker) Klatt: 358 (1882). *Ixia nervosa* (Baker) Baker: 166 (1892). *Tanaosolen nervosus* (Baker) G.J.Lewis: 55 (1941). Type: South Africa, [Western Cape], Cardouw Mtns, *Zeyher 1632* (K, holo.).

Tanaosolen nudus N.E.Br.: 262 (1932). Type: South Africa, [Western Cape], Cold Bokkeveld, Tandfontein, *R. Schlechter 10136* (K, probable holo.; BOL, G, PRE, iso.).

Plants 500–1 100 mm high. *Corm* 25–35 mm diam.; tunics of densely matted fibres, with long fibrous collar. *Stem* slender, curved outward at ground level then erect, unbranched, 2.0–3.5 mm diam. *Basal leaves* 5 or 6, dry at flowering, blade linear to narrowly lanceolate, 200–400 × 4–8 mm, acuminate, with 2 to 4 veins; cauline leaves 3 to 6, lowermost concealed among leaf bases, reddish brown, subulate, up to 70 mm long, clasping throughout, upper 1 to 3 reduced to a minute scales. *Spike* moderately densely 12- to 25-flowered, 100–300 mm long; bracts dry and brown, leathery, oblong, outer 5–9 mm long, acute to apiculate, inner slightly longer. *Flowers* weakly zygomorphic, pale yellow or creamy white, tepals sometimes flushed purplish distally and on reverse and usually purplish in sinuses at base, sweetly scented; perianth tube cylindric, 30–40 mm long; tepals subequal or dorsal slightly larger, suberect and recurved distally, upper laterals sometimes obliquely ascending, spathulate or oblong-spathulate, narrowed or clawed in basal ⅓ or ½, obtuse or truncate-emarginate, crispulate, dorsal 9–13 × 3–4 mm, others slightly shorter, lower 3 tepals united for 1–2 mm. *Filaments* subarcuate, later diverging, 5–6 mm long; anthers 4–5 mm long, yellow, with apiculus 0.5 mm long. *Style* 38–48 mm long, dividing opposite middle of anthers, branches 1–2 mm long. *Capsules* inflated, ovoid or subglobose, 15–20 × 10–15 mm. *Seeds* up to 6 mm long, winged on angles. *Flowering time*: (November) December to January (February).



Distribution of ***Tritoniopsis nervosa***.

Distribution and ecology: endemic to the mountains along the West Coast of Western Cape, South Africa, from Pakhuis through the Cederberg, Cold Bokkeveld and Olifants River Mtns to Groot Winterhoek; in rocky outcrops from 500–1 000 m elevation.

Diagnosis: a very distinctive species, 500–1 100 mm high, with relatively long spikes of creamy white to pale yellow flowers with a slender, subcylindric tube 30–40 mm long and relatively short tepals 9–13 mm long. The sweetly scented flowers are pollinated by sphinx moths. Unlike other species in the genus, in which the tepals start to gape several days before the flowers open fully, the tepals in *Tritoniopsis nervosa* remain joined at the tips until anthesis.

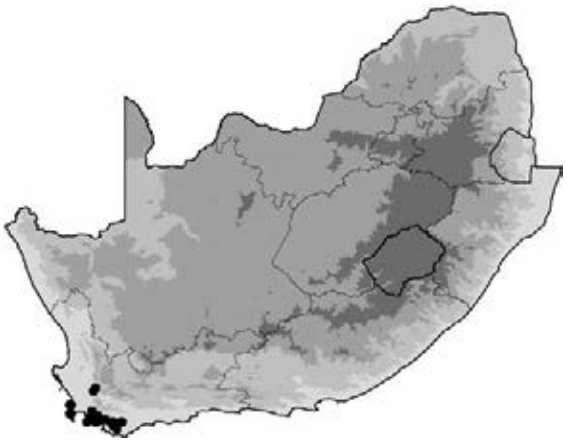
14. **Tritoniopsis unguicularis** *(Lam.) G.J.Lewis* in Journal of South African Botany 25: 347 (1959). *Moraea unguicularis* Lam.: 275 (1797). *Vieusseuxia unguicularis* (Lam.) Roem. & Schult.: 491 (1817). *Exohebea unguicularis* (Lam.) G.J.Lewis: 132 (1954). Type: South Africa, without precise locality, *Sonnerat s.n.* (P: Herb. Lamarck, holo.).

Gladiolus tabularis Pers.: 44 (1805), illegitimate superfluous name for *G. montanus* L.f. (1782). *Hebea tabularis* Eckl.: 43 (1827). Type: South Africa, [Western Cape], Table Mtn., without precise locality, *Thunberg s.n* (UPS: Herb. Thunberg '*Gladiolus montanus*', holo.).

Gladiolus fraternus N.E.Br.: 26 (1928). *Exohebea fraterna* (N.E.Br.) R.C.Foster: 37 (1939). Type: South Africa, [Western Cape], top of Table Mtn., *Burchell 640* (K, holo.).

Exohebea caledonensis R.C.Foster in Contributions from the Gray Herbarium of Harvard University 127: 37 (1939), new synonym. *Tritoniopsis caledonensis* (R.C.Foster) G.J.Lewis: 349 (1959). Type: South Africa, [Western Cape], near Caledon, *Hafström & Lindberg s.n.* (GH, holo.).

Plants (200)300–600 mm high. *Corm* 25–35 mm diam.; tunics of densely matted fibres, with fibrous collar. *Stem* slender, curved outward at ground level, unbranched, 1.5–2.0 mm diam. *Basal leaves* 3 to 9, dry at flowering, blade linear to narrowly lanceolate, 90–250 × 1–7 mm, acuminate, 1- to 3-veined; cauline leaves 2 or 3, lowermost concealed among leaf bases, reddish brown, subulate, up to 60 mm long, clasping throughout, uppermost reduced to a minute scale. *Spike* densely 7- to 20-flowered, 30–100 mm long; bracts green at base but dry and brown above, leathery, ovate, outer 4–9 mm long, obtuse, inner slightly longer. *Flowers* zygomorphic, pale yellow or creamy white flushed pink, lower 3 often flushed purple toward bases or with small maroon median streak in basal ⅓, with a herbaceous or acrid fragrance; perianth tube funnel-shaped, 3–4 mm long; tepals subequal or dorsal slightly larger, suberect and recurved distally, upper laterals sometimes obliquely ascending, spathulate



Distribution of ***Tritoniopsis unguicularis***.

or oblong-spathulate, strongly narrowed or clawed in basal ½ or ⅓, obtuse or truncate, crispulate, dorsal 10–13 × 2.5–3.0 mm, others slightly shorter, lower 3 tepals joined for 1.5–2.0 mm. *Filaments* arcuate, later erect, (3–)4–7 mm long; anthers 3–5 mm long, yellow, with short apiculus 0.5 mm long. *Style* 8–9 mm long, dividing opposite anther bases, branches 1 mm long. *Capsules* inflated, ovoid or subglobose, 15–20 × 10–20 mm. *Seeds* up to 8 mm long, winged on angles. *Chromosome number* 2*n* = 32. *Flowering time*: November to January (March).

Distribution and ecology: scattered along the coastal mountains of Western Cape, South Africa, and recorded from the Elandskloof Mtns near Tulbagh, the Cape Peninsula, the Hottentots Holland–Kogelberg–Groenlandberg complex, and Bredasdorp Mtn; on rocky sandstone outcrops from 500–1 000 m elevation.

The flowers are pollinated by long-tongued bees in the genus *Amegilla* (Apidae: Anthophorinae).

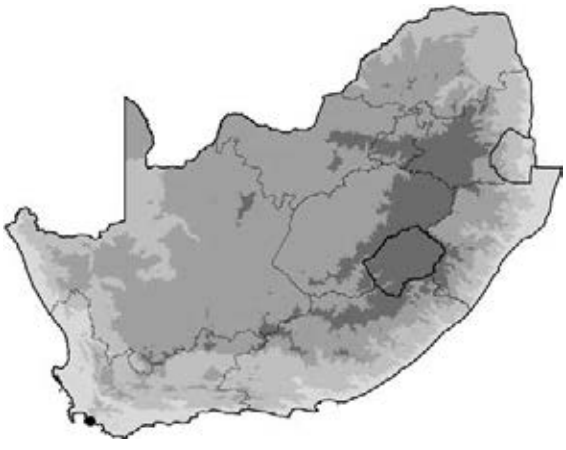
Diagnosis: distinguished by its small, short-tubed, pale yellow to creamy white flowers, sometimes flushed pinkish, with tepals 9–13 mm long and short filaments (3–)4–7 mm long. The capsules are moderately to well inflated, 15–20 mm long. The smaller flowers separate *Tritoniopsis unguicularis* from species such as *T. bicolor* and *T. flava*, also with yellow flowers and small anthers up to 5 mm long.

The typical form of *Tritoniopsis unguicularis*, as represented by populations on the Cape Peninsula, has leaves 2–7 mm wide with (1)2 or 3 veins, and cream-coloured or white flowers with filaments 6–7 mm long. Populations from the Groenland Mtns with linear, 1-veined leaves up to 2 mm wide and yellow flowers with short filaments 3–5 mm long have been treated as the separate species *T. caledonensis* until now (Lewis, 1959), but these distinctions do not hold elsewhere, and a range of intermediates has been recorded from the Kogelberg and Bredasdorp. This has been compounded by later collections of yellow-flowered plants with narrowly lanceolate leaves from the Elandskloof Mtns, and we adopt a broader view of the species here to include these populations.

Hybrids with *Tritoniopsis parviflora* have been recorded on the Elandskloof Mtns near Tulbagh and with *T. bicolor* on Bredasdorp Mtn.

15. **Tritoniopsis flava** *J.C.Manning & Goldblatt* in Bothalia 31: 178 (2001). Type: South Africa, Western Cape, Kogelberg State Forest, along footpath and next to stream, 10 Dec. 1991, *I. Kruger* (NBG, holo.).

Plants 300–600 mm high. *Corm* 20–35 mm diam.; tunics of densely matted fibres, with short collar. *Stem* robust, curved outward at ground level, unbranched, 4–5 mm diam. *Basal leaves* 6 or 7, green at flowering, blade narrowly lanceolate, 130–190 × (3–)5–8 mm, acuminate, 2- or 3-veined, narrowed into flattened pseudopetiole below; cauline leaves 2 or 3, lowermost concealed among leaf bases, reddish brown, lanceolate, up to 60 mm long, clasping throughout, upper 1 or 2 reduced to minute scales. *Spike* densely ± 18- to 25-flowered, 150–180 mm long; bracts green at base, dry and brown above, leathery, ovate, outer 6–9 mm long, obtuse, inner slightly longer. *Flowers* zygomorphic, yellow with lower 3 tepals paler or flushed purple toward base and with small maroon median streak in basal ⅓, with a herbaceous or acrid fragrance; perianth tube funnel-shaped, slightly curved, 4–5 mm long; tepals unequal, crispulate, dorsal slightly larger, arched over stamens, oblanceolate, strongly narrowed in lower ⅓, 15–16 × 6 mm, obtuse, other tepals suberect and recurved distally, upper laterals obovate-spathulate, abruptly clawed in basal half, 13–14 × 5–6 mm, obtuse, lower 3 tepals joined below for ± 2.5 mm, obovate-pandurate, ± 12 × 5–6 mm, truncate, claws 1–2 mm long. *Filaments* arcuate, later diverging, ± 10 mm long; anthers 4–5 mm long, yellow, with apiculus 0.5–0.8 mm long. *Style* ± 9 mm long, dividing opposite anther bases, branches 1 mm long. *Capsules* and *seeds* unknown. *Flowering time*: December.



Distribution of ***Tritoniopsis flava***.

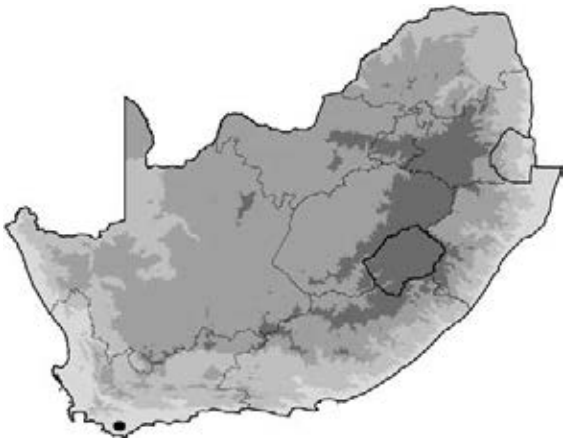
Distribution and biology: a highly local endemic from the lower Palmiet River Valley near Kleinmond, Western Cape, South Africa; along streams in humic, seasonally damp soils, at ± 100 m elevation. The riparian vegetation regenerates rapidly and within a few years the plants are smothered; flowering only after fire.

Diagnosis: recognised by its relatively large, bright yellow flowers with the lower tepals not heavily bicoloured with purple, and shortly joined at the base without forming a well-defined lower lip. The perianth tube is short, 4–5 mm long, and the filaments are ± 10 mm long with anthers 4–5 mm long. The leaves are subpetiolate below with a narrowly lanceolate blade mostly 4–8 mm wide, with 2 or 3 veins. The fruits are unknown.

Tritoniopsis flava is most likely to be confused with *T. bicolor* from the Bredasdorp Mtns but that species has strongly bicoloured flowers, narrower tepals 3–4 mm wide, and shorter filaments 6–7 mm long, papillate at the base and in the mouth of the tube.

16. **Tritoniopsis bicolor** *J.C.Manning & Goldblatt* in Bothalia 31: 175 (2001). Type: South Africa, Western Cape, western end of Bredasdorp Mtn., plateau west of Grootkop and Normanskop, 6 Dec. 2000, *Manning 2286* (NBG, holo.; NBG, K, MO, PRE, iso.).

Plants 200–400(–600) mm high. *Corm* 20–30 mm diam.; tunics of densely matted brown fibres, with well-developed collar. *Stem* moderately slender to robust, curved outward at ground level, then suberect or weakly inclined, unbranched, 2.5–4.0 mm diam. *Basal leaves* (4)5 to 7, green at flowering or outermost drying, blades narrowly lanceolate, acuminate, with 1 or 2(3) veins, (85–)100–150 × (5–)6–10 mm, contracted abruptly into semiterete pseudopetiole 30–35 mm long; cauline leaves 1 or 2, lowermost concealed by corm fibres, scale-like. *Spike* densely 20- to 35-flowered, 80–100(–150) mm long; bracts green at base, dry and brown above, leathery, oblong, outer 7–10 mm long, obtuse or acute, inner slightly longer. *Flowers* zygomorphic, yellow with lower 3 tepals flushed maroon in basal half and with darker median streak, strongly acrid or musty scented; perianth tube 2–5 mm long; tepals unequal, dorsal slightly larger, suberect and recurved distally, crisped or undulate, base of lower tepals and mouth of tube minutely papillate, dorsal tepal narrowly oblanceolate, 14–16 × 3–4 mm, obtuse, upper laterals oblanceolate- to obovate-spathulate, 9–13 × 2–4 mm, obtuse, strongly clawed in basal 2–4 mm, lower 3 tepals joined for 1.0–1.5 mm, oblong-spathulate, 9–10 × 2.0–4.5 mm, truncate, with or without short claw up to 1.5 mm long. *Filaments* arcuate, later erect, 6–7 mm long, base of median filament minutely papillate; anthers 3 mm long, yellow, with short apiculus 0.5 mm long. *Style* ± 9 mm long, dividing opposite anther bases, branches 1.0–1.5 mm long. *Capsules* much inflated, ovoid to broadly ellipsoid, 23–28 × 15–20 mm. *Seeds* 10–12 × 10 mm, winged on angles. *Flowering time*: November to December.



Distribution of ***Tritoniopsis bicolor***.

Distribution and ecology: a highly local endemic from the summit plateau of the Bredasdorp Mtns, Western Cape, South Africa; on seasonally waterlogged flats at 400–500 m elevation, in deep, humus-enriched sands, flowering only after fire.

The flowers are pollinated by the solitary bee *Amegilla spilostoma* (Apidae: Anthophorinae).

Diagnosis: *Tritoniopsis bicolor* is recognised by its moderately-sized, bright yellow flowers with the bicoloured lower tepals maroon in the lower third and joined at the base for up to 1.5 mm without forming a well-defined lower lip. The perianth tube is short, 2–5 mm long, and the filaments are 6–7 mm long, with the base of the tepals and mouth of the tube minutely papillate. The leaves are conspicuously petiolate with a narrowly lanceolate blade 6–10 mm wide, with 1 or 2(3) veins, and the capsules are conspicuously inflated. It is most likely to be confused with *T. parviflora*, with which it co-occurs and which has similar, balloon-like fruits, but linear or linear-lanceolate leaves, 2–5 mm wide, and more prominently bilabiate flowers with the lower tepals joined together in a distinct palate 3–4 mm long, and with much longer filaments, 12–14 mm long, arching well over the lower lip. Occasional hybrids with *T. unguicularis* have been recorded

17. **Tritoniopsis parviflora** *(Jacq.) G.J.Lewis* in Journal of South African Botany 25: 340 (1959). *Gladiolus parviflorus* Jacq.: 2, t. 78 (1771). *Hebea parviflora* (Jacq.) L.Bolus: 123 (1929). *Exohebea parviflora* (Jacq.) R.C.Foster: 38 (1939). Type: South Africa, without precise locality or collector, illustration in Jacq.: 2, t. 78 (1771).

Gladiolus montanus L.f.: 95 (1782). *Antholyza montana* (L.f.) Ker Gawl.: 233 (1804) [as *A. montana* Thunb.). Type: South Africa, without precise locality, *Sparrman 162* [LINN59.24, lecto., designated by Lewis: 342 (1959)].

Gladiolus arenarius Baker: 178 (1877), as replacement name for *Hebea orchidiflora* Eckl.: 43 (1827)

[not *G. orchidiflorus* Andrews]. *Hebea arenaria* (Baker) L.Bolus: 123 (1929). Type: none cited in protologue but at least *Ecklon & Zeyher 71* and *72* and *Drège s.n.* '*Schweiggera montana* E.Mey.' are potential syntypes.

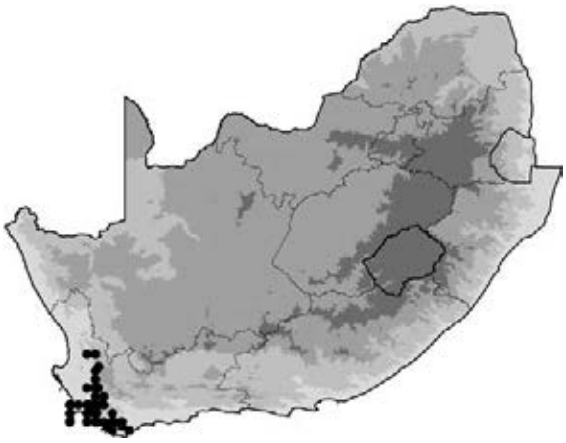
Hebea angusta L.Bolus: 106 (1930), new synonym. *Exohebea angusta* (L.Bolus) R.C.Foster: 36 (1939). *Tritoniopsis parviflora* var. *angusta* (L.Bolus) G. J.Lewis: 343 (1959). Type: South Africa, [Western Cape], foot of the mountains near Ceres, *H. Bolus 7455* (BOL, holo.).

[*Schweiggera montana* E.Mey. ex Baker: 178 (1877), invalid name only in synonymy of *Gladiolus arenarius* Baker (1877).]

[*Gladiolus scorpius* L. ex B.D.Jacks., Index Linn. Herb. 80 (1912), invalid name only in synonymy of *Gladiolus montanus* ?L.f.]

Plants 150–400 mm high. *Corm* 20–30 mm diam.; tunics of densely matted brown fibres, with well-developed collar. *Stem* moderately slender, curved outward at ground level and then erect, unbranched, 1.5–3.0 mm diam. *Basal leaves* 5 to 7, green at flowering or drying, blade linear, acuminate, with 1(2) veins, 80–220 × 2–5 mm, contracted into semiterete pseudopetiole usually, extending shortly above ground; cauline leaves 2 or 3, lowermost concealed by tunic fibres, subulate, upper 1 or 2 minute and scale-like. *Spike* densely 8- to 22-flowered, 30–120 mm long; bracts green at base but dry and brown above, leathery, ovate to oblong, outer 5–8 mm long, obtuse or acute, inner slightly longer. *Flowers* zygomorphic, yellow with tube and three lower tepals flushed maroon or purple in basal half and with the apex yellow but soon turning brown, strongly acrid or musty scented; perianth tube 3–4 mm long; tepals unequal, dorsal larger, arching over stamens and recurved apically, crisped or undulate, base of lower tepals and mouth of tube minutely papillate, dorsal tepal spathulate-oblanceolate, 14–17 × (3–)4–6 mm, obtuse, clawed in basal half, upper laterals oblanceolate- to obovate-spathulate, 10–14 × (2–)3–5 mm, obtuse, strongly clawed in basal half, connate with lower tepals for up to 1 mm and then curved back and up toward dorsal, three lower tepals fused to one another for 3–4 mm forming a lip, oblong-spathulate or panduriform, 10–13 × 3–4 mm, truncate, with short claws 2–3 mm long. *Filaments* arcuate, later diverging, 12–14 mm long, base of median filament minutely papillate; anthers yellow, 3–4 mm long with short or obsolete apiculus up to 0.5 mm long. *Style* ± 15 mm long, dividing opposite anther bases, branches ± 1 mm long. *Capsules* much inflated, ovoid to subglobose, 24–34 × 15–25 mm. *Seeds* 9–10 mm long, winged on angles. *Chromosome number* 2*n* = 32. *Flowering time*: November to January (early February).

Distribution and ecology: relatively widely distributed along the southwestern coastal mountains of Western Cape, South Africa, from the Cold Bokkeveld to the Peninsula and east to Bredasdorp; on rocky sandstone slopes and flats, from 200–1 000 m elevation, flowering only after fire



Distribution of ***Tritoniopsis parviflora***.

This is the only African Iridaceae known to secrete floral oils, and populations on the Kogelberg are pollinated mainly by the large oil-collecting bee *Rediviva gigas* (Melittidae), which collects the oils from the base of the tepals (Manning & Goldblatt, 2002). This bee has a limited distribution, however, and over most of its range *Tritoniopsis parviflora* is pollinated by nectar-feeding bees in the genus *Amegilla* (Apidae: Anthophorinae).

Hybrids have been recorded with *T. dodii* (G.J.Lewis) G.J.Lewis at Hermanus and with *T. unguicularis* (Lam.) G.J.Lewis on the Elandskloof Mtns above Tulbagh Waterfall.

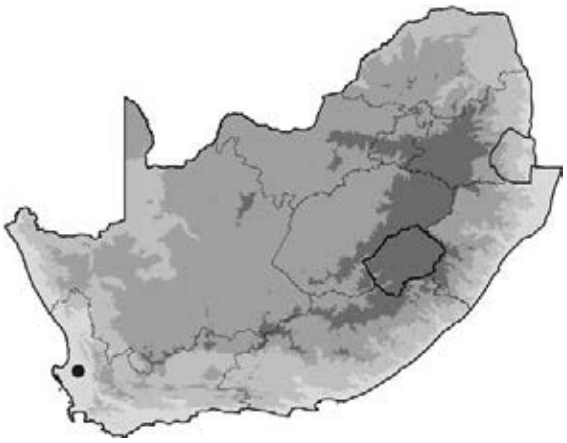
Diagnosis: recognised by its moderately sized, yellow flowers with bicoloured lower tepals flushed maroon or purple in the lower third and joined at the base for 3–4 mm to form a well-defined lower lip. The perianth tube is short, 3–4 mm long but the filaments are relatively long, 12–14 mm long and strongly arched. The base of the tepals and mouth of the tube are minutely papillate. The leaves are characteristically narrow and linear, 2–5 mm wide, with 1 or rarely 2 veins, and the capsules are conspicuously inflated.

Tritoniopsis parviflora is most likely to be confused with *T. bicolor*, with which it co-occurs on Bredasdorp Mountain and which has similar, balloon-like fruits, but that species has narrowly lanceolate leaves, 6–10 mm wide, with 1 or 2(3) veins, and flowers with the lower tepals joined together only at the base without forming a distinct palate, and much shorter filaments, 6–7 mm long. The closely allied Piketberg endemic, *T. cinnamomea* J.C.Manning & Goldblatt, is distinguished by its creamy white flowers flushed dark brownish pink, with a linear dorsal tepal 2.0–2.5 mm wide and upper lateral tepals ± 1.5 mm wide, lower tepals shortly joined at the base for up to 2 mm without forming a distinct palate, slightly longer filaments 15–16 mm long, and much smaller capsules 8–12 mm long.

Plants with narrower lateral and lower tepals 2–3 mm wide, mainly from the Cold Bokkeveld, were treated as var. *angusta* (L.Bolus) G.J.Lewis (1959) but grade imperceptibly into typical forms and cannot be maintained as taxonomically distinct.

18. **Tritoniopsis cinnamomea** *J.C.Manning & Goldblatt* in Manning et al. in South African Journal of Botany 102 (online): 128 (2015 [hardcopy 2016]). Type: South Africa, Western Cape, Piketberg, plateau at SW foot of Zebrakop, 24 Dec. 2014, *J.C.Manning 3489* (NBG, holo.; MO, iso.).

Plants 200–300 mm high. *Corm* globose, ± 20 mm diam.; tunics of densely matted brown fibres, with well-developed collar. *Stem* moderately slender, curved outward at ground level and then erect, unbranched, 1.0–1.5 mm diam. *Basal leaves* 3 or 4, green at flowering or outermost drying, blade linear to linear-lanceolate, acute, with 1 vein, 90–150 × 1–4 mm, contracted gradually into semiterete pseudopetiole 60–80 mm long; cauline leaves 3, lowermost concealed by corm collar, linear-conduplicate, ± 20 mm long, uppermost minute and scale like. *Spike* moderately densely 5- to 15-flowered, 60–120 mm long; bracts green at base but dry and brown above, leathery, oblong, outer bracts 5–6 mm long, acute, inner slightly longer, obtuse. *Flowers* zygomorphic, creamy white with apices of all tepals and outer surface of midline flushed dark brownish pink, acrid scented; perianth tube 3–4 mm long; tepals unequal, dorsal slightly larger, arching over stamens, crisped or undulate, base of lower tepals and mouth of tube minutely papillate, dorsal tepal linear, acute, 17–18 × 2.0–2.5 mm, upper laterals spreading horizontally, strongly clawed and recurved above, 10–12 × ± 1.5 mm, claw involute, 3–5 mm long, blade narrowly oblanceolate, acute, lower 3 tepals fused to one another for ± 2 mm, with short, involute claws up to 3 mm long, 13–15 × 2–3 mm. *Filaments* arcuate but later erect, 15–16 mm long, base of median filament minutely papillate; anthers yellow flushed reddish, 3 mm long with short apiculus 0.5 mm long. *Style* ± 20 mm long, dividing opposite anther bases, branches 0.5–1.0 mm long. *Capsules* much inflated, ovoid to subglobose, 8–12 × 8–15 mm. *Seeds* 4–5 mm long, winged on angles. *Flowering time*: December.



Distribution of ***Tritoniopsis cinnamomea***.

Distribution and ecology: a narrow endemic known only from the Piketberg in Western Cape, South Africa; on a seasonally wet plateau among low restios.

Diagnosis: a recently discovered species evidently closely allied to *Tritoniopsis parviflora* but distinguished from it by the creamy white flowers with the apices and outer surface of the tepals flushed dark brownish pink. The tepals are linear, the dorsal 2.0–2.5 mm wide and the upper laterals ± 1.5 mm wide, and the filaments are relatively long, 15–16 mm long. *Tritoniopsis parviflora*, which does not occur on the Piketberg, has yellow flowers with the tube and three lower tepals flushed maroon or purple in basal half and wider tepals, the dorsal tepal spathulate-oblanceolate, 3–6 mm wide, and the upper laterals 2–5 mm wide, and slightly shorter filaments 12–14 mm long; and larger capsules, 24–43 mm long.

Sect. 4. **Anapalina** *(N.E.Br.) Goldblatt* in South African Journal of Botany 56: 580 (1990). *Anapalina* N.E.Br.: 274 (1932). Type: *Tritoniopsis antholyza* (Lamarck) Goldblatt

Plants usually unbranched, rarely with one short branch. *Leaves* linear to lanceolate, sometimes narrowed and subpetiolate below; lower cauline leaves leaflike, upper reduced and bract-like or scale-like. *Flowers* usually scarlet, rarely carmine or pinkish red to purple, unscented; perianth tube long, sharply bent or geniculate, 20–40 mm long, dimorphic, with slender, suberect lower portion inflated at knee into a horizontal, cylindric portion. *Filaments* 20–45 mm long; anthers 6–9 mm long, obtuse or acute to conspicuously apiculate, yellow or red to purple. *Capsules* leathery, scarcely to strongly inflated.

Species 5: Western and Eastern Cape, South Africa.

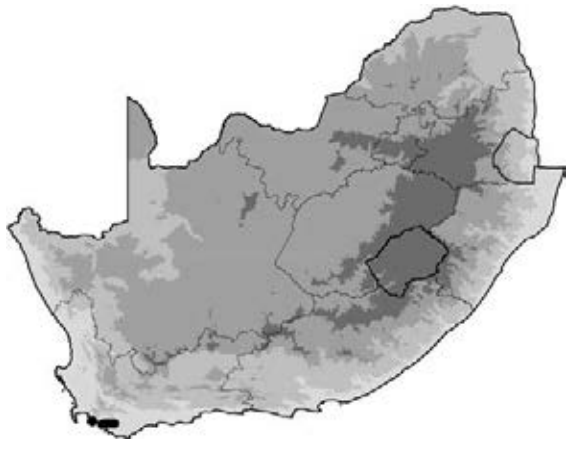
The section comprises all except one (*Tritoniopsis triticea*) of the species with flowers adapted for pollination by sunbirds, thus shades of red or rarely carmine with a well-developed, dimorphic perianth tube that is sharply bent near the middle, with a slender, suberect lower portion widening ± abruptly into a horizontal, cylindric upper portion. The filaments are inserted at the knee bend and thus relatively long, 20–40 mm long. The species appear to fall into three groups: *T. pulchra* and *T. williamsiana* with narrow, subpetiolate leaves and purple anthers with a well-developed apiculus; *T. antholyza* with a basal fan of broad leaves, subacute anthers, and strongly inflated capsules; and *T. caffra* and *T. intermedia* with markedly bilabiate flowers with the dorsal tepal ± twice as long as the others, and obtuse,

yellow anthers. It is possible that the three groups are not immediately related.

19. **Tritoniopsis williamsiana** *Goldblatt* in South African Journal of Botany 56: 580 (1990). Type: South Africa, [Western Cape], Hermanus, Vogelgat Nature Reserve, marsh after fire, 30 Jan. 1987, *P. Goldblatt 8471* (NBG, holo.; K, MO, PRE, iso.).

Plants 400–800 mm high. *Corm* 12–20 mm diam.; tunics of soft, fine fibres or papery, without a collar. *Stem* flexed outward at ground level then erect, unbranched or rarely with one short branch, 3–4 mm diam. *Basal leaves* 3 or 4, green at flowering, reaching less than halfway to base of spike, blade linear-lanceolate, 120–250 × 5–8 mm, acute or acuminate, narrowed and subpetiolate below, with 2 or 3 veins; cauline leaves 2 or 3, lower 1 or 2 like basal but smaller, upper 1 or 2 scale-like. *Spike* moderately densely ± 12- to 20(40)-flowered, 120–200(–300) mm long; bracts dark brown, dry and leathery, lanceolate, outer 12–15 mm long, acute or acuminate, inner slightly longer. *Flowers* red, lower 3 tepals darker in midline, unscented; perianth tube dimorphic, sharply bent, 24–28 mm long, slender in lower 12–15 mm, widening obliquely at bend into cylindric upper part ± 12 mm long; tepals unequal, dorsal tepal largest, horizontal at first later reflexed, oblanceolate, ± 20 × 6 mm, obtuse, other tepals spreading but later reflexed, oblanceolate-elliptic, obtuse or acute, upper lateral tepals 13–15 × 4 mm, adnate to dorsal tepal for ± 2 mm, lower 3 tepals joined for ± 2 mm, subequal or lower slightly shorter, 15–18 × 4 mm. *Filaments* inserted obliquely at base of upper part of tube, arcuate, later diverging, ± 28 mm long; anthers 6 mm long, purple or red, with bifid apiculus 1 mm long. *Style* 40–45 mm long, dividing opposite lower half of anthers, branches 2 mm long, sometimes bifid. *Capsules* obovoid, slightly inflated, 7–10 × 6–9 mm, rugose-verrucose. *Seeds* ± 5 mm long, winged at opposite ends. *Chromosome number* $2n = \pm 32$ (or 30). *Flowering time*: January to February.

Distribution and ecology: a poorly collected local endemic of the southwestern coastal mountains of Western Cape, South Africa, originally known only from Vogelgat Nature Reserve on the Kleinrivier Mtns near Hermanus but now also from the northern foot of the Dwarsrivierberg just west of Kogelberg; in marshes and seeps at 300–450 m elevation, flowering only after fire.



Distribution of ***Tritoniopsis williamsiana***.

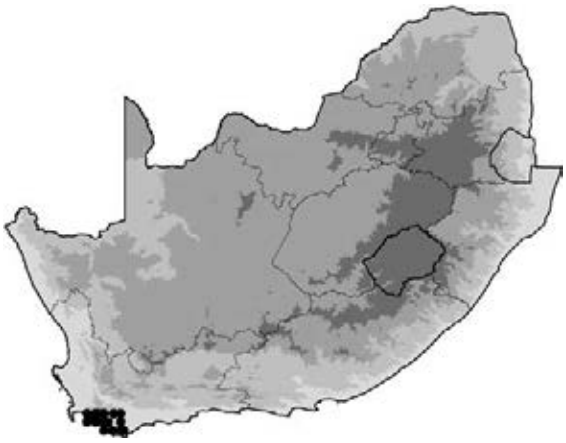
The species is adapted to pollination by sunbirds, including the Orange-breasted Sunbird.

Diagnosis: recognised by its soft corm tunics without a collar and narrow, linear-lanceolate leaves, 5–7 mm wide with 2 or 3 veins, and long-tubed red flowers with oblanceolate tepals. The capsules are unique for the genus, relatively small and only slightly inflated, 7–10 × 6–9 mm, with conspicuously wrinkled-warty walls. Similarly wrinkled-warty but larger capsules are otherwise known only in *Tritoniopsis pulchella*. The seeds are winged only at the apex and base, unlike the tetrahedral seeds winged on the angles that are typical of the genus. Similar two-winged seeds are also found in the two species of sect. *Aristatae*, which likewise have small capsules but with smooth, woody walls.

Tritoniopsis williamsiana co-occurs with both *T. antholyza* and *T. pulchra* and has a general resemblance to both. It is distinguished from the former by its narrow leaves and soft corm tunics, and from the latter by its narrower, oblanceolate tepals, the dorsal ± 20 × 6 mm vs. 15–19 × 8–10 mm, and by its longer filaments ± 28 mm long vs. 20–23 mm long.

20. **Tritoniopsis pulchra** *(Schltr. ex Baker) Goldblatt* in South African Journal of Botany 56: 580 (1990). *Antholyza pulchra* Schltr. ex Baker: 531 (1897). *Homoglossum pulchrum* Schltr.: 453 (1897), superfluous name based on same type. *Anapalina pulchra* (Schltr. ex Baker) N.E.Br.: 275 (1932). Type: South Africa, [Western Cape], Bredasdorp, near Elim, 500 ft [150 m], *R. Schlechter 7611* (K, lecto., designated by Lewis: 59 (1960); PRE, S, WAG, isolecto.).

Plants 250–500 mm high. *Corm* 20–30 mm diam.; tunics of moderately coarse fibres or papery, with a short collar. *Stem* flexed outward at ground level then erect, unbranched or rarely with one short branch, 1.5–3.0 mm diam. *Basal leaves* 3 to 5, dry at flowering, blades linear to linear-lanceolate, 150–300 × 3–6(–10) mm, acute or acuminate, narrowed and petiolate below, 2- or 3-veined; cauline leaves 3–5, lower 1 to 3 subulate, upper 1 or 2 reduced or scale-like. *Spike* moderately densely ± 7- to 20-flowered, 50–150 mm long; bracts brown or reddish, dry and leathery or softer, oblong-lanceolate, outer 8–12 mm long, acute or acuminate, inner slightly longer. *Flowers* carmine to dark red or purplish, lower 3 tepals with darker midline between white bands, unscented; perianth tube dimorphic, sharply bent, 25–30 mm long, slender in lower 10–15 mm, widening at bend into cylindric upper part ± 15 mm long; tepals unequal, all suberect to spreading and later reflexed, arising at same level or upper lateral tepals adnate



Distribution of ***Tritoniopsis pulchra***.

to dorsal for up to 1 mm, ovate or oblong to obovate-oblong, obtuse to truncate, very shortly clawed, dorsal tepal largest, 15–19 × 8–10 mm, others subequal, 12–15 × 7–9 mm. *Filaments* arcuate, later recurved, 20–23 mm long; anthers 6–7 mm long, purple or red, with bifid apiculus 1.0–1.5 mm long. *Style* 30–40 mm long, dividing opposite lower half of anthers, branches 2–3 mm long, sometimes bifid. *Capsules* ellipsoid, inflated, 16 mm long. *Seeds* 2–3 mm long, shortly winged on angles. *Flowering time*: February to June.

Distribution and ecology: restricted to the extreme south-western mountains of Western Cape, South Africa, from the Du Toit's Kloof, Hottentots Holland and Kogelberg onto the Riviersonderend and Kleinrivier Mountains east to Pearly Beach near Elim, with an outlying collection from the eastern end of the Langeberg; on cooler sandstone slopes up to 1 000 m elevation.

Diagnosis: recognised among species with similarly shaped, red flowers by its characteristic carmine to deep pinkish red or purple perianth with broad, oblong to obovate tepals arising ± at the same level, the dorsal 8–10 mm wide, and its relatively short filaments, 20–23 mm long and only shortly exserted from the tube, with apiculate, purple anthers. *Tritoniopsis williamsiana* from the Kleinrivier Mtns has similar flowers with purple anthers but the perianth is scarlet and the tepals are narrower and oblanceolate, the dorsal ± 6 mm wide, and filaments ± 28 mm long, and the capsules are unusually short and warty.

21. **Tritoniopsis antholyza** *(Poir.) Goldblatt* in South African Journal of Botany 57: 226 (1991). *Gladiolus antholyza* Poir. in Lam.: 795 (1812), as replacement name for *Antholyza nervosa* Thunb.: 7 (1794) [not *G. nervosus* Lam. (1788)]. *G. nervosus* (Thunb.) Baker: 228 (1892), illegitimate homonym, not *G. nervosus* Lam. (1788). *Anapalina nervosa* (Thunb.) G.J.Lewis: 63 (1960). *T. nervosa* (Thunb.) Goldblatt: 580 (1990), illegitimate homonym, not *T. nervosa* (Baker) G.J.Lewis (1959). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB, holo).

Antholyza spicata Brehm ex Klatt: 345 (1882), illegitimate homonym, not *A. spicata* Mill. (1768). Type: South Africa, [Western Cape], Du Toit's Kloof, *Drège 1576* (B: Herb. Lubeck, holo.; P, possible iso. [as 'Paarlberg']).

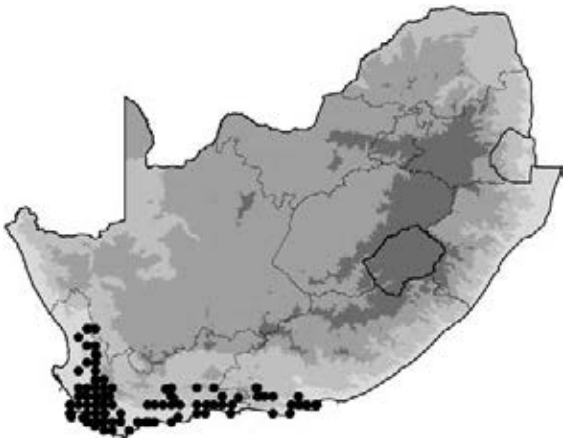
Anapalina longituba Fourc.: 76 (1932). *Tritoniopsis longituba* (Fourc.) Goldblatt: 580 (1990). Type: South Africa, [Western Cape], Prince Alfred's Pass, 2 900 ft [890 m], *Fourcade 2063* (BOL, holo.).

Plants 250–600 mm high. *Corm* 30–60 mm diam.; tunics of coarse fibres, with a long collar. *Stem* flexed outward at ground level then erect, unbranched or with 1, rarely 2 short branches, 3–6 mm diam. *Basal leaves* 3 to 6, in a fan with longitudinally folded, overlapping sheaths, green or drying at flowering, blades lanceolate, 150–400 × 8–20 mm, acute or acuminate, not subpetiolate below, with 3 to 5(6) veins; cauline leaves 3 to 5, lower 1 or 2 lanceolate or subulate, rarely up to 100 mm long, upper 1 to 3 reduced, bract- or scale-like. *Spike* moderately to densely ± 7- to 40-flowered, 50–200 mm long; bracts brown or reddish, dry and leathery, ovate or ovate-lanceolate, outer 8–15 mm long, acute or acuminate, inner slightly longer. *Flowers* usually dull pink or pinkish red, rarely bright red, the tube often yellowish, lower tepals often with dark median line between white bands, unscented; perianth tube dimorphic, sharply bent, 25–40 mm long, slender in lower 8–25 mm, widening at bend into cylindric upper part, lower part much shorter to ± as long as upper part; tepals unequal, all suberect to spreading, later reflexed, arising at same level or lower arising progressively up to 5 mm beyond upper, all narrowly spathulate to oblanceolate-spathulate, obtuse, narrowed or clawed in lower half, dorsal tepal largest, 22–30 × 4–7 mm, others subequal or upper lateral slightly smaller, (12–)15–24 × 3–5 mm. *Filaments* arcuate, later recurved, 30–40 mm long; anthers 5–8 mm long, yellow, subacute or shortly apiculate with apiculus up to 1.5 mm long. *Style* 45–60 mm long, dividing opposite lower half of anthers, branches 3–4 mm long, often bifid. *Capsules* ellipsoid to subglobose, usually strongly inflated, 20–40 × 15–20 mm. *Seeds* 4–6 mm long, shortly winged on angles. *Chromosome number* 2*n* = 34. *Flowering time*: October to March.

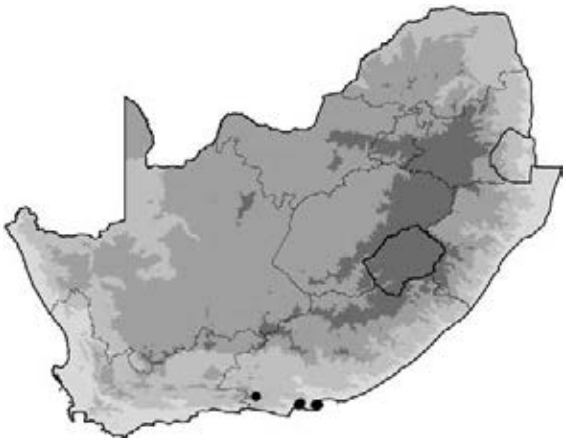
Distribution and ecology: common and widespread through the mountains of the Western and Eastern Cape, South Africa, from the Bokkeveld Escarpment to the Cape Peninsula and along the Swartberg and southern coastal ranges to Port Elizabeth; on stony and rocky slopes and flats from near sea level to over 1 000 m elevation.

The species is primarily adapted to pollination by sunbirds, but later-flowering forms with a pinkish perianth and longer tubes are probably also visited by long-proboscid flies.

Diagnosis: the most common species in the genus, recognised by the basal fan of lanceolate leaves, 8–20 mm



Distribution of ***Tritoniopsis antholyza***.



Distribution of ***Tritoniopsis intermedia***.

wide, and the yellowish or pinkish to red flowers with dimorphic perianth tube 25–40 mm long, and narrowly spathulate to oblanceolate-spathulate tepals, the dorsal 22–30 × 4–7 mm, and arising either at the same level as the other tepals or below them. The capsules are somewhat to markedly inflated.

22. **Tritoniopsis intermedia** *(Baker) Goldblatt* in South African Journal of Botany 56: 580 (1990). *Antholyza intermedia* Baker: 230 (1892). *Chasmanthe intermedia* (Baker) N.E.Br.: 273 (1932). *Petamenes intermedia* (Baker) E.Phillips: 44 (1941). *Anapalina intermedia* (Baker) G.J.Lewis: 66 (1960). Type: South Africa, [Eastern Cape], Port Elizabeth, Van Stadenshoogte, *MacOwan 2070* (K, holo.).

[*Antholyza intermedia* Baker: 180 (1877), invalid name without description.]

[*Antholyza caffra* Ker Gawl. in Herb. Banks m.s.]

Plants 300–450 mm high. *Corm* 30–40 mm diam.; tunics of moderately coarse fibres, with short or long collar. *Stem* erect or flexed outward basally, unbranched, 3–4 mm diam. *Basal leaves* 3 to 7, green at flowering, in a fan, reaching ± halfway to base of spike, blades lanceolate, 100–150 × 7–15 mm, acute or acuminate, not narrowed and subpetiolate below, with 3 or 4 veins; cauline leaves 2 or 3, lower 1 or 2 like basal but smaller, upper 1 or 2 reduced and subulate, 15–50 mm long. *Spike* moderately densely ± 10- to 25-flowered, 150–240 mm long, secund; bracts flushed red or purplish, softly leathery or submembranous, lanceolate, outer 9–15 mm long, acute or acuminate, inner slightly longer. *Flowers* red with paler tube and conspicuous black or purple blotch in sinuses between all tepals, especially lower 3, unscented; perianth tube dimorphic, sharply bent, 25–30 mm long, slender in lower 5–8 mm, widening at bend into cylindric upper part ± 20 mm long, with ventral pouch at base; tepals unequal, arising obliquely, lower lateral tepals joined to upper laterals for ± 2 mm and upper laterals joined to the dorsal for an additional 3–5 mm, dorsal tepal largest, horizontal, oblanceolate-spathulate, clawed in lower half, 25–30 × 7–8 mm, obtuse, lower tepals spreading but later reflexed, elliptic to oblong, shortly clawed, subequal or lower slightly shorter, 12–18 × 4–6 mm. *Filaments* arcuate but later recurved, 40–45 mm long; anthers 7–9 mm long, yellow flushed red, obtuse, almost medifixed. *Style* 50–60 mm long, dividing opposite upper half of anthers, branches 3–4 mm long, oblanceolate-conduplicate. *Capsules* and *seeds* unknown. *Flowering time*: September to December.

Distribution and ecology: a local endemic of Eastern Cape, South Africa, from the Kouga, Baviaanskloof, Groot Winterhoek and Van Stadens River Mtns to Port Elizabeth; in sandy and loamy soil on rocky sandstone slopes.

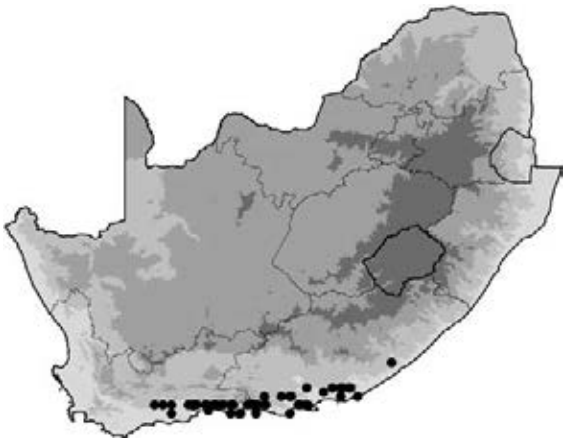
The flowers are clearly adapted to pollination by sunbirds, but no observations have been recorded.

Diagnosis: resembling *Tritoniopsis caffra* in its strongly bilabiate flowers with large, spathulate upper tepal but distinguished from it by the basal fan of shorter leaves reaching ± halfway to the base of the spike, and the characteristic dark purple or black blotches in the tepal sinuses. The perianth tube is slightly but distinctly pouched ventrally at the base of the cylindric upper potion, the upper lateral tepals are connate to the dorsal for 3–5 mm, and the filaments are 40–45 mm long. *Tritoniopsis caffra*, which occurs nearer the coast, has longer, subpetiolate leaves reaching ± to the base of the spike and unmarked flowers without a pouch at the base of the upper part of the perianth tube, upper lateral tepals joined to the dorsal for 6–8 mm, and slightly shorter filaments 33–38 mm long.

23. **Tritoniopsis caffra** *(N.E.Br.) Goldblatt & J.C.Manning* in Strelitzia 29: 808 (2012). *Chasmanthe caffra* N.E.Br.: 273 (1932), as a replacement name for *Antholyza caffra* Ker Gawl. ex Baker: 179 (1877) [not *A. caffra* Ker Gawl. m.s. in Herb. Banks], illegitimate superfluous name for *Anisanthus splendens* Sweet [= *Gladiolus splendens* (Sweet) Herbert]. *Petamenes caffra*

(N.E.Br.) E.Phillips: 44 (1941). *Anapalina caffra* (N.E.Br.) G.J.Lewis: 68 (1960). *T. caffra* Goldblatt: 580 (1990), invalidly published name without Latin description [proposed as a replacement name for *Antholyza caffra* Baker, illegitimate superfluous name]. Type: South Africa, [Western Cape], George, lower slopes of Posberg, *W. Burchell 6010* [K, lecto., designated by Milne-Redhead: t. 9470 (1937) [as *Burchell 3487*], corrected by Lewis: 69 (1960)].

Plants 250–700 mm high. *Corm* 20–40 mm diam.; tunics of soft to moderately coarse fibres, sometimes papery, with short or long collar. *Stem* unbranched or with 1 or 2 short ascending branches, 2–4 mm diam. *Basal leaves* 3 to 6, green at flowering, reaching ± to base of spike, blades linear-lanceolate to lanceolate, 150–500 × 4–10 mm, acuminate or often attenuate, narrowed below and subpetiolate, with 2 or 3(4) veins; cauline leaves 2 to 4, lower 1 or 2 like basal but smaller, upper 1 or 2, subulate, 25–30 mm long. *Spike* moderately densely ± 7- to 25-flowered, 70–300 mm long, 2-ranked; bracts flushed red or purplish, softly leathery, lanceolate, outer 12–20 mm long, acute or acuminate, inner slightly longer. *Flowers* bright or dark red, with or without small black or purple marks in sinuses between lower 3 tepals, unscented; perianth tube dimorphic, sharply bent, 20–30 mm long, slender in lower 8–15 mm, widening at bend into cylindric upper part ± 12–15 mm long; tepals unequal, arising very obliquely, lower lateral tepals joined to upper laterals for 2–4 mm and the upper laterals joined to dorsal for an additional 6–8 mm, dorsal tepal largest, horizontal, oblanceolate-spathulate, clawed in lower half, 26–33 × 6–9 mm, obtuse, lower tepals spreading, later reflexed, elliptic to oblong, shortly clawed, upper lateral tepals and lower median tepal smallest, 10–13 × 4–6 mm, lower lateral tepals, 12–16 × 5–7 mm. *Filaments* arcuate, later recurved, 33–38 mm long; anthers 6–8 mm long, yellow flushed red, obtuse, almost medifixed. *Style* 45–60 mm long, dividing opposite upper half of anthers, branches 2.5–4.0 mm long, sometimes bifid. *Capsules* elliptic to oblong, slightly inflated, (12–)15–30(–40) × 10–15 mm, pale creamy flushed pink with darker impressed-reticulate sculpturing. *Seeds* up to 5 mm long, winged on angles. *Chromosome number* 2*n* = 32 ± 0–2b. *Flowering time*: usually September to December.



Distribution of ***Tritoniopsis caffra***.

Distribution and ecology: occurring along the southern coastal mountains of Western and Eastern Cape, South Africa, from the Langeberg near Heidelberg eastward to Grahamstown and East London; on cooler slopes among sandstone and quartzite rocks.

The bright red, strongly bilabiate flowers with reduced lower tepals bear a remarkable superficial similarity to those of *Gladiolus cunonius* and *G. splendens* and, like these species, are adapted for pollination by sunbirds, including Malachite and Orange-breasted Sunbirds.

Diagnosis: allied to *Tritoniopsis intermedia*, with which it shares the green leaves at flowering, similar, red, strongly bilabiate flowers with a dimorphic perianth tube with a strongly oblique mouth resulting from the progressive adnation of the lower tepals to the dorsal, and an oblanceolate-spathulate dorsal tepal twice as long as the lower tepals. *Tritoniopsis caffra* is distinguished from *T. intermedia* by its longer, attenuate, subpetiolate leaves reaching ± to the base of the spike and its unmarked flowers without a ventral pouch at the base of the upper part of the perianth tube, upper lateral tepals joined to the dorsal for 6–8 mm, and slightly shorter filaments 33–38 mm long.

REFERENCES

BAKER, J.G. 1876. New species of Ixieae. *Journal of Botany, British and foreign* 14: 236, 237.

BAKER, J.G. 1877 ['1878']. Systema Iridacearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell, London.

BAKER, J.G. 1897 [June]. Addenda. In W.T. Thiselton-Dyer, *Flora capensis* 6: 529–536. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1901. Beiträge zur Kenntnis der Afrikanischen Flora. Iridaceae. *Bulletin de l' Herbier Boissier*, sér. 2, 1: 862–868.

BOLUS, F. 1917. Novitates africanae. *Annals of the Bolus Herbarium* 2: 98–109.

BOLUS, L. 1929. Plants—New and noteworthy. *South African Gardening and Country Life* 19: 123.

BOLUS, L. 1930. Novitates Africanae. *Journal of Botany, British and foreign* 68: 106, 107.

BOUCHÉ, C.D. & WITTMACK, L. 1876. *Acidanthera bicolor* Hochst. (Irideae). *Monatsschrift zum Vereines Beförderung des Gartenbaues* 19: 12–17.

BROWN, N.E. 1928. The South African Iridaceae of Thunberg's Herbarium. *Journal of the Linnean Society, Botany* 48: 15–55.

BROWN, N.E. 1929. The Iridaceae of Burman's *Florae capensis prodromus*. *Bulletin of Miscellaneous Information Kew* 1929: 129–139.

BROWN, N.E. 1932. Contributions to a knowledge of Transvaal Iridaceae. *Transactions of the Royal Society of South Africa* 20: 261–280.
BURMAN, N.L. 1768. *Flora indica: cui accedit series zoophytorum indicorum, nec non Prodromus florae capensis*. Cornelius Haak, Leiden.
ECKLON, C.F. 1827. *Topographisches Verzeichnis der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.
FOSTER, R.C. 1939. Studies in the Iridaceae I. *Contributions from the Gray Herbarium of Harvard University* 127: 33–48.
FOURCADE, G.H. 1932. Contributions to the flora of the Knysna and neighbouring devisions. *Transactions of the Royal Society of South Africa* 21: 75–102.
GOLDBLATT, P. 1971. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460.
GOLDBLATT, P. 1990. Status of the southern African *Anapalina* and *Antholyza* (Iridaceae) genera, based solely on characters for bird pollination, and a new species of *Tritoniopsis*. *South African Journal of Botany* 56: 577–582.
GOLDBLATT, P. 1991. Nomenclatural notes on African Iridaceae. *South African Journal of Botany* 57: 226.
GOLDBLATT, P., DAVIES, T.J., MANNING, J.C., VAN DER BANK , M. & SAVOLAINEN, V. 2006. Phylogeny of Iridaceae subfamily Crocoideae based on a combined multigene plastid analysis. *Aliso 22*: 399–411.
JACKSON, B.D. 1912. Index to the Linnean Herbarium with indication of the types of species marked by Carl von Linné. *Proceedings of the Linnean Society (London)*, session 124, Suppl.: 1–152.
JACQUIN, N.J. 1771. *Observationum botanicarum*, vol. 4. J.P. Kraus, Vienna.
KER GAWLER, J.B. 1804 [‘1805’]. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247. Taylor, London.
KLATT, F.W. 1864. Revisio Iridearum. *Linnaea* 32: 689–784.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker’s Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
LAMARCK, J.B.A.P.M. de. 1786–1788. *Encyclopédie méthodique. Botanique*, vol. 2. Panckouke, Paris.
LAMARCK, J.B.A.M. de. 1797–1798. *Encyclopédie méthodique. Botanique*, vol. 4. Panckouke, Paris.
LAMARCK, J.B.A.M. de. 1811–1812. *Encyclopédie méthodique. Botanique*, Suppl. 2. Panckouke, Paris.
LEWIS, G.J. 1934. *Hebea dodii. The Flowering Plants of South Africa* 14: t. 549.
LEWIS, G.J. 1941. New genera and species and miscellaneous notes. *Journal of South African Botany* 7: 19–59.
LEWIS, G.J. 1952. A note on the rediscovery of Thunberg’s ‘*Gladiolus flexuosus*’ and a complete description of the plant. *Annals of the South African Museum* 40: 1–5, t. 1.
LEWIS, G.J. 1954. Iridaceae—New species and miscellaneous notes, Part 5. *Annals of the South African Museum* 40: 115–135.
LEWIS, G.J. 1959. South African Iridaceae. The genus *Tritoniopsis*. *Journal of South African Botany* 25: 319–355.
LEWIS, G.J. 1960. South African Iridaceae. The genus *Anapalina*. *Journal of South African Botany* 26: 51–72.
LINNAEUS, C. 1762. *Species plantarum,* edn. 2. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 [‘1781’]. *Supplementum plantarum*. Orphanotropheus, Brunswick.
MANNING, J.C. & GOLDBLATT, P. 2001. Three new species of *Tritoniopsis* (Iridaceae: Crocoideae) from the Cape Region of South Africa. *Bothalia* 31: 175–181.
MANNING, J.C. & GOLDBLATT, P. 2002. The pollination of *Tritoniopsis parviflora* (Iridaceae) by the oil collecting bee *Rediviva gigas* (Hymenoptera: Melittidae): the first record of oil-secretion in African Iridaceae. *South African Journal of Botany* 68: 171–176.
MANNING, J.C. & GOLDBLATT, P. 2005. Radiation of pollination systems in the Cape genus *Tritoniopsis* (Iridaceae: Crocoideae) and the development of bimodal pollination strategies. *International Journal of Plant Science* 166: 459–474.
MANNING, J.C. & GOLDBLATT, P. 2012. *Plants of the Greater Cape Floristic Region 1: The Core Cape Flora. Strelitzia* 29. South African National Biodiversity Institute, Pretoria.
MANNING, J.C., GOLDBLATT, P. & EBRAHIM, I. 2016 [online 17 Aug. 2015]. *Tritoniopsis cinnamomea* (Iridaceae), a new species from the Piketberg, Western Cape, with a key to allied species. *South African Journal of Botany* 102: 127–129.
MILLER, P. 1768. *The Gardeners dictionary*, edn. 8. P. Miller, London.
MILNE-REDHEAD, E.W.B.H. 1937. *Chasmanthe caffra. Curtis’s Botanical Magazine* 160: t. 9470.
PERSOON, C.H. 1805. *Synopsis plantarum*, vol. 1. Paris and Tubingen.
PHILLIPS, E.P. 1941. A note on N.E. Brown’s sub-division of the genus *Antholyza* Linn. *Bothalia* 4: 43, 44.
PHILLIPS, E.P. 1951. *The genera of South African Flowering Plants*, 2nd edition. Botanical Survey Memoir No. 25. Department of Agriculture, Pretoria.
ROEMER, J.J. & SCHULTES. J.A. 1817. *Systema vegetabilium*, vol. 1. J.G. Cotta, Stuttgart.
SCHLECHTER, 1897 [August] [‘1898’]. Plantae Schlechterianae novae vel minus cognitae describuntur 1. *Botanische Jahrbücher für Systematik* 24: 434–459.
THUNBERG, C.P. 1794. *Prodromus plantarum capensium*, part 1. Edman, Uppsala.
WIJNANDS, D.O. & GOLDBLATT, P. 1992. A volume of South African plant drawings for Johannes Burman (1701–1779). *Candollea* 47: 357–366.

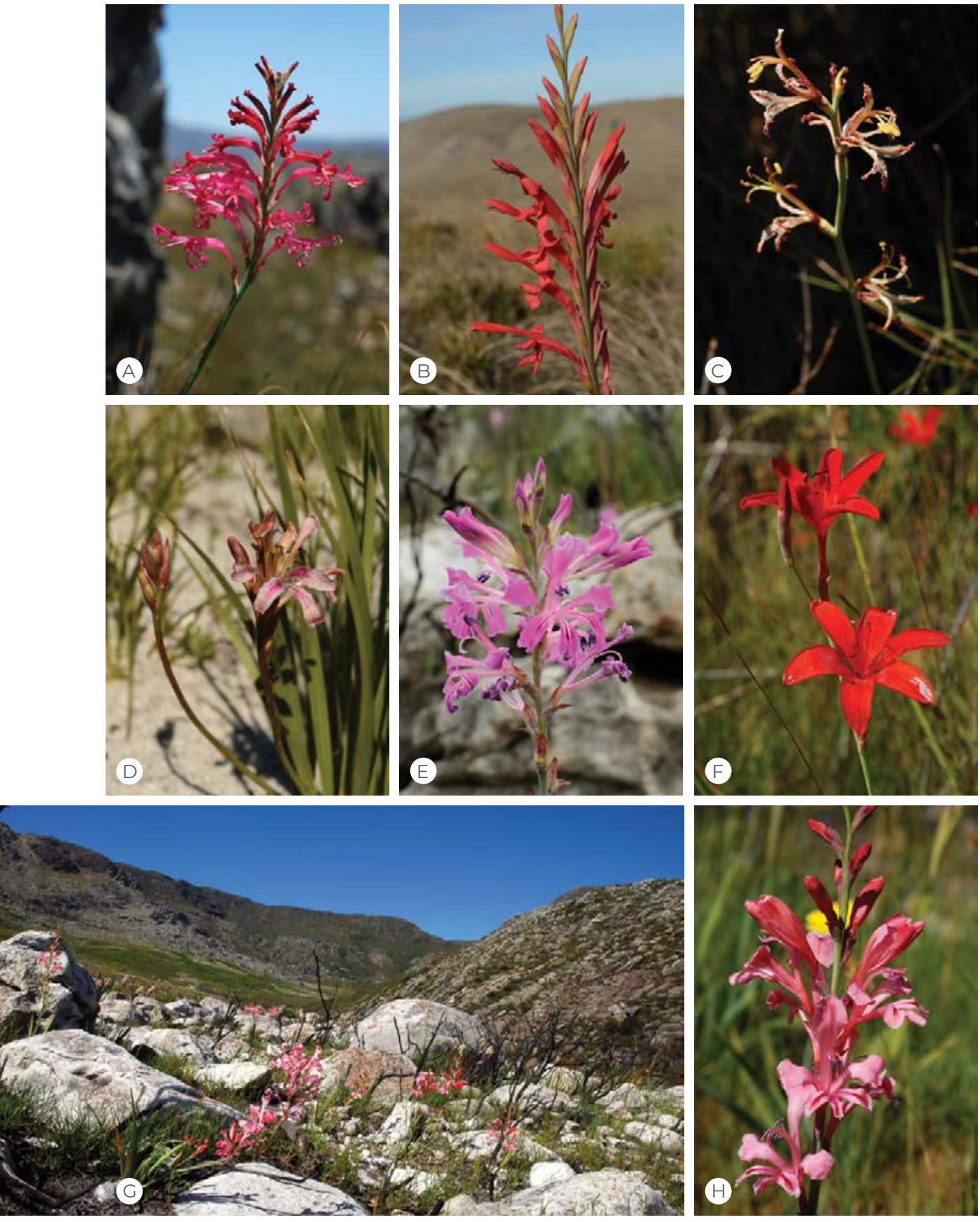


Plate 6: A, ***Tritoniopsis antholyza***, Wellington, WC; B, ***T. caffra***, Grahamstown, EC; C, ***T. cinnamomea***, Piketberg, WC; D, ***T. doddii***, Simonstown, WC; E, ***T. lata***, Kogelberg, WC; F, ***T. leslei***, Ceres, WC; G & H, ***T. pulchella***, Wellington, WC.

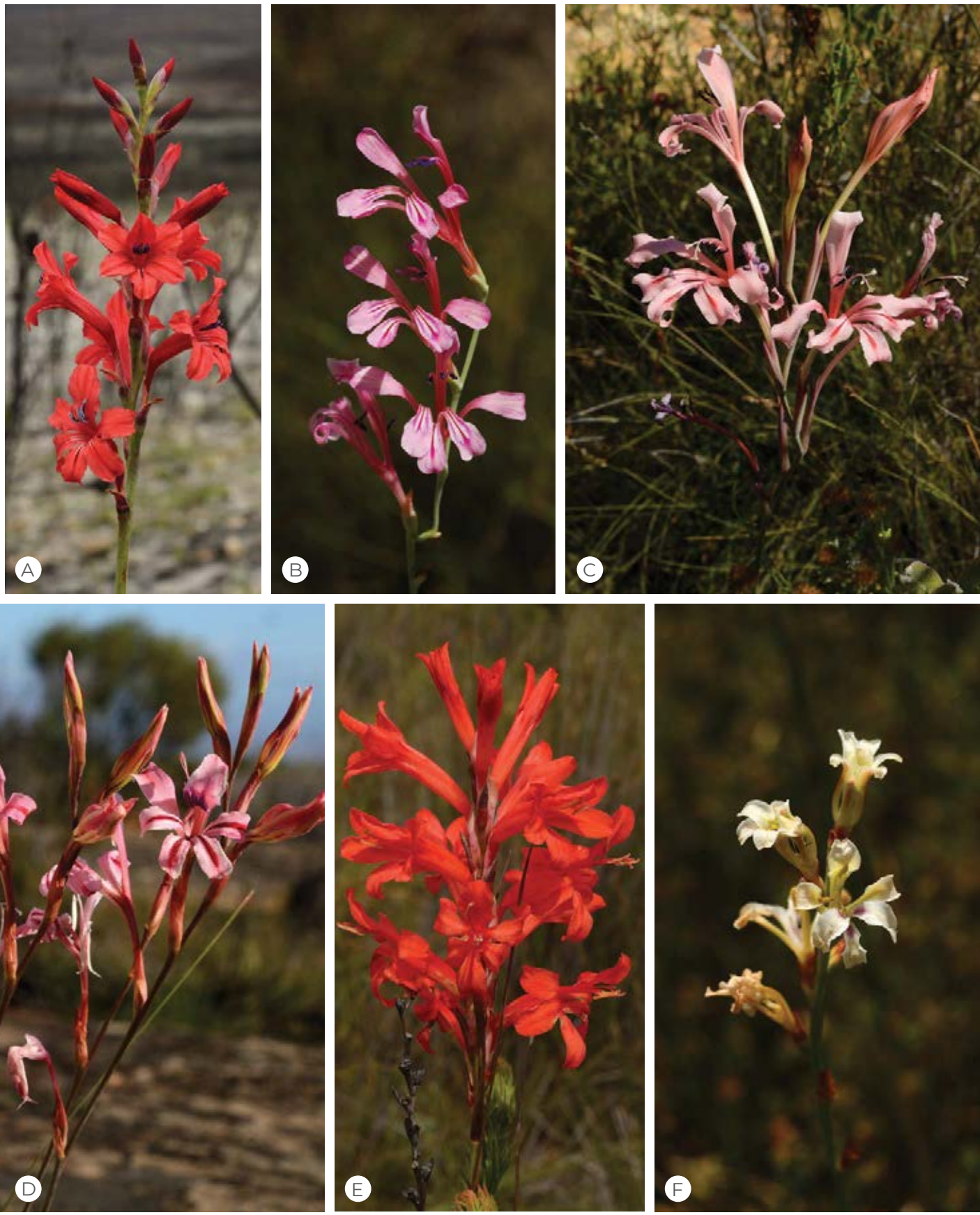


Plate 7: A, ***Tritoniopsis pulchra***, Elim, WC; B, ***T. ramosa***, Ceres, WC; C, ***T. revoluta***, Riversdale, WC; D, ***T. toximontana***, Gifberg, WC; E, ***T. triticea***, Elim, WC; F, ***T. unguicularis***, Table Mt, WC.

Tribe 2. **Watsonieae**

Watsonieae *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 351 (1882). Type: *Watsonia* P.Miller

Subtribe *Watsoniinae* G.J.Lewis ex Goldblatt in Goldblatt in Journal of South African Botany 37: 438 (1971). Type: *Watsonia* Miller

Subtribe *Lapeirousiinae* Goldblatt in Journal of South African Botany 37: 439 (1971). Type: *Lapeirousia* Pourr.

Plants with axillary corm development; corm with rounded or flat base, tunics fibrous or woody; flowering stem usually well developed (subterranean in some *Lapeirousia* spp.). *Leaves* with a main vein (except *Pillansia*), plane or ribbed, margins with subepidermal sclerenchyma associated with a marginal vein (lacking in *Pillansia*). *Inflorescence* a spike, sometimes contracted, or paniculate (*Pillansia*); inner bracts shorter than outer, forked apically. *Flowers* usually actinomorphic with stamens unilateral, rarely actinomorphic; style branches often deeply divided or sometimes undivided (*Cyanixia, Pillansia, Zygotritonia*); ovules campylotropous; seed epidermal cell outlines prominent; ovular vascular trace intact; *Basic chromosome number x* = 10 (9, 8, 7).

Genera 11, 8 in southern Africa, 118 species in southern Africa: *Watsonia* (53 spp.); *Pillansia* (1 sp.); *Thereianthus* (11 spp.); *Micranthus* (7 spp.); *Codonorhiza* (7 spp.); *Schizorhiza* (1 sp.); *Lapeirousia* (27 spp.); *Afrosolen* (11 spp).

Key to genera

1a Corm bell-shaped, ellipsoid or obconic (triangular in outline), with flat base and roots emerging from basal margin:
2a Corm ± ellipsoid, diameter of flat base narrower than midline; lower axils of stem bearing multiple cormlets; inflorescence a many-branched false panicle. . . . . 11. *Schizorhiza*
2b Corm bell-shaped or obconic, widest at base; lower axils of stem with a single cormlet or without cormlets; inflorescence a spike or a false panicle:
3a Corm tunic layers woody, base sometimes serrated to spiny; leaves corrugate (plicately ridged); inflorescence a spike or a crowded rosette when plants lacking aerial stem; floral bracts large, fleshy, the inner significantly smaller than outer; seeds globose . . . . . 12. *Lapeirousia*
3b Corm tunic layers not woody, composed of compressed fibres, the outer layers often becoming loosely fibrous with age, base never serrated to spiny; leaves plane or terete; inflorescence a spike or a many-branched false panicle, the individual flowers always sessile (subtended by a pair of opposed bracts at base of ovary); floral bracts subequal, the inner slightly shorter or slightly longer than outer; seeds ovoid or globose:
4a Floral bracts green, firm and ± leathery, apices ± rounded or emarginate; seeds ovoid with surface reticulate to rugose; pollen grains with 1-banded operculum . . . . . 10. *Codonorhiza*
4b Floral bracts green to dry, soft-textured, often becoming membranous, apices acute; seeds globose with smooth surface; pollen grains with 2-banded operculum . . . . . 13. *Afrosolen*
1b Corm globose to obconic with rounded base and roots emerging from lower half of corm:
5a Inflorescence a panicle with individual flowers stalked; flowers actinomorphic, bright orange; style branches divided less than halfway. . . . . 7. *Pillansia*
5b Inflorescence a spike with individual flowers sessile; flowers usually zygomorphic, rarely actinomorphic then white or pink; style branches usually deeply divided:
6a Leaves ± clustered in a basal fan, with thickened, hyaline margins; flowers medium to large, usually at least 20 mm long, never blue; bracts usually green, sometimes becoming dry . . . . . .6. *Watsonia*
6b Leaves superposed, only lowermost basal, with or without thickened, hyaline margins; flowers small to medium, mostly less than 30 mm long, blue or mauve to white; bracts ± dry:
7a Spikes 2-ranked; flowers small, < 12 mm long, crowded in dense spikes; perianth tube curved; bracts with broad membranous margins . . . . . .9. *Micranthus*
7b Spikes spiral; flowers > 15 mm long, not noticeably crowded; perianth tube ± straight; bracts with narrow membranous margins . . . . . .8. *Thereianthus*

6. Watsonia

Watsonia *Miller*, Figures of plants in the Gardener's dictionary 2: pl. 276 (1758 [1760]), conserved name. Type: *W. meriana* (L.) Miller

Meriana Trew: 11 & pl. 40 (1754), rejected name. Type: *M. flore rubello* Trew = *W. meriana* (L.) Miller

Lomenia Pourr.: 74 & pl. 5 (1788). Type: *Lomenia borbonica* Pourret = *Watsonia borbonica* (Pourret) Goldblatt

[*Neuberia* Eckl.: 37 (1827), invalid name without description.]

Revisionary account: Goldblatt (1989).

Named for the eighteenth century British botanist, William Watson.

Deciduous or sometimes evergreen perennials. *Corm* depressed-globose, axillary in origin, old corms often not resorbed, tunics leathery becoming fibrous and netted with age. *Cataphylls* 2 or 3, dry and papery or leathery. *Leaves* several, foliage leaves mostly in a basal fan, lanceolate to linear, leathery and sclerotic, plane with midrib and margins often thickened and prominent, cauline leaves smaller, inserted on upper ½ of stem, entirely sheathing and bract-like; marginal vascular bundle present, epidermis unspecialised. *Stem* aerial, simple or with one to several short, ascending branches, subterete. *Inflorescence* a distichous spike; bracts firm-textured, partly to completely dry at anthesis, inner shorter to longer than outer, 2-nerved, usually forked apically. *Flowers* zygomorphic (radially symmetric in *W. marginata*), long-lived, pink, orange or red, rarely cream-coloured to pale yellow, sometimes with darker markings on lower tepals, unscented or rarely lightly scented, with nectar from septal nectaries; perianth tube slightly to strongly curved, lower part narrowly cylindric, upper part flared or broadly cylindric; tepals subequal, ± spreading or dorsal horizontal. *Stamens* unilateral and arcuate or sometimes deflexed, rarely central and symmetrically disposed; filaments inserted well below top of perianth tube at junction between lower and upper parts. *Ovary* ovoid; style filiform, 3-branched distally, branches slender and forked for half their length. *Capsules* globose to oblong or elongate, sometimes spindle-shaped, leathery to woody, tardily dehiscent. *Seeds* large, angular or compressed and winged at chalazal end or at both ends, areolate, matte. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number* $x = 9$.

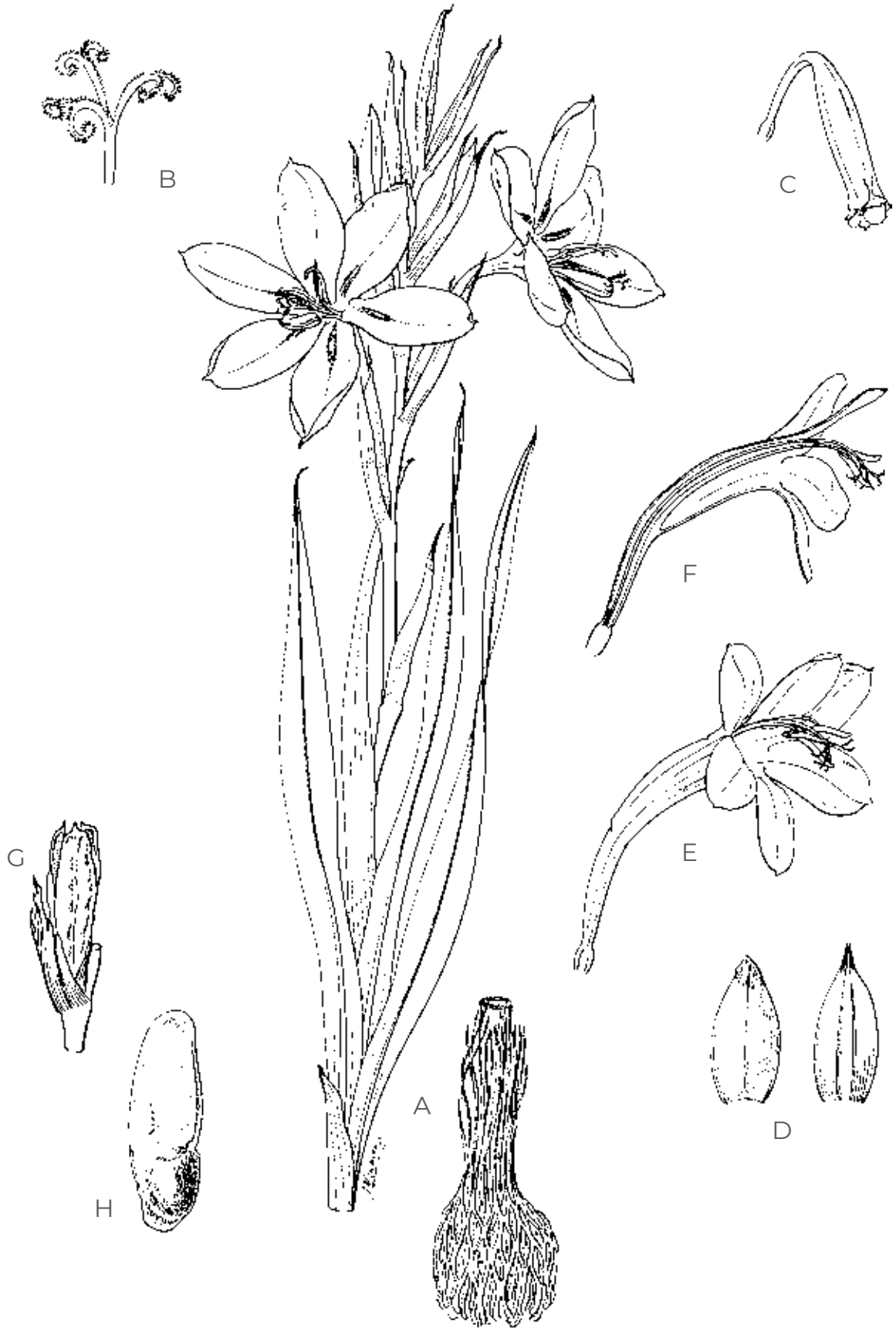
Species 53: southern Africa, centred in the southwestern parts of Western Cape but extending north into Namaqualand, and east into the summer-rainfall zone of eastern South Africa, Eswatini, and Lesotho.

Watsonia can be recognised by its basal fan of leathery or fibrous leaves often with thickened midrib and margins, and the sturdy, erect, 2-ranked spike, often with numerous closely packed flowers subtended by firm, leathery bracts. The flowers are usually quite large, mostly pink to orange or red to purple, rarely pale yellow, with slender style branches divided for half their length. The large, somewhat flattened corms are axillary in origin, and the leaves have the ancestral marginal anatomy type, with a marginal vein with phloem cap. *Watsonia* has a unique basic chromosome number in the subfamily, $x = 9$, and a karyotype with one large pair of chromosomes. Seeds of many species are specialised in having the proximal and distal ends flattened and drawn into wing-like processes. In a few species the seeds may have only one large distal wing. Winged seeds are found only in species of the southern African winter-rainfall zone and it is here that the species diversity is greatest.

Flower colour is closely correlated with perianth shape and pollination system. Pink or pale yellow flowers, with either a relatively short, flared tube or a moderately long, slender tube are adapted for pollination by bees or long-proboscid flies, whereas red or orange flowers, nearly always with a perianth tube that is narrow below and wide and tubular above, are pollinated by sunbirds.

The relationships of *Watsonia* lie with the other genera of Crocoideae with similar, deeply divided style branches and axillary corm development, together comprising tribe Watsonieae. Within the tribe, *Watsonia* is sister to *Pillansia*, with a very different leaf and inflorescence structure and radially symmetric, orange flowers and large, areolate seeds. Basic chromosome number for the tribe is evidently $x = 10$, and *Watsonia* appears derived in its secondary base of $x = 9$.

The existing classification of the genus is largely intuitive and is based on proposed morphological specialisations (Goldblatt 1989). In that system *Watsonia marginata* was segregated as the monospecific subg. *Neuberia* for its unique, actinomorphic flowers, which were then interpreted as plesiomorphic, and the remaining, zygomorphic-flowered species were segregated in three sections in subg. *Watsonia*. Outgroup comparison now suggests that the actinomorphic flower is secondarily derived in the genus. In the absence of corroborative phylogenetic data we favour a non-hierarchical classification system in which we treat *Neuberia* as a fourth section.



WATSONIA. W. dubia: A, flowering plant; B, detail of style branches. ***W. aletroides***: C, flower. ***W. meriana***: D, outer bract (left) and inner bract (right); E, flower; F, half-flower. ***W. vanderspuyiae***: G, dehisced capsule; H, seed.

Keys to species

A. Species of summer rainfall eastern southern Africa (Port Elizabeth to Limpopo):

1a Upper part of perianth tube above stamen insertion ± cylindric, barely wider at mouth than near middle of upper part; tepals usually shorter than to ± as long as upper part of tube; filaments usually well exserted, 7–15 mm from tube, rarely less; flowers usually red to orange, or pink to purple:
2a Floral bracts short, 5–14(–16) mm long (disregard lower 1–3 flowers):
3a Filaments 10–20 mm long, included in perianth tube or exserted up to 5 mm . . . . . 39. *W. bachmannii*
3b Filaments 25–45 mm long, well exserted from perianth tube:
4a Filaments 16–28 mm long; flowers pink to purple or rarely red; tepals 8–15 mm wide; capsules narrowly obovoid . . . . . 37. *W. knysnana*
4b Filaments 30–38 mm long; flowers scarlet to dark red; tepals 4–10 mm wide; capsules elongate-fusiform . . . . . 43. *W. angusta*
2b Floral bracts longer, 15–45 mm long:
5a Inner (broader) tepals at least 10 mm wide and at least half as wide as long:
6a Flowers pink to purple; filaments 16–25(–30) mm long . . . . . 37. *W. knysnana*
6b Flowers orange to red; filaments (25–)30–45 mm long . . . . . 38. *W. pillansii*
5b Inner (broader) tepals 4.5–9.0 mm wide and more than twice as long as wide:
7a Leaves 30–60 mm wide; bracts green below; plants from northern KwaZulu-Natal to Mpumalanga . . . . 23. *W. latifolia*
7b Leaves 3–25 mm wide; bracts entirely dry and brown; plants from southern KwaZulu-Natal to Eastern Cape . . . . . 26. *W. gladioloides*
1b Upper part of perianth tube above stamen insertion flared evenly from base to apex, usually ± twice as wide at mouth as near centre; tepals usually 1.5–2.0 times as long as upper part of tube; filaments included or shortly exserted up to 5 mm from tube; flowers usually pink to purple, rarely red, white or yellow:
8a Lower part of perianth tube 30–55 mm long:
9a Bracts dry and brown above, 25–35 mm long; upper part of perianth tube ± 15 mm long; spike 15- or more-flowered . . . . . 17. *W. wilmsii*
9b Bracts herbaceous, 33–55 mm long; upper part of perianth tube ± 6 mm long; spike 3- to 7-flowered . . . . . 18. *W. occulta*
8b Lower part of perianth tube 7–25 mm long:
10a Flowers pale yellow to cream-coloured, rarely maroon, small, tepals 10–18 mm long; basal leaves 1 or 2, linear, 3–6 mm wide, with heavily thickened midrib and margins . . . . . 16. *W. watsonioides*
10b Flowers usually pink to purple or red, rarely white, tepals usually longer; basal leaves usually 3 or more, 2–80 mm wide, with or without heavily thickened midrib and margins:
11a Bracts entirely dry at flowering, uniformly brown or with pale veins, (10–)20–40 mm long, strongly overlapping and at least 2 internodes long; spike crowded with (10)20 to 60 flowers:
12a Plants solitary with erect stems:
13a Leaves channelled with margins curved inward; bract-like cauline leaves not or hardly inflated . . . . . 29. *W. canaliculata*
13b Leaves plane, the lower usually dead and dry at flowering; bract-like cauline leaves inflated . . . . . 25. *W. lepida*
12b Plants forming clumps, with stems ± erect or inclined below:
14a Spike internodes (7–)9–15 mm long; tepals 25–32 mm long; spike 15- to 30-flowered . . . . . 27. *W. confusa*
14b Spike internodes 4–8 mm long; tepals 16–25 mm long; spike 30- to 60-flowered:
15a Bracts 22–28 mm long, dark brown with venation not evident; leaves mostly 15–30 mm wide . . . 28. *W. pulchra*
15b Bracts 16–40 mm long, pale brown with dark margins and paler veins; leaves mostly 10–15 mm wide . . . . . 30. *W. densiflora*
11b Bracts usually partly green and herbaceous below, 5–30 mm long, sometimes overlapping but then *either* shorter than 2 internodes long *or* green below; spike relatively lax and with 3 to 30 flowers:
16a Flowers bright orange; upper part of perianth tube subcylindric, ± as long as lower part . . . . . 39. *W. bachmannii*
16b Flowers pink to purple; upper part of perianth tube funnel-shaped:
17a Anthers 5–6 mm long; leaves linear, 3–6 mm wide:
18a Bracts herbaceous with brown papery margins, becoming dry and brown apically, (15–)20–25 mm long, not clasping rachis below; filaments exserted 3 mm from perianth tube . . . . . 21. *W. vicschuettei*
18b Bracts dry and brown, (10–)12–16 mm long, clasping rachis below; filaments included in tube . . . . . 22. *W. bella*
17b Anthers 6–9 mm long; leaves linear to lanceolate, 2–40 mm wide:
19a Basal leaves linear, 2–3 mm wide, at least as long as spike (sometimes dry and broken); bracts dry and brown; tepals 14–16 mm long. . . . . 24. *W. mtamvunae*
19b Basal leaves linear to lanceolate, 4–40 mm wide; bracts herbaceous or dry and brown; tepals 16–28 mm long:
20a Spike 3- to 8-flowered; anthers ± 9 mm long:
21a Stem inclined at ground level; tepals 24–28 mm long; plants of open, stony, well-drained slopes . . . . . 19. *W. inclinata*
21b Stem erect; tepals 20–22 mm long; plants of permanently wet vleis and marshes. . . . . 20. *W. pondoensis*
20b Spike 10- to 25-flowered; anthers 6–9 mm long:
22a Tepals 20–25 mm long; stems always simple . . . . . 14. *W. transvaalensis*
22b Tepals 16–19 mm long; stems frequently branched, branches sometimes 1- or 2-flowered, thus resembling stalked flowers:
23a Leaves 14–40 mm wide; spike 25- to 35-flowered; plants from Mpumalanga . . . . . 15. *W. strubeniae*
23b Leaves 5–14 mm wide; spike 10- to 20-flowered; plants from Eastern Cape . . . . . 13. *W. amatolae*

B. Species of winter rainfall western southern Africa (Namaqualand to Port Elizabeth):

1a Flowers actinomorphic, rotate; upper part of perianth tube less than half as long as tepals; stamens central 1. *W. marginata*
1b Flowers zygomorphic; upper part of perianth tube half as long or more as tepals; stamens unilateral, rarely pseudosymmetrical, but then median stamen curved upward between laterals: shortly exserted up to 5 mm from tube; flowers usually pink to purple, rarely red, white or yellow:
2a Stamens declinate:
3a Floral bracts (15–)20–50(–70) mm long; perianth tube 25–50 mm long:
4a Bracts (15–)20–25(–33) mm long; upper part of perianth tube 8–14 mm long; filaments 13–15 mm long, well exserted from tube. . . . . 6. *W. strictiflora*
4b Bracts (25–)30–50(–70) mm long; upper part of perianth tube 5–8 mm long; filaments usually 6–12 mm long, shortly exserted from tube. . . . . 7. *W. dubia*
3b Floral bracts 6–20 mm long; perianth tube 15–30 mm long:
5a Anthers 4–8 mm long; plants small, rarely taller than 500 mm:
6a Bracts narrow throughout, not clasping stem; anthers 7–8 mm long, dark purple. . . . . 5. *W. amabilis*
6b Bracts broad-based and clasping stem; anthers 4–5 mm long, yellow (rarely purple):
7a Tepals up to half as long as upper part of perianth tube, ± 10 mm long; leaves up to 10 mm wide. . . . . 9. *W. aletroides*
7b Tepals more than half as long as upper part of perianth tube, 14–16 mm long; leaves often > 10 mm wide . . . . . 8. *W. laccata*
5b Anthers 9–13 mm long; plants taller, usually more than 500 mm tall:
8a Plants usually more than 1 000 mm tall; leaves glossy apple-green, rarely less than 20 mm wide; tepals (26–)30–36 mm long . . . . . 2. *W. borbonica*
8b Plants usually up to 500 mm tall; leaves dull green, 5–10 mm wide; tepals 22–30(–35) mm long . . . . . 4. *W. rogersii*
2b Stamens arcuate to horizontal:
9a Upper part of perianth tube above stamen insertion flared evenly from base to apex, usually ± twice as wide at mouth as near centre; tepals usually 1.5–2.0 times as long as upper part of tube; filaments included or
10a Spikes with at least 2 branches, each with at least 5 flowers; seeds 2-winged:
11a Upper part of perianth tube 8–12 mm long; bracts 10–18 mm long . . . . . 2. *W. borbonica*
11b Upper part of perianth tube 20–30 mm long; bracts 15–26 mm long . . . . . 3. *W. versfeldii*
10b Spikes unbranched or with short branches rarely with more than 2 flowers each:
12a Filaments ± twice as long as upper part of perianth tube, exserted 6–10 mm beyond tube; bracts 5–10 mm long . . . . . 32. *W. galpinii*
12b Filaments ± as long as upper part of perianth tube, included or shortly exserted up to 3 mm; bracts 9–30 mm long:
13a Plants 150–350 mm high, unbranched; upper part of perianth tube 9–12 mm long; anthers 5–6 mm long; plants from Hottentots Holland Mtns . . . . . 11. *W. distans*
13b Plants 400–600 mm high, often branched; upper part of perianth tube 6–8 mm long; anthers 8–9 mm long; plants from Langeberg and Swartberg. . . . . 10. *W. emiliae*
9b Upper part of perianth tube above stamen insertion ± cylindric, barely wider at mouth than near middle of upper part; tepals usually shorter than to ± as long as upper part of tube; filaments arcuate, usually well exserted, 7–15 mm from tube, rarely less; flowers usually red to orange, or pink to purple:
14a Floral bracts shorter, 5–14(–16) mm long (disregard lower 1 to 3 flowers):
15a Filaments 10–20 mm long, included in perianth tube or exserted up to 5 mm:
16a Flowers pink . . . . . 12. *W. paucifolia*
16b Flowers orange to scarlet:
17a Filaments exserted up to 5 mm from tube, 15–16 mm long; upper part of perianth tube 9–10 mm long, style dividing beyond anthers and well exserted . . . . . 35. *W. minima*
17b Filaments included in perianth tube, ± 10 mm long; upper part of perianth tube 10–15 mm long, style dividing below anthers with branches included in perianth tube. . . . . 36. *W. elsiae*
15b Filaments 25–45 mm long, well-exserted from perianth tube:
18a Tepals 12–16 mm long:
19a Floral bracts 5–8 mm long, usually shorter than spike internodes; leaf margins hardly thickened; plants from western mountains . . . . . 33. *W. stokoei*
19b Floral bracts 9–12 mm long, usually ± as long as spike internodes; leaf margins heavily thickened; plants from southern mountains . . . . . 34. *W. marlothii*
18b Tepals 18–33 mm long:
20a Cauline bract leaves much inflated; plants from Cape Peninsula . . . . . 44. *W. tabularis*
20b Cauline bract leaves not inflated; plants from Cape Peninsula and elsewhere:
21a Floral bracts 7–10 mm long; capsules globose to ovoid; plants from Swartberg and east of George . . . . . 31. *W. wilmaniae*
21b Floral bracts 9–14 mm long but, if only 9–10 mm long, then capsules elongate-fusiform; capsules ovoid to fusiform:
22a Inner bracts forked for 2–4 mm:
23a Tepals 20–22 mm long; anthers ± 7 mm long; plants of marshes and seeps . . . . . 42. *W. zeyheri*
23b Tepals 24–33 mm long; anthers 9–12 mm long; plants of open slopes . . . . . 41. *W. fourcadei*
22b Inner bracts entire or shortly forked up to 1.5 mm:
24a Filaments 16–28 mm long; flowers pink to purple or rarely red; tepals 8–15 mm wide; capsules narrowly obovoid. . . . . 37. *W. knysnana*
24b Filaments 30–38 mm long; flowers scarlet to dark red; tepals 4–10 mm wide; capsules elongate-fusiform . . . . . 43. *W. angusta*
14b Floral bracts longer, 15–45 mm long:
25a Inner bracts forked for 2–4 mm:

26a Foliage leaves dry at flowering; plants from Saldanha Bay; flowering April to July . . . . . 50. *W. hysterantha*
26b Foliage leaves green at flowering; plants not from Saldanha Bay; flowering September to January:
27a Tepals 20–22 mm long; anthers ± 7 mm long; plants of marshes and seeps . . . . . .42. *W. zeyheri*
27b Tepals 24–33 mm long; anthers 9–12 mm long; plants of open slopes . . . . . 41. *W. fourcadei*
25b Inner bracts entire or shortly forked up to 1.5 mm:
28a Outer floral bracts consistently longer than inner (disregard upper flowers):
29a Inner (broader) tepals 4.5–9.0 mm wide and more than twice as long as wide; flowers pink; plants from Namaqualand . . . . . .49. *W. rourkei*
29b Inner (broader) tepals at least 10 mm wide and at least half as wide as long; flowers pink to purple or orange; plants from Cape Floristic Region:
30a Flowers pink to purple; filaments 16–25(–30) mm long . . . . . 37. *W. knysnana*
30b Flowers orange to red; filaments (25–)30–45 mm long:
31a Leaves (7–)12–18 mm wide, margins lightly to moderately thickened; plants from Langeberg eastward . . . . . 38. *W. pillansii*
31b Leaves 6–15 mm wide, margins heavily thickened; plants from Langeberg westward . . . . . 40. *W. schlechteri*
28b Outer floral bracts ± as long as or shorter than inner:
32a Leaves 50–85 mm wide, with pale, heavily thickened margins . . . . . 51. *W. vanderspuyiae*
32b Leaves 2–40(–50) mm wide:
33a Tepals (28–)30–35 mm long; anthers 10–12 mm long:
34a Flowers red: bracts 28–40 mm long. . . . . .48. *W. spectabilis*
34b Flowers pink; bracts 15–24 mm long . . . . . 3. *W. versfeldii*
33b Tepals 15–26(–30) mm long; anthers 6–12 mm long:
35a Flowering stem branched and more than 400 mm high . . . . . 45. *W. meriana*
35b Flowering stem usually simple and up to 400 mm high:
36a Filaments (10–)15–20(–22) mm long:
37a Bracts keeled and curving outwards apically; flowers white or pale pink to salmon-pink; filaments usually included in perianth tube . . . . . 47. *W. humilis*
37b Bracts not keeled nor curving outwards apically; flowers orange or salmon-pink; filaments usually exserted from perianth tube . . . . . 53. *W. stenosiphon*
36b Filaments 25–35 mm long:
38a Bracts clasping stem only at base, usually flushed red; anthers violet; plants from loamy and sandstone soils. . . . . 46. *W. coccinea*
38b Bracts clasping stem in lower half, green; anthers yellow; plants from limestone soils. . . . .52. *W. fergusoniae*

Sect. 1. **Neuberia** *(Eckl. ex Baker) Goldblatt & J.C.Manning*, new rank. *Watsonia* subg. *Neuberia* Eckl. ex Baker in Flora capensis 6: 99 (1896). Type species: *W. marginata* (L.) Ker Gawl.

Stems usually branched; bracts dry and pale above or throughout, becoming lacerate. *Flowers* actinomorphic, rotate, pink; perianth tube funnel-shaped with upper part short and flared; tepals spreading, ± twice as long as upper part of tube. *Stamens* erect and symmetrically disposed. *Capsules* subglobose. *Seeds* elongate-angular.

Species 1: southwestern parts of Northern and Western Cape, South Africa.

1. **Watsonia marginata** *(L.f.) Ker Gawl.* in Curtis's Botanical Magazine 17: t. 608 (1802c). *Gladiolus marginatus* L.f.: 95 (1782). *Ixia marginata* (L.f.) Aiton: 59 (1789). *Neuberia marginata* (L.f.) Eckl.: 37 (1827) [genus not validly published]. *Antholyza marginata* (L.f.) Page ex Steud.: 106 (1840a). Type: South Africa, without precise locality, *Sparrman s.n.* (LINN ['*Gladiolus 32*'], holo.).

Gladiolus glumaceus Thunb.: 186 (1800). *Watsonia glumacea* (Thunb.) Aschers. & Graebn.: 583 (1907). Type: South Africa, without precise locality, *Thunberg s.n. 'Gladiolus marginatus* δ' (UPS-THUNB, holo.).

Watsonia marginata var. *minor* Ker Gawl.: t. 1530 (1813). Type: South Africa, without precise locality or collector, illustration in Curtis's Bot. Mag. 37: t. 1530 (1813).

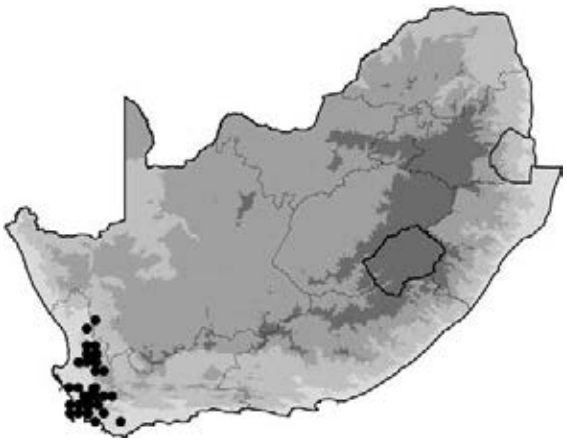
[*Ixia sceptrum* Baker: 158 (1877), invalid name, as a synonym.]

Plants 700–2 000 mm high. *Corm* subglobose, 20–50 mm diam.; tunics coarsely netted. *Stem* erect or inclined, simple or with several short, ascending branches. *Leaves* 3 or 4, lower 2 basal, others sheathing stem below or entirely, lanceolate to linear, (20–)30–50 mm wide, glaucous, midrib moderately and margins heavily thickened and yellowish hyaline or becoming purple; bract-like cauline leaves 1 or more. *Spike* 10- to 20-flowered; bracts entirely dry and pale straw-coloured, or green or reddish below, attenuate, becoming lacerate, 10–18 mm long, inner usually 1–2 mm longer, barely forked apically. *Flowers* actinomorphic, rotate with upper part of tube flexed outward, usually pale pink or mauve (rarely magenta or white), each tepal with white streak at base edged in darker colour; perianth tube funnel-shaped, lower part 7–9(–12) long, included or shortly emerging from bracts, upper part flaring and ± horizontal, 6–7 mm long, 4–5 mm diam. at mouth; tepals spreading, obovate, (14–)20–22 × (7–)11–13 mm, with short peg-like callus at base. *Filaments* ± 10 mm long, contiguous below and surrounding style, diverging above; anthers 7–9 mm

long, incurved apically, yellow or bluish. *Style* erect, usually dividing shortly below to opposite middle of anthers, branches 4–5 mm long. *Capsules* subglobose, up to 8 mm long. *Seeds* angular and prominently ridged, more so distally, 4–6 × 2 mm. *Flowering time*: mid-September to early December.

Distribution and ecology: endemic to the southwestern part of Northern and Western Cape, South Africa, from the Bokkeveld Escarpment along the western mountain chain and isolated coastal massifs to Hermanus; mostly in seasonally marshy sites and seeps on sandstone or granitic soils.

Diagnosis: unique in the genus in its pale, dry bracts and actinomorphic flowers with short, narrowly cupped perianth tube 7–12 mm long. Forms with lateral branches are highly floriferous, the branches appressed to the main axis and giving the appearance of a single, densely-flowered inflorescence. The peg-like callus at the base of each tepal is distinctive. Most populations have pinkish flowers but the dwarf form, which occurs almost throughout the range, may have white, pink or magenta flowers. The latter colour form is restricted to the Cederberg.



Distribution of ***Watsonia marginata***.

Sect. 2. **Lomenia** *(Pourr.) Goldblatt*, Annals of Kirstenbosch Botanic Gardens 19: 32 (1989). *Lomenia* Pourr.: 74 (1788). Type species: *Watsonia borbonica* (Pourr.) Goldblatt

Stems usually branched; bracts firm-textured. *Flowers* zygomorphic, usually pale to deep pink or purple, rarely red or orange; perianth tube narrowly funnel-shaped with upper part flared, or subcylindric throughout; tepals spreading or suberect, usually ± as long as upper part of tube, rarely less than half as long. *Stamens* arcuate or declinate. *Capsules* oblong or flask-shaped. *Seeds* elongate, unequally 2-winged with distal wing larger.

Species 8: southwestern and southern parts of Western and Eastern Cape, South Africa.

2. **Watsonia borbonica** *(Pourr.) Goldblatt* in Annals of the Missouri Botanical Garden 74: 571 (1987). *Lomenia borbonica* Pourr.: 76 (1788). *Gladiolus lomenia* J.F.Gmel.: 112 (1791), illegitimate superfluous name for *Lomenia borbonica* Pour. (1788). Type: South Africa, [said to be from Réunion], *Commerson s.n.* (P, holo.).

Gladiolus pyramidalis Lam.: 726 (1788), illegitimate homonym, not *G. pyramidalis* Burm.f. (1768). Type: South Africa, without precise locality or collector (P, holo.).

Gladiolus pyramidatus Andrews: t. 335 (1803). *Watsonia rosea* Ker Gawl.: 230 (1804), illegitimate superfluous name for *G. pyramidatus* Andrews. *Neuberia rosea* (Ker Gawl.) Eckl.: 37 (1827), invalidly published name [*Neuberia* without description]. *Watsonia pyramidata* (Andrews) Klatt in Th.Durand & H.Schinz: 194 (1894). Type: South Africa, without precise locality or collector, illustration in Andrews, Botanist's Repository 5: t. 335 (1803).

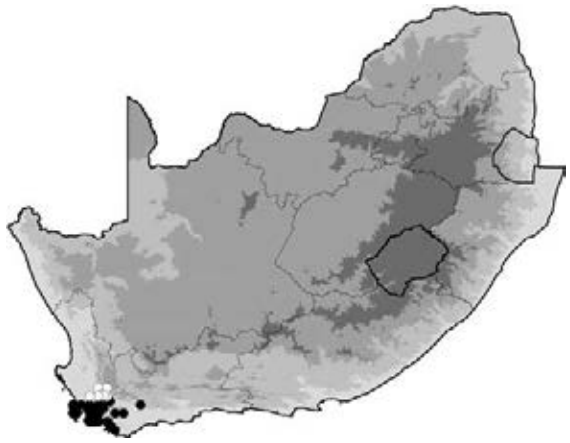
Gladiolus striatus Herb. Banks ex Roem. & Schult.: 435 (1817), as a synonym.

Watsonia striata Klatt: 352 (1882). Type: South Africa, [Western Cape], Cape Town, *Spilhaus s.n.* (B: Herb. Lubeck, holo, believed destroyed).

Watsonia cooperi L.Bolus: 135 (1929b), as a replacement name for *Tritonia cooperi* Baker: 192 (1892), illegitimate homonym, not *T. cooperi* (Baker) Klatt (1882). *Tritonia quinquenervata* R.C.Foster: 46 (1936), as a replacement name for *T. cooperi* Baker. Type: South Africa, [Western Cape], Worcester Division, *Cooper 3182* (K, holo.).

[*Watsonia pyramidata* var. *zeyheri* Baker ex Klatt in Th.Durand & H.Schinz: 194 (1894), invalid name as a synonym of *W. punctata* var. *zeyheri* Baker].

Plants 1 200–2 000 mm high. *Corm* depressed-globose, 30–50 mm diam.; tunics coarsely netted. *Stem* erect or inclined below, usually with several short, ascending branches. *Leaves* 5 to 8, mostly basal, upper basal leaf sheathing stem below or entirely, ⅓–⅔ as long as spike, lanceolate to linear, 20–40 mm wide, bright apple-green, midrib lightly and margins lightly to moderately thickened; bract-like cauline leaves 2 or more, overlapping. *Spike* up to 20-flowered; bracts green below and dry and brownish above or entirely, often ± sticky, 10–18 mm long, inner ± as long or 2–3 mm shorter, acute or forked apically for 1–2 mm. *Flowers* zygomorphic, pale to deep pink or pale purple, darker in midline of lower 3 or all tepals and with white streak at base, rarely entirely white, faintly scented; perianth tube funnel-shaped, lower part 12–15(–20) long, emerging 3–8 mm from bracts, upper part flaring, ± horizontal to slightly pendulous, 8–20 mm



Distribution of ***Watsonia borbonica*** subsp. ***borbonica*** ●; subsp. ***ardernei*** ○.

long, 7–10 mm diam. at mouth; tepals spreading, oblanceolate to obovate, (26–)30–36 × 13–18 mm. *Filaments* unilateral, either arcuate-horizontal and somewhat spreading or decumbent, 13–18(–25) mm long; anthers 10–13 mm long, purple (yellowish when flowers white). *Style* arching above or below stamens, dividing at or below anther apices, branches up to 7 mm long. *Capsules* ovoid to obovoid-truncate, 20–25(–30) × 7–10 mm. *Seeds* unequally 2-winged, 8–12 mm long, distal wing 2–3 mm long, proximal smaller or vestigial. *Flowering time*: October to early December (January).

Distribution and ecology: endemic to the extreme southwestern part of Western Cape, South Africa, from Tulbagh to the Cape Peninsula eastward to Gansbaai; on rocky, usually well-drained sandstone or granite slopes.

Diagnosis: a robust species with bright apple-green leaves and well-branched stems more than 1 000 mm tall, with funnel-shaped, pink flowers, the perianth tube flared in the upper ± half and 20–40 mm long. The filaments vary in orientation from arcuate-horizontal to decumbent. *Watsonia rogersii* is a shorter species, up to 500 mm high, with narrower, dull green leaves 5–10 mm wide with heavily thickened margins, and often slightly smaller flowers with tepals 22–30(–35) mm long. The two species are sympatric along the lower slopes of the Hottentots Holland and Kogelberg ranges and may hybridise there.

The orientation of the stamens in *Watsonia borbonica* varies between the northern and southern populations and this variation, combined with small differences in the length of the perianth tube, forms the basis for the recognition of two subspecies.

Hybrids between subsp. *borbonica* and *W. zeyheri* have been reported from Betty's Bay.

Key to subspecies

1a Stamens arcuate-horizontal, anthers horizontal; upper part of perianth tube 14–20 mm long . . . . . 2a. subsp. *ardernei*

1b Stamens declinate, anthers decumbent; upper part of perianth tube 8–15 mm long . . . . . 2b. subsp. *borbonica*

2a. subsp. **ardernei** *(Sander) Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 35 (1989). *Watsonia ardernei* Sander: 19, fig. 1897). Type: unknown, possibly illustration in Sander's New Plants for 1897: 18–20 (1897).

Watsonia alba Arderne: 229 (1893). Type: South Africa, without precise locality or collector, illustration in Arderne in The Garden 63: 229 (1893).

Watsonia ardernei Mathews & L.Bolus in Bolus: 25 (1925), illegitimate homonym, not *W. ardernei* Sander (1897). Type: South Africa, [Western Cape], Farm Romans River, ex hort Kirstenbosch, *Tredgold s.n.* (BM, lecto., designated by Goldblatt in Strelitzia 19: 35 (1989); BOL, isolecto.).

Watsonia iridifolia var. *obrienii* N.E.Br.: 350 (1889). Type: South Africa, [Western Cape], ?Romans River, ex hort. Kew [K, lecto. and isolecto., designated by Goldblatt: 35 (1989)].

[*Watsonia obrienii* Tubergen: 701 (1894), invalid name without description.]

Perianth tube with upper part 14–20 mm long. *Stamens* arcuate-horizontal, anthers horizontal, sometimes widely separated with central anther above two lower anthers. *Style* arched above stamens.

Distribution and ecology: restricted to the northern part of the range of the species, from Paarl through the Du Toit's Kloof Mtns into the upper Breede River Valley between Rawsonville and Tulbagh.

The typical white-flowered form is widely cultivated, but only pink-flowered plants are known in the wild.

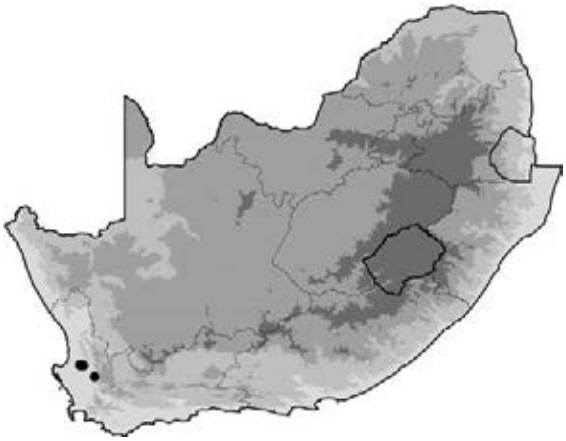
2b. subsp. **borbonica**

Perianth tube with upper part 8–15 mm long. *Stamens* declinate, anthers decumbent above lower tepal. *Style* curving below stamens.

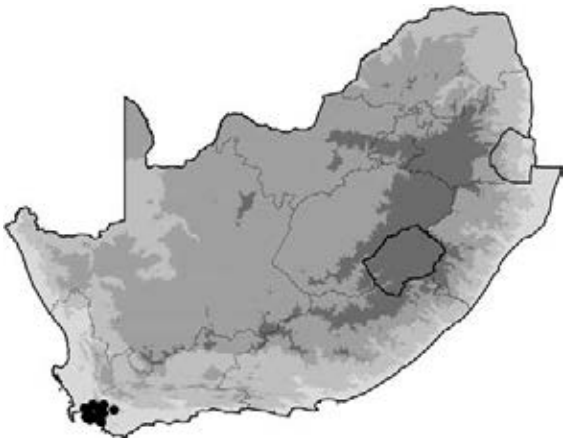
Distribution and ecology: restricted to the southern part of the range of the species, from the Cape Peninsula through the Stellenbosch and Hottentots Holland Mtns to the Riviersonderend Mtns and Kleinrivier Mtns east to Gansbaai.

3. **Watsonia versfeldii** *J.W.Mathews & L.Bolus* in Bolus in Annals of the Bolus Herbarium 3: 139 (1922). Type: South Africa, [Western Cape], mountains near Piketberg, *Versfeld s.n.* (BOL [Nat. Bot. Gard. 6125/14], lecto., designated by Goldblatt: 37 (1989); BOL, isolecto.).

Watsonia versfeldii var. *alba* J.W.Mathews & L.Bolus in Bolus: 140 (1922). Type: South Africa, mountains near Piketberg, *Versfeld s.n.* [BOL



Distribution of ***Watsonia versfeldii***.



Distribution of ***Watsonia rogersii***.

(Nat. Bot. Gard. 2670/16), lecto., designated by Goldblatt: 37 (1989)].

Watsonia ecklonii L.Bolus: 53 (1926). Type: South Africa, without precise locality, *Ecklon 938* (B, lecto., designated by Goldblatt: 37 (1989); BOL, isolecto.).

Plants 1 200–2 000 mm high. *Corm* depressed-globose, 50–60 mm diam.; tunics coarsely netted. *Stem* erect, with several short, ascending branches. *Leaves* 6 to 8, mostly basal, uppermost sheathing stem below, ⅓–⅔ as long as spike, lanceolate, 25–40 mm wide, apple-green, midrib weakly defined, margins lightly thickened and hyaline; cauline leaves 2 or more, sheathing and slightly inflated. *Spike* up to 24-flowered; bracts dry and brownish above or entirely, ± sticky, 15–26 mm long, inner ± as long as or slightly shorter, emarginate or forked for 1–2 mm. *Flowers* zygomorphic, purplish pink; perianth tube narrowly funnel-shaped, lower part 15–22 mm long, emerging 10–12 mm from bracts, upper part gradually flaring or almost cylindric and nearly horizontal to slightly pendulous, 20–25(–30) mm long, 6–10 mm diam. at mouth; tepals spreading, lanceolate, 33–46 × 10–15 mm. *Filaments* unilateral, extending horizontally beneath upper tepal, 25–33 mm long; anthers 12–16 mm long, purple. *Style* arching above stamens, dividing near anther apices, branches ± 5 mm long. *Capsules* ovoid to narrowly obconic, 18–35 × 8–10 mm. *Seeds* unequally 2-winged, with prominent distal wing. *Flowering time*: late October to November.

Distribution and ecology: restricted to the Piketberg and the Twenty-Four Rivers Mtns above Porterville and Saron in Western Cape, South Africa; on open, stony sandstone slopes and plateaus.

Diagnosis: recognised by the lanceolate leaves, 25–40 mm wide, and the long-tubed pinkish purple flowers with the upper part of the perianth tube 20–30 mm long, and declinate stamens with purple anthers. *Watsonia borbonica* from south of Tulbagh is similar in habit and foliage but has shorter flowers with the upper part of the perianth tube 8–15(–20) mm long.

4. **Watsonia rogersii** *L.Bolus* in Annals of the Bolus Herbarium 4: 54 (1926). Type: South Africa, [Western Cape], Steenbras, *Rogers 17841* (K, lecto., designated by Goldblatt: 39 (1989); BOL, isolecto.).

Watsonia middlemostii L.Bolus: 27 (1929a). Type: South Africa, [Western Cape], near Steenbras, ex hort. Kirstenbosch, *Middlemost s.n.* (BOL [Nat. Bot. Gard. 2082/26], lecto., designated by Goldblatt: 39 (1989); BOL, isolecto.).

Plants (200–)300–500 mm high. *Corm* depressed-globose, 15–25 mm diam.; tunics coarsely netted. *Stem* erect or inclined below, simple or with few short, ascending branches. *Leaves* 4 or 5, mostly basal, uppermost sheathing stem below or entirely, ⅓–⅔ as long as spike, narrowly lanceolate to linear, 5–10 mm wide, main vein and margins strongly thickened and hyaline; bract-like cauline leaves 1 or more, sheathing and bract-like. *Spike* 5- to 16-flowered; bracts green below and dry and brownish above or entirely, often ± sticky, 9–16 mm long, inner slightly shorter, acute or forked apically for 1–2 mm. *Flowers* zygomorphic, pink or pale purple, darker in midline of lower 3 or all tepals and with white streak at base; perianth tube funnel-shaped, lower part 12–15 mm long, emerging 3–4 mm from bracts, upper part flaring and nearly horizontal to slightly pendulous, 8–10 mm long, ± 5 mm diam. at mouth; tepals spreading, obovate to oblanceolate, 22–30(–35) × 9–12(–15) mm. *Filaments* unilateral, decumbent above lower tepal, 10–12(–15) mm long; anthers 9–11(–13) mm long, purple. *Style* arching below stamens, dividing at ± middle of anthers, branches ± 5 mm long. *Capsules* elongate-ovoid, up to 14 mm long. *Seeds* 2-winged. *Flowering time*: October to early December.

Distribution and ecology: restricted to the extreme southwestern part of Western Cape, from the foot of the Hottentots Holland and Kogelberg ranges to the Kleinrivier and Riviersonderend Mtns; in rocky sand or granite.

Diagnosis: a relatively small species, up to 500 mm high, with narrow leaves, 5–10 mm wide with strongly thickened midrib and margins, and pink flowers with a funnel-shaped perianth tube 20–25 mm long, and decumbent stamens with purple anthers 9–13 mm long. *Watsonia borbonica* is a larger species, 1 000 mm or more tall, with broader, apple-green leaves 20–40 mm wide. The two species co-occur along the foot of the Hottentots Holland and Kleinrivier Mtns, and may hybridise.

5. **Watsonia amabilis** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 41 (1989). Type: South Africa, [Western Cape], Wemmershoek, *Barker 4904* (NBG, holo.; NBG, SAM, iso.).

Plants (80–)150–300(–500) mm high. *Corm* subglobose, 15–20 mm diam.; tunics coarsely netted. *Stem* erect, simple or 1 or 2 short, ascending branches. *Leaves* 4 to 7, all basal or upper inserted on lower part of stem and partly sheathing, linear to lanceolate, 5–20 mm wide, midrib and margins lightly thickened and hyaline; bract-like cauline leaf 1. *Spike* 4- to 8(16)-flowered; bracts green, 12–20 mm long, inner ± as long, acute or minutely forked apically. *Flowers* zygomorphic, rose-pink with dark star-shaped marking in centre; perianth tube funnel-shaped, lower part 10–17 mm long, upper part flaring and nearly horizontal, 6–10 mm long, ± 6 mm diam. at mouth; tepals spreading, elliptic to obovate, 19–25 × 7–13 mm. *Filaments* unilateral and declinate, ± 12 mm long; anthers 7–8 mm long, dark purple. *Style* arching below stamens, usually dividing near base of anthers, branches ± 3 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-October to mid-November.

Distribution and ecology: a rare and local species restricted to the foot of the Groot Drakenstein and Hottentots Holland Mtns between Paarl and Sir Lowry's Pass in Western Cape, South Africa; on granite soils in renosterveld.

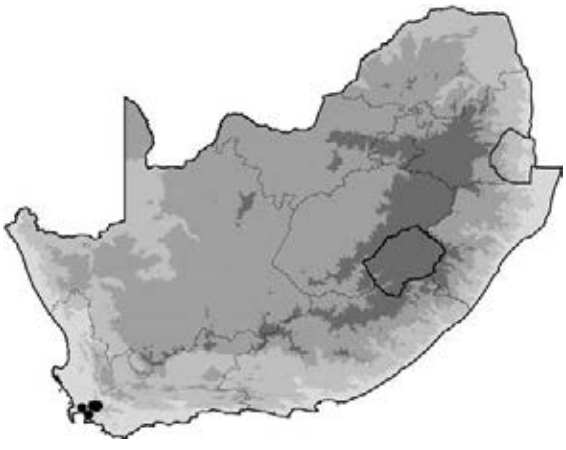
Diagnosis: a small species with linear to lanceolate leaves and pink flowers with funnel-shaped perianth tube 16–27 mm long, and declinate stamens with relatively short, purple anthers 7–8 mm long. *Watsonia rogersii* is superficially similar, but has longer anthers 9–13 mm long.

6. **Watsonia strictiflora** *Ker Gawl.* in Curtis's Botanical Magazine 34: t. 1406 (1811). *Gladiolus strictiflorus* (Ker Gawl.) Delile in Redouté: t. 399 (1812). Type: South Africa, without precise locality or collector, illustration in Ker Gawl. in Curtis's Botanical Magazine 34: t. 1406 (1811).

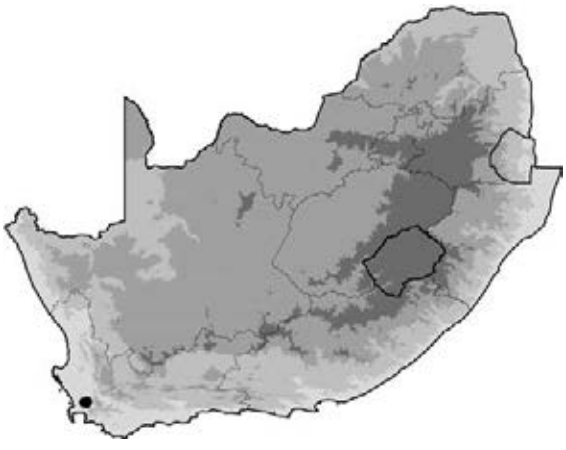
Plants 250–400 mm high. *Corm* subglobose, 20–30 mm diam.; tunics coarsely netted. *Stem* erect, simple or 1 or 2 short, ascending branches. *Leaves* 5 to 7, mostly ± basal with uppermost partly sheathing stems below, ± half as long as spike, narrowly lanceolate, up to 16 mm wide, midrib and margins lightly thickened and hyaline; bract-like cauline leaf 1. *Spike* 4- to 10-flowered; bracts overlapping, green, becoming dry at brown apically at flowering, (15–)20–25(–33) mm long, inner somewhat shorter, acute or minutely forked apically. *Flowers* zygomorphic, rose-pink with dark maroon star-shaped marking in centre; perianth tube slender and weakly funnel-shaped, lower part 20–35 mm long, upper part flaring slightly and nearly horizontal, 8–14 mm long, ± 6 mm diam. at mouth; tepals spreading, obovate, 22–25 × 11–15 mm. *Filaments* unilateral and declinate, 13–15 mm long, recurved apically; anthers 8–10 mm long, dark purple. *Style* arching below stamens, dividing between middle and upper half of anthers, branches 4–5 mm long. *Capsules* ovoid, 14–20 × 6–9 mm. *Seeds* 4–5 mm long, 2-winged. *Flowering time*: November to early December.

Distribution and ecology: a rare and local endemic of lower slopes and flats between Durbanville and Klapmuts in Western Cape, South Africa; mainly granite outcrops in renosterveld. Now known only from two severely fragmented populations.

Diagnosis: distinguished from other pink-flowered species with declinate stamens and purple anthers by the longer perianth tube, 30–50 mm long with the lower part 20–35 mm long and the upper part 8–14 mm long,



Distribution of ***Watsonia amabilis***.



Distribution of ***Watsonia strictiflora***.

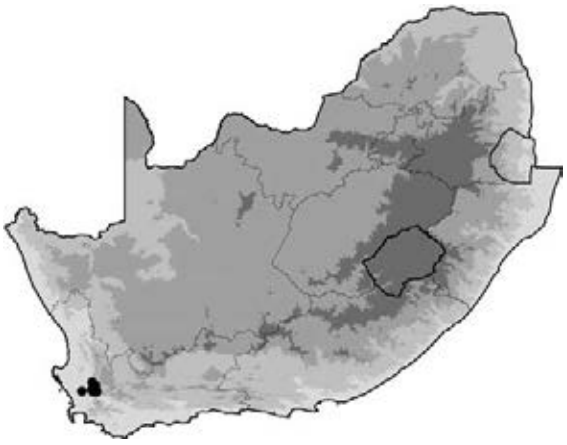
and comparatively short bracts, mostly 15–30 mm long. *Watsonia dubia* from Wellington and Tulbagh has slightly longer bracts, mostly 30–50 mm long enclosing all or most of the lower part of the perianth tube, with the upper part of the tube relatively short, 5–8 mm long, and proportionally shorter filaments usually 6–12 mm long.

7. **Watsonia dubia** *Eckl. ex Klatt* in Linnaea 32: 741 (1864). *Watsonia meriana* var. *dubia* (Eckl. ex Klatt) Baker: 158 (1877). Type: South Africa, 'Worcester, beim Wasserfal,' etc., *Ecklon & Zeyher Irid. 186* (†B, holo.; G, MO, P, PRE, S, Z, iso. [some with different locality data]).

Plants (150–)250–400 mm high. *Corm* subglobose, 20–30 mm diam.; tunics coarsely netted. *Stem* erect, simple or with 1 to 3 short, ascending branches. *Leaves* 4 to 6, mostly ± basal with uppermost partly sheathing stems below, ⅔ to as long as spike, narrowly lanceolate to linear, (3–)6–12 mm wide, midrib and margins moderately thickened and hyaline; bract-like cauline leaves 2 or more. *Spike* 7- to 14-flowered; bracts slightly diverging, dry and brown distally or throughout at flowering, (25–)30–50(–70) mm long, inner slightly shorter to longer, minutely forked apically. *Flowers* zygomorphic, pale to deep pink with dark maroon streak near base of each tepal; perianth tube slender and weakly funnel-shaped, lower part 26–35(–40) mm long, usually enclosed in bracts, upper part flaring slightly and suberect or nearly horizontal, 5–8 mm long, ± 6 mm diam. at mouth; tepals spreading, obovate to oblanceolate, 24–30 × 9–15 mm. *Filaments* unilateral and declinate, 6–10 mm long; anthers 8–10 mm long, dark purple. *Style* arching below stamens, dividing between base and apex of anthers, branches 2–3 mm long. *Capsules* oblong, 16–25 × 4–9 mm long. *Seeds* unknown. *Flowering time*: early October to mid-November.

Distribution and ecology: a local endemic of the Swartland in Western Cape, South Africa, from Tulbagh to Wellington and Malmesbury; on granite and clay soils in renosterveld.

Diagnosis: distinguished from other pink-flowered species with declinate stamens and purple anthers by the long perianth tube, 30–50 mm long with the lower part 26–40 mm long and a short upper part 5–8 mm long, and the long bracts, mostly 30–50 mm long, usually diverging from the stem, and the relatively short filaments 6–12 mm long. *Watsonia strictiflora* from south of Wellington has slightly shorter bracts, (15–)20–25(–33) mm long, and a longer upper part of the perianth tube, 8–14 mm long, with proportionally longer filaments, 13–15 mm long.



Distribution of ***Watsonia dubia***.

8. **Watsonia laccata** *(Jacq.) Ker Gawl.* in Curtis's Botanical Magazine 17: t. 631 (1803). *Gladiolus laccatus* Jacq.: 171 (1791). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 232 (1794 [1788–1795]).

Watsonia hyacinthoides Pers.: 43 (1805), as replacement name for *Antholyza spicata* Andrews in Botanists Repository 1: t. 56 (1799), illegitimate homonym, not *A. spicata* Mill. (1768). *Gladiolus testaceus* Vahl: 105 (1805), as replacement name for *A. spicata* Andrews and an illegitimate homonym and superfluous name for *W. hyacinthoides* Pers. *Watsonia spicata* Klatt in Th.Durand & H.Schinz: 195 (1894), as replacement name for *A. spicata* Andrews and an illegitimate homonym, not *W. spicata* Ker Gawl. (1803) and a superfluous name for *W. hyacinthoides* Pers. Type: South Africa, without precise locality or collector, illustration in Andrews in Botanists Repository 1: t. 56 (1799).

Watsonia brevifolia Ker Gawl. in Curtis's Botanical Magazine 17: t. 601 (1802b). Type: South Africa, without precise locality or collector, illustration in Ker Gawl. in Curtis's Botanical Magazine 17: t. 601 (1802).

Watsonia caledonica Baker: 27 (1906). Type: South Africa, [Western Cape], Caledon, Leos Kraal, *Penther 725* [K, lecto., designated by Goldblatt: 47 (1989)].

Watsonia muirii E.Phillips: 351 (1917). Type: South Africa, [Western Cape], near Albertinia, *Muir s.n.* (SAM [*SAM5122*], lecto., designated by Goldblatt: 47 (1989); BOL, GRA, J, Z, isolecto.).

Watsonia albertiniensis R.Glover in Bolus: 162 (1918). Type: South Africa, [Western Cape], near Albertinia, *Muir s.n.* (BOL [*Nat. Bot. Gard. 911/13*], lecto., designated by Goldblatt: 47 (1989); SAM, isolecto.).

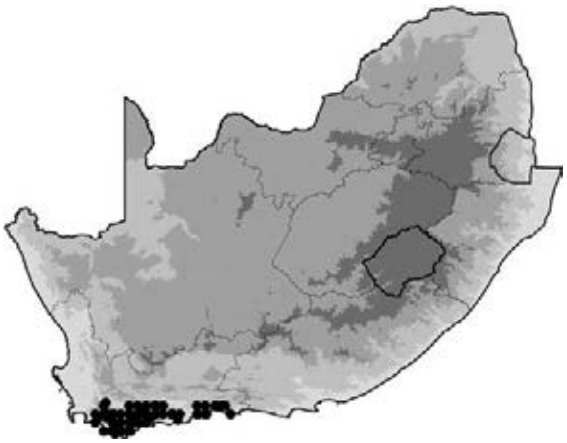
Plants 200–500(–650) mm high. *Corm* subglobose, 20–30 mm diam.; tunics coarsely netted. *Stem* erect, simple or with up to 3 short, ascending branches. *Leaves* 4 to 6, mostly ± basal with uppermost partly or entirely sheathing stem below, ⅓–⅔ as long as spike, lanceolate to linear, (3–)6–20(–28) wide, often glossy, midrib and margins lightly to strongly thickened and hyaline; bract-like cauline leaves 1 or more. *Spike* usually 8- to 20-flowered; bracts usually overlapping, broadly clasping below, green below but dry and pale brown distally with evident netted venation, becoming dry

throughout and lacerate, 10–20 mm long, inner ± as long, minutely forked apically. *Flowers* zygomorphic, pale pink to purple or orange, rarely white; perianth tube funnel-shaped, lower part 10–15 mm long, emerging ± 5 mm from bracts, upper part flaring slightly or rarely ± subcylindric and horizontal or slightly pendent, 7–15(–25) mm long, ± 6 mm diam. at mouth, usually with well-developed longitudinal ridges between filament bases; tepals spreading, obovate to oblanceolate, 14–16 × ± 8 mm. *Filaments* unilateral and declinate, 8–15(–25) mm long; anthers 4–5 mm long, yellow (rarely purple). *Style* arching below stamens, dividing near apex of anthers, branches ± 3 mm long. *Capsules* fusiform, 15–20 × ± 4 mm long, dehiscing only above. *Seeds* linear, 5–8 × 1.0–1.3 mm, 1- or 2-winged. *Flowering time*: late August to October (early November).

Distribution and ecology: distributed widely along the southern coastal plain, from Villiersdorp, Worcester and Kleinmond in Western Cape eastward to Jeffrey's Bay in Eastern Cape, South Africa; mostly on clay or loamy soils in renosterveld and transitional fynbos.

Diagnosis: a relatively short species with funnel-shaped, white or pale pink to mauve or rarely orange flowers with declinate stamens and short, pale yellow (rarely purple) anthers 4–5 mm long. The broad-based bracts, pale and dry above with netted venation, and the fusiform capsules are also distinctive.

The flowers are mostly pink to mauve (rarely orange near Heidelberg) and broadly funnel-shaped with the upper part of the perianth tube flared and 7–10 mm long but up to 15 mm long in some populations. Populations in the upper Breede River Valley between Montagu and Worcester represent a distinct variant with consistently bright orange, narrowly funnel-shaped flowers with the upper part of the perianth tube scarcely or only weakly flared and 15–25 mm long, thus ± 1.0–1.5 times as long as the tepals, and often purple anthers. These populations represent a shift toward bird-pollination. *Watsonia laccata* does hybridise with bird-pollinated *Watsonia aletroides*, especially around Caledon, and some of the longer-tubed forms may also indicate introgression with that species. *Watsonia aletroides* has ± tubular flowers with the tepals less than half as long as the upper part of the perianth tube. Both species have similar bracts and unusual, fusiform capsules.



Distribution of ***Watsonia laccata***.

9. **Watsonia aletroides** *(Burm.f.) Ker Gawl.* in Curtis's Botanical Magazine 15: t. 533 (1801a). *Antholyza aletroides* Burm.f.: 1 (1768). *Gladiolus aletroides* (Burm.f.) Vahl: 96 (1805). Type: South Africa, without precise locality or collector (G: Herb. Burman, holo.).

Watsonia jacquinii Pers.: 42 (1805), as a replacement name for *Gladiolus tubulosus* Jacq.: 153 (1791), illegitimate homonym, not *G. tubulosus* Burm.f. (1768). Type: South Africa, [Western Cape], illustration in Jacquin: t. 229 (1792 [1788–1795]).

Antholyza tubulosa Andrews: t. 174 (1801a). *Watsonia tubulosa* (Andrews) Pers.: 42 (1805). Type: South Africa, [Western Cape], illustration in Andrews: t. 174 (1801a).

[*Watsonia tubulosa* Eckl.: 36 (1827), invalid name without description.]

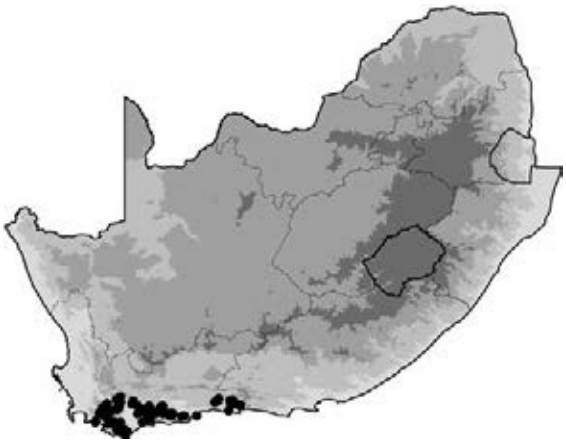
Plants 250–600 mm high. *Corm* subglobose, 20–30 mm diam.; tunics coarsely netted. *Stem* erect, simple or with 1 or 2 short, ascending branches. *Leaves* 4 to 6, mostly ± basal with uppermost partly or entirely sheathing stem below, ½–⅔ as long as spike, lanceolate to linear, (3–)5–10 mm wide, glossy, midrib and margins lightly to moderately thickened and hyaline; bract-like cauline leaves 1 or more. *Spike* usually 8- to 20-flowered; bracts usually overlapping, broadly clasping below, green below but dry and pale brown distally with evident netted venation, becoming dry throughout and lacerate, 11–24 mm long, inner ± as long, minutely forked apically. *Flowers* zygomorphic, reddish or orange, occasionally purple or pink, inner tepals usually paler or whitish; perianth tube with lower part 12–15 mm long, emerging 5–8 mm from bracts, upper part subcylindric and slightly to strongly pendent, 25–28 mm long, 5–8 mm diam. in middle; tepals weakly spreading distally, obovate to oblanceolate, ± 10 × 7–9 mm. *Filaments* unilateral and declinate, 30–35 mm long, shortly exserted from tube but included in flower; anthers 4–5 mm long, yellow. *Style* arching below stamens, dividing near base of anthers, branches ± 4 mm long. *Capsules* fusiform-attenuate, 15–25(–30) × 4–8 mm long, dehiscing only above, rarely aborted and replaced by cormlets. *Seeds* linear, 6–8 × 1.0–1.5 mm, shortly 2-winged. *Flowering time*: late August to October (early November).

Distribution and ecology: distributed widely along the southern coastal plain of Western Cape, from Bot River to Knysna, extending up the Breede River Valley to Worcester; on clay soils in renosterveld.

Diagnosis: a relatively short species distinguished by its ± pendent, tubular reddish or purple flowers with

short, barely spreading tepals ± 10 mm long and less than half as long as the upper part of the perianth tube, and declinate filaments with short, yellow anthers 4–5 mm long. The broad-based bracts, pale and dry above with netted venation, and the fusiform capsules are also distinctive and are shared with *Watsonia laccata*, which has funnel-shaped flowers with the tepals ± as long as or longer than the upper part of the perianth tube, and shorter filaments up to 20 mm long. The two species hybridise in the wild, producing a range of fertile intermediates (Goldblatt, 1989).

Unusual populations in the Bredasdorp district with pale pink flowers develop cormlets in the axils of the lower floral bracts in place of the buds or capsules, which abort after flowering. One of these populations has been established to be triploid (Goldblatt, 1989).



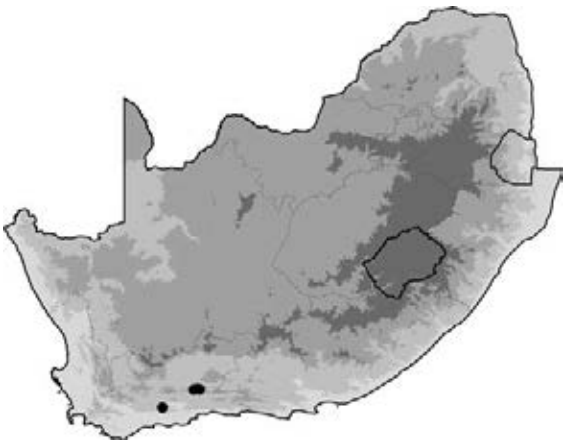
Distribution of ***Watsonia aletroides***.

Sect. 3. **Gladioloides** *Goldblatt*, Annals of Kirstenbosch Botanic Gardens 19: 52 (1989). Type species: *Watsonia densiflora* Baker

Stems usually unbranched; bracts firm-textured. *Flowers* zygomorphic, mostly pale to deep pink or purple, rarely red or pale yellow; perianth tube funnel-shaped with upper part flared or rarely subcylindric; tepals usually ± as long as or longer than upper part of tube. *Stamens* arcuate. *Capsules* ovoid or obovoid-globose. *Seeds* elongate-angular, not winged.

Species 21: southwestern and eastern southern Africa.

10. **Watsonia emiliae** *L.Bolus* in Bulletin of Miscellaneous Information Kew 1932: 327 (1932). Type: South Africa, [Western Cape], Riversdale, Garcia's Pass, *Ferguson s.n.* (BOL [*BOL19975*], lecto., designated by Goldblatt in Annals of Kirstenbosch Botanic Garden 19: 53 (1989); BOL, K, isolecto.).



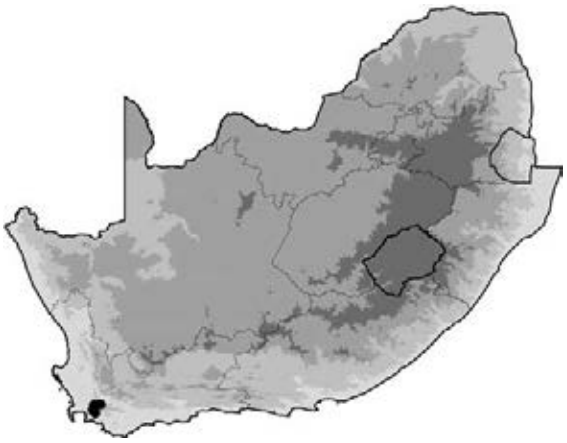
Distribution of ***Watsonia emiliae***.

Plants 400–600 mm high. *Corm* depressed-globose, 25–30 mm diam.; tunics finely to coarsely netted. *Stem* erect, simple or with short, ascending branches. *Leaves* 2 to 4, lower 1 or 2 basal, linear, 4–5 mm wide, midrib and margins moderately thickened and hyaline, others smaller and partly sheathing; bract-like cauline leaves 2 or more, distant in upper part of stem. *Spike* 7- to 20-flowered; bracts probably dry and brown, 12–15 mm long, acute, inner somewhat shorter, forked apically for 2–4 mm. *Flowers* zygomorphic, pale pink with dark streak in lower midline of each tepal; perianth tube with lower part 10–12 mm long, usually included in bracts, upper part funnel-shaped, 6–8 mm long; suberect below and spreading distally, oblanceolate, 16–20 × 7–9 mm. *Filaments* unilateral and arcuate, 9–14 mm long, exserted 2–4 mm from tube; anthers 8–9 mm long, yellow. *Style* arching over stamens, dividing near apex of anthers, branches ± 3.5 mm long. *Capsules* narrowly obovoid, 9–12 mm long. *Seeds* unknown. *Flowering time*: November to December.

Distribution and ecology: a rare and localised endemic of Western Cape, South Africa, recorded only from Garcia's Pass in the Langeberg above Riversdale and high in the Swartberg east of Swartberg Pass; on rocky sandstone slopes, flowering only after fire.

Diagnosis: a small species with narrow, linear leaves 4–5 mm wide, laxly spaced cauline leaves, and pale pink flowers with funnel-shaped tube, the upper part ± as long as the tepals, and arcuate stamens with yellow anthers 8–9 mm long. *Watsonia distans* from marshy sites in the Hottentots Holland Mtns has unbranched stems with mostly fewer flowers with shorter anthers, 5–6 mm long.

11. **Watsonia distans** *L.Bolus* in Annals of the Bolus Herbarium 4: 51 (1926). Type: South Africa, [Western Cape], Franschhoek, *Schlechter 9305* (K [as '*9303*'], lecto., designated by Goldblatt: 54 (1989); B, BM, E, G, GRAMO, K, P, PRE, S, Z, isolecto.).



Distribution of ***Watsonia distans***.

Watsonia pauciflora L.Bolus: 328 (1932). Type: South Africa, [Western Cape], Caledon, near Elgin, *Ryder s.n.* (K [*BOL19973*], lecto., designated by Goldblatt: 54 (1989); BOL, isolecto.).

Plants 150–350 mm high. *Corm* depressed-globose, 15–25 mm diam.; tunics finely to coarsely netted. *Stem* erect, simple. *Leaves* 3 or 4, lower 2 or 3 basal, linear, 3–6 mm wide, midrib and margins moderately thickened and hyaline, others sheathing stem below, ± half as long to as long as spike; bract-like cauline leaves 1 or more, tightly sheathing, brown and dry. *Spike* 2- to 7(10)-flowered; bracts probably dry and brown, 10–13 mm long, inner somewhat shorter, forked apically. *Flowers* zygomorphic, pale pink to purple; perianth tube with lower part 8–12 mm long, shortly emerging from bracts, upper part horizontal and weakly funnel-shaped or subcylindric, 9–12 mm long, 3–5 mm diam. at mouth; tepals spreading, obovate, 15–20 × 7–9 mm. *Filaments* unilateral and arcuate, 10–14(–17) mm long; anthers 5–6 mm long, evidently yellow. *Style* arching over stamens, dividing ± at middle of anthers, branches 3–4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: October to November.

Distribution and ecology: a poorly known species, restricted to the mountains in the extreme southwest part of Western Cape, from Franschhoek Pass to Houwhoek; in marshy sites, flowering only after fire.

Diagnosis: resembling *Watsonia amabilis* Goldblatt and *W. rogersii* L.Bolus in its short, simple stems and funnel-shaped pink flowers but distinguished from them by its arcuate stamens with shorter, yellow anthers 5–6 mm long. The funnel-shaped flowers with short upper portion of the tube, 9–12 mm long, distinguish it from the vegetatively similar *W. paucifolia*.

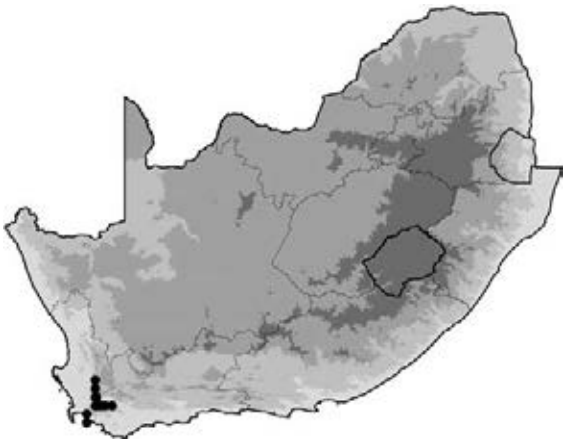
12. **Watsonia paucifolia** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 56 (1989). Type: South Africa, [Western Cape], Slanghoek Mtns, Cossacks, *Esterhuysen 24000* (BOL, holo.; K, MO, PRE, iso.).

Plants 200–450 mm high. *Corm* depressed-globose, 15–25 mm diam.; tunics finely netted. *Stem* erect, simple. *Leaves* 1 to 3, lower 1 or 2 basal, third leaf, if present, small and inserted near middle of stem, lowermost longest and reaching or exceeding spike, linear to narrowly lanceolate, 2–8(–11) mm wide, midrib and margins moderately thickened and hyaline; bract-like cauline leaves 1 or 2. *Spike* 4- to 12-flowered; bracts green or flushed purple, becoming dry and rusty brown from apex, 10–18(–20) mm long, inner ½–⅔ (rarely almost as long), forked apically. *Flowers* zygomorphic, pale pink with dark purple median streak at base of tepals; perianth tube with lower part 10–12 mm long, shortly or not emerging from bracts, upper part ascending, subcylindric, 12–16 mm long, 6 mm diam. at mouth; tepals spreading, obovate, 14–16 × 6–9 mm. *Filaments* unilateral and arcuate, 14–18 mm long, exserted ± 3 mm from tube; anthers 6–7 mm long, purple. *Style* arching over stamens, dividing near apex of anthers, branches ± 3 mm long. *Capsules* obovoid, 7–9 mm long. *Seeds* angular with pronounced proximal and distal ridges, 4.5–5.5 × 2–3 mm. *Flowering time*: November to January.

Distribution and ecology: distributed through the mountains of the southwestern part of Western Cape, South Africa, from Groot Winterhoek above Tulbagh southward along the Witsenberg and Du Toit's Kloof Mtns to the Wemmershoek Mtns thence eastward onto the Riviersonderend Mtns, with outlying populations on the lower slopes of the Kogelberg near Kleinmond and the Kleinrivier Mtns near Stanford; on damp slopes or seeps, typically above 600 m elevation but at low altitudes along the coast.

The long-tubed, pale pink flowers with dark streaks around the mouth are adapted to pollination by long-proboscid flies (Manning et al. 1999).

Diagnosis: a delicate species with 1 or 2 narrow, basal leaves and a mostly unbranched stem with pink flowers with narrowly subcylindric perianth tube, the upper part 12–16 mm long, and purple anthers. *Watsonia*



Distribution of ***Watsonia paucifolia***.

distans has funnel-shaped flowers with the upper part of the perianth tube flared and 9–12 mm long, and evidently yellow anthers.

13. **Watsonia amatolae** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 58 (1989). Type: South Africa, [Eastern Cape], Katberg Pass, above Forrester's Cottage, *Hutchinson 1684* (PRE, holo.; BM, BOL, K, iso.).

Plants 400–600 mm high. *Corm* subglobose, 25–35 mm diam.; tunics finely to coarsely netted. *Stem* erect, simple or with 1 or 2 short branches. *Leaves* 2 to 4, lower 1 to 3 basal, reaching to ± base of spike, linear to narrowly lanceolate, 5–10(–14) mm wide, midrib and margins moderately or sometimes heavily thickened and hyaline, uppermost sheathing lower half of stem; bract-like cauline leaves 2 or more, overlapping. *Spike* (6)10- to 20-flowered; bracts green below but dry and brown in upper half or throughout, 1.0–1.5(2.0) internodes long and usually shortly overlapping or somewhat lax, (10–)12–15 mm long, inner somewhat shorter, forked apically for 2–4 mm. *Flowers* zygomorphic, bright pink or purplish pink; perianth tube with lower part 10–12 mm long, usually included in bracts, upper part ascending, funnel-shaped, 6–8 mm long; tepals suberect, oblanceolate, 16–20 × 7–9 mm. *Filaments* unilateral and arcuate, 9–14 mm long, shortly exserted from tube; anthers 6–8 mm long, purple or pale pinkish. *Style* arching over stamens, dividing near apex of anthers, branches ± 3.5 mm long. *Capsules* obovoid, 9–11 mm long. *Seeds* angular with pronounced proximal and distal ridges, 5–6 × 1.5 mm. *Flowering time*: November to January (rarely later).

Distribution and ecology: restricted to the Amatole Mtns in Eastern Cape, South Africa, from the Katberg and Gaika's Kop in the west to Hogsback and Dohne Peak in the east; favouring marshes or rarely moist rocky slopes, in mountain grassland.

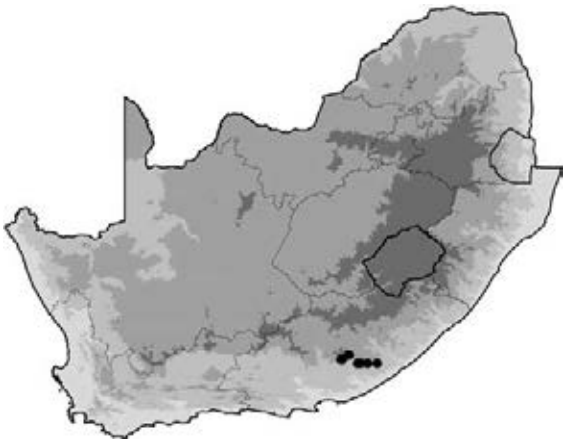
Diagnosis: distinguished from other summer-rainfall species with similar pink, funnel-shaped flowers by the relatively short bracts mostly 1.0–1.5 internodes long and thus not closely overlapping, and often green and leathery in the lower half at flowering. The stems are simple or branched and the anthers are moderately large, 6–8 mm long.

14. **Watsonia transvaalensis** *Baker* in Bulletin de l' Herbier Boissier, ser. 2, 1: 868 (1901). Type: South Africa, Transvaal, [Limpopo], Houtbosch, *Rehmann 5779* (Z, lecto., designated by Goldblatt: 59 (1989); K, Z, isolecto.).

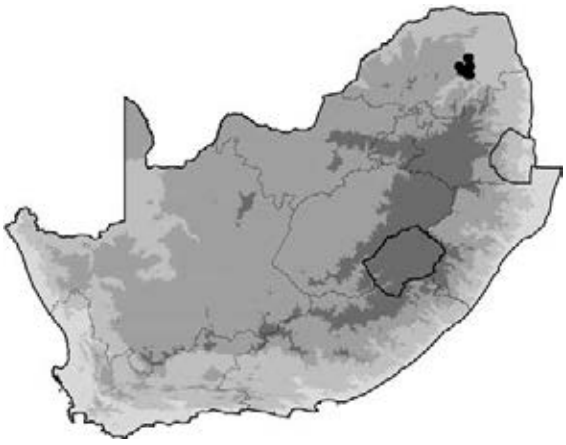
Plants 350–500 mm high. *Corm* subglobose, 20–30 mm diam.; tunics coarsely netted. *Stem* erect, simple or rarely branched. *Leaves* 3 or 4, all basal or upper 1 or 2 sheathing lower part of stem or below or entirely, reaching to base or apex of spike, lanceolate, 8–20(–25) mm wide, midrib and especially margins moderately thickened and hyaline; bract-like cauline leaves 1 or more, often concealed by leaves. *Spike* 10- to 16-flowered; bracts greenish but dry and brownish in upper half with paler margins, later lacerate, ± 2 internodes long, barely clasping stem below, 13–20(–28) mm long, inner ½–⅔ as long, forked apically for 1–2 mm. *Flowers* zygomorphic, bright pink; perianth tube with lower part 10–12 mm long, usually included in bracts, upper part horizontal, funnel-shaped, 7–10 mm long; tepals suberect and flaring distally, oblanceolate-attenuate, 20–25 × 6–8 mm. *Filaments* unilateral and arcuate, 10–12 mm long; anthers 6–8 mm long, violet or pink. *Style* arching over stamens, dividing near apex of anthers, branches ± 4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: late January to April.

Distribution and ecology: endemic to the eastern Drakensberg Escarpment in Limpopo, South Africa, from Duiwelskloof and Magoebaskloof to The Downs; in open rocky sites in montane grassland.

Diagnosis: distinguished from other summer-rainfall species with similar pink, funnel-shaped flowers by the unbranched stems with narrow bracts not or hardly



Distribution of ***Watsonia amatolae***.



Distribution of ***Watsonia transvaalensis***.

clasping the stem below, relatively large flowers with attenuate tepals 20–25 mm long, and more northerly distribution.

15. **Watsonia strubeniae** *L.Bolus* in Journal of Botany, British and foreign 69: 261 (1931). Type: South Africa, Transvaal, [Mpumalanga], near Sabie, *Struben s.n.* (BOL [*Nat. Bot. Gard. 1209/30*], lecto., designated by Goldblatt: 60 (1989); BOL, GRA, K, isolecto.).

Watsonia transvaalensis var. *drakensbergensis* L.Bolus: 55 (1926). Type: South Africa, Transvaal, [Mpumalanga], valley near Pilgrims Rest, *Roe s.n.* (K [*BOL 2655*], lecto., designated by Goldblatt: 60 (1989); BOL [fragment], isolecto.).

Watsonia alpina G.J.Lewis: t. 689 (1938). Type: South Africa, Transvaal, [Mpumalanga], Mt Anderson near Lydenburg, *Galpin s.n.* (BOL, holo.).

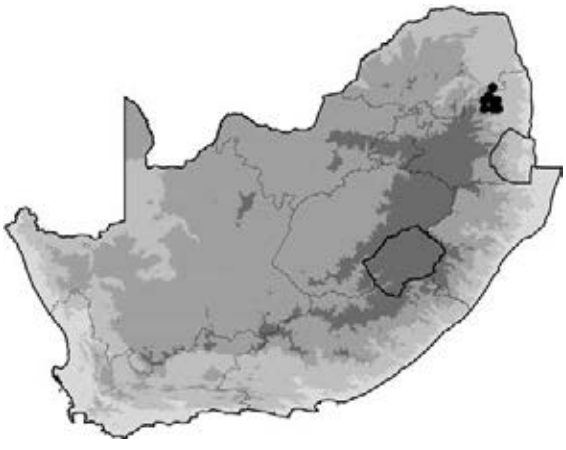
Plants 600–1 000 mm high. *Corm* subglobose, 30–40 mm diam.; tunics coarsely netted, extending upward as a fibrous collar. *Stem* erect, with 3 to 5 rigid, diverging branches. *Leaves* 4 or 5, lower 2 or 3 ± basal, reaching to ± base of spike, lanceolate, 14–20 mm wide, midrib and especially margins heavily thickened and hyaline, remaining leaves inserted on lower part of stem, smaller and partly to entirely sheathing; bract-like cauline leaves 1 or 2 in upper part of stem. *Spike* 25- to 35-flowered; bracts greenish but dry and brownish in upper half, later lacerate, not or barely clasping stem only at base, 9–14 mm long, inner somewhat shorter, entire or forked apically for ± 1 mm. *Flowers* zygomorphic, pale pink; perianth tube with lower part 7–9 mm long, barely emerging from bracts, upper part horizontal, funnel-shaped, 6–7 mm long, ± 6 mm diam. at mouth; tepals suberect and flaring distally, lanceolate, 17–19 × 5–6 mm. *Filaments* unilateral and arcuate, 6–7 mm long; anthers 6–7 mm long, violet. *Style* arching over stamens, dividing near apex of anthers, branches 4–5 mm long. *Capsules* globose, up to 6 mm long. *Seeds* elongate-angular. *Flowering time*: late February to April.

Distribution and ecology: endemic to the eastern Drakensberg Escarpment in Mpumalanga, South Africa, between Sabie and Pilgrim's Rest; in well-watered montane grassland on shallow soils.

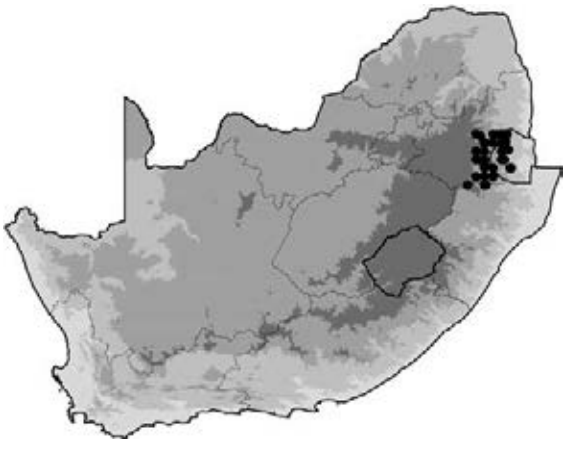
Diagnosis: distinguished by its long spikes of relatively small, pale pink flowers with the upper part of the perianth tube 6–7 mm long and tepals 17–19 mm long, and short, ± dry floral bracts 9–14 mm long, not clasping the stem. *Watsonia transvaalensis* from the escarpment north of Graskop has mostly narrower leaves, 8–20(–25) mm wide, with moderately thickened margins, and mostly unbranched stems with larger bracts, 13–28 mm long, and larger flowers with tepals 20–25 mm long.

16. **Watsonia watsonioides** *(Baker) Oberm.* in Bothalia 8: 116 (1962). *Tritonia watsonioides* Baker: 195 (1892). *Watsonia flavida* Bolus in Bolus & Kensit: 162 (1909), illegitimate superfluous name for *T. watsonioides* Baker (1892). Type: South Africa, [Mpumalanga], Saddleback, Barberton Mtns, *Galpin 814* (K, lecto., designated by Goldblatt: 62 (1989); BOL, GRA, NH [as *813*], isolecto.).

Plants 500–1 000 mm high. *Corm* depressed-globose, 20–30 mm diam.; tunics finely netted, extending upward as a fibrous collar. *Stem* erect, with simple or with 1 or more short, erect branches. *Leaves* (1)2 or 3, lower 2 ± basal, ± as long as stem, linear, 4–6 mm wide, midrib moderately and margins heavily thickened and hyaline, third leaf, if present, inserted on lower part of stem and partly to entirely sheathing; bract-like cauline leaves overlapping upper part of stem up to spike. *Spike* congested, 25- to 35-flowered; bracts green at base, dry and brownish in upper half, clasping stem only at base, 7–10(–15) mm long, inner shorter, forked for 2–3 mm. *Flowers* zygomorphic, pale yellow to cream-coloured or maroon; perianth tube with lower part 8–9 mm long, emerging 2–3 mm from bracts, upper part horizontal to drooping, funnel-shaped, 7–9 mm long, ± 5 mm diam. at mouth; tepals suberect and flaring distally, obovate, 10–18 × 5–7 mm. *Filaments* unilateral and arcuate,



Distribution of ***Watsonia strubeniae***.



Distribution of ***Watsonia watsonioides***.

10–12 mm long; anthers 5–8 mm long, yellow. *Style* arching over stamens, dividing near base of anthers, branches ± 2 mm long. *Capsules* globose, 5–8 mm long. *Seeds* narrowly ovoid-angular, 3–4 × 2 mm. *Flowering time*: (December) January to March.

Distribution and ecology: distributed along the eastern escarpment in southeastern Mpumalanga, South Africa and Eswatini; in rocky montane grassland, usually from 1 300 to 1 800 m elevation.

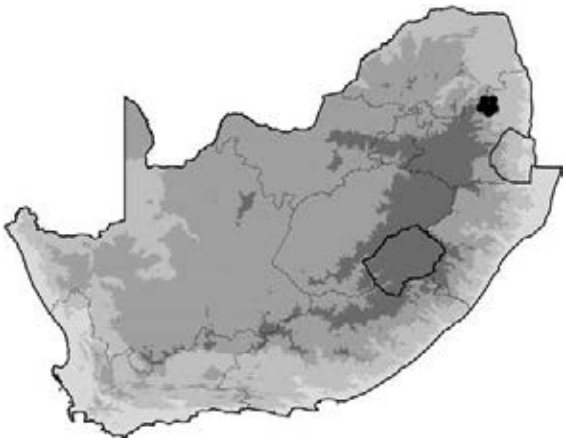
Diagnosis: a distinctive species readily recognised by the one or two linear basal leaves and dense spikes of small flowers, the upper part of the perianth tube 7–9 mm long and the tepals 10–18 mm long. The flowers are typically and uniquely pale yellow to cream-coloured, but maroon-flowered populations occur around Mankayane in southwestern Eswatini.

17. **Watsonia wilmsii** *L.Bolus* in Annals of the Bolus Herbarium 4: 54 (1926). Type: South Africa, [Mpumalanga], Parade Platz near Lydenburg, *Wilms 1440* (B, lecto., designated by Goldblatt: 64 (1989); BM, E, K, G, isolecto.).

Plants 450–750 mm high. *Corm* subglobose, 20–30 mm diam.; tunics coarsely netted. *Stem* erect, simple or with 1 or 2 diverging branches. *Leaves* 4 or 5, ± basal or upper inserted on lower part of stem, upper 1 or 2 partly or entirely sheathing, ± half as long as spike, lanceolate, 10–20(–25) mm wide, midrib moderately and margins heavily thickened and hyaline; bract-like cauline leaves 1 or 2, inserted on upper part of stem and often concealed by leaves. *Spike* 16- to 24-flowered; bracts greenish below but dry and brownish in upper half or entirely, later lacerate, usually clasping stem below, (20–)25–35 mm long, completely enclosing inner, inner 3–5 mm shorter, forked for ± 1 mm. *Flowers* zygomorphic, deep pink with dark median streak in basal half of lower tepals; perianth tube with lower part 25–30 mm long, emerging 7–10 mm from bracts, upper part poorly differentiated, horizontal, narrowly funnel-shaped, ± 15 mm long, ± 8 mm diam. at mouth; tepals suberect and flaring distally, lanceolate, 22–26 × 6–9 mm. *Filaments* unilateral and arcuate, 20–22 mm long; anthers 6–8 mm long, violet. *Style* arching over stamens, dividing near apex of anthers, branches ± 5 mm long. *Capsules* narrowly oblong, up to 16 mm long. *Seeds* angular, ± 4 × 2 mm. *Flowering time*: January to early April.

Distribution and ecology: a narrow endemic of the higher parts of the eastern escarpment in Mpumalanga, South Africa, between Mauchsberg above Lydenburg and Pilgrim's Rest and Ohrigstad; in rocky montane grassland, usually above 1 600 m elevation.

Diagnosis: recognised by the long bracts, (20–)25–35 mm long, and especially the very long lower part of the perianth tube, 25–30 mm long, with a narrowly funnel-shaped upper part ± 15 mm long. *Watsonia occulta* has



Distribution of ***Watsonia wilmsii***.

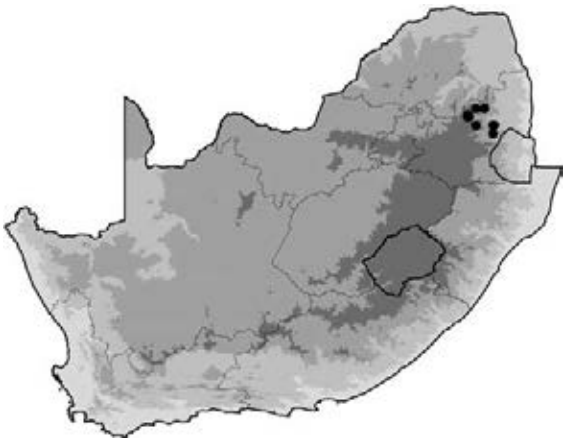
even longer bracts, 35–55 mm long, and similarly long-tubed flowers with a much shorter upper part of the tube, just ± 6 mm long.

18. **Watsonia occulta** *L.Bolus* in Annals of the Bolus Herbarium 4: 51 (1926). Type: South Africa, Transvaal, [Mpumalanga], Lydenburg, Crocodile River, *Wilms 1439* (B, lecto., designated by Goldblatt: 66 (1989); BM, isolecto.).

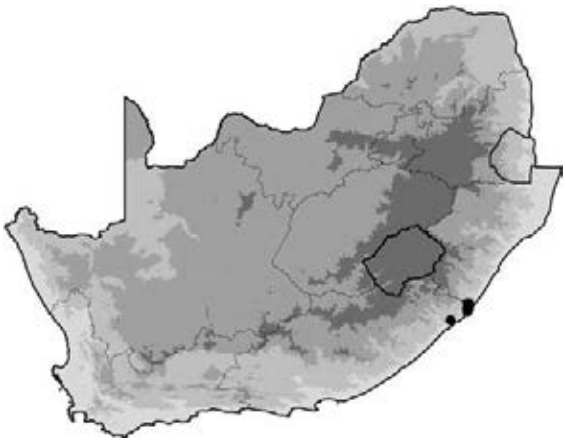
Plants 180–400 mm high. *Corm* subglobose, 20–30 mm diam.; tunics finely netted, extending upward as a collar. *Stem* erect, simple. *Leaves* 3 or 4, lower 2 or 3 basal, ± as long as stem, linear-lanceolate, 3–8 mm wide, midrib and margins thickened and hyaline, uppermost leaf smaller and basal or inserted on lower part of stem, sheathing for half its length; bract-like cauline leaves 1 to 3, inserted on upper part of stem, overlapping, 60–80 mm long. *Spike* 3- to 7-flowered; bracts green, dry and brownish apically, 35–55 mm long, clasping and concealing stem, reaching to middle of next bract, completely enclosing inner bract, inner ± half as long, pale green, entire or forked for 1–2 mm. *Flowers* zygomorphic, pale pink; perianth tube with lower part 30–35(–50) mm long, enclosed, upper part poorly differentiated, horizontal, narrowly funnel-shaped, ± 6 mm long, ± 6 mm diam. at mouth; tepals suberect and flaring distally, lanceolate, 20–22 × 7–8 mm. *Filaments* unilateral and arcuate, ± 10 mm long; anthers 5.5–6.5 mm long, pale bluish. *Style* arching over stamens, dividing opposite anthers, branches 5–6 mm long. *Capsules* and *seeds* unknown. *Flowering time*: December to January.

Distribution and ecology: a narrow endemic of the higher parts of the eastern escarpment in Mpumalanga, South Africa, from near Lydenburg to Kaapschehoop; in montane grassland, usually above 1 400 m elevation.

Diagnosis: a very distinctive but inconspicuous species, with a spike of 3 to 7 pale pink flowers largely concealed by unusually long bracts, 35–55 mm long. The flowers are long-tubed, with the lower part of the perianth tube 30–50 mm long and the upper part relatively short, ±



Distribution of ***Watsonia occulta***.



Distribution of ***Watsonia inclinata***.

6 mm long. *Watsonia wilmsii* is a larger, more conspicuous species with similarly long-tubed flowers but with a much longer upper part of the tube ± 15 mm long, and shorter bracts (20–)25–35 mm long.

19. **Watsonia inclinata** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 67 (1989). Type: South Africa, [KwaZulu-Natal], Umtamvuna Nature Reserve, Gogosa, north side of Umtamvuna [Mtamvuna] Gorge, sloping stony grassland, *Goldblatt 7895* (PRE, holo.; MO, NU, iso.).

Plants 300–600 mm high. *Corm* subglobose, 20–30 mm diam.; tunics coarsely netted, extending upward as a thick collar. *Stem* flexed at ground level and inclined, simple. *Leaves* 3 or 4, lower 2 basal, ± half as long as stem, narrowly lanceolate, 4–14 mm wide, pale green, midrib and margins thickened and hyaline, uppermost leaf or leaves smaller and inserted on lower part of stem, largely sheathing and becoming bract-like; bract-like cauline leaves 2 or more, inserted on upper part of stem, overlapping. *Spike* (3)6- to 11-flowered; bracts green and herbaceous, dry and brown apically, (18–)20–30 mm long, clasping stem in lower half, up to 2 internodes long, inner shorter and concealed. *Flowers* zygomorphic, pink with whitish throat and tube, sweetly scented; perianth tube with lower part 15–18 mm long, included or shortly exserted from bracts, upper part horizontal and funnel-shaped, 8–10 mm long, ± 6 mm diam. at mouth; tepals spreading distally, obovate, 24–28 × 10–12 mm. *Filaments* unilateral and arcuate, 6–10 mm long, included in tube; anthers ± 9 mm long, pale bluish mauve. *Style* arching over stamens, dividing near apex of anthers, 3–4 mm long. *Capsules* obovate-truncate, 8–10 mm long. *Seeds* elongate-angular, 3–4 × ± 1.5 mm. *Flowering time*: September to October.

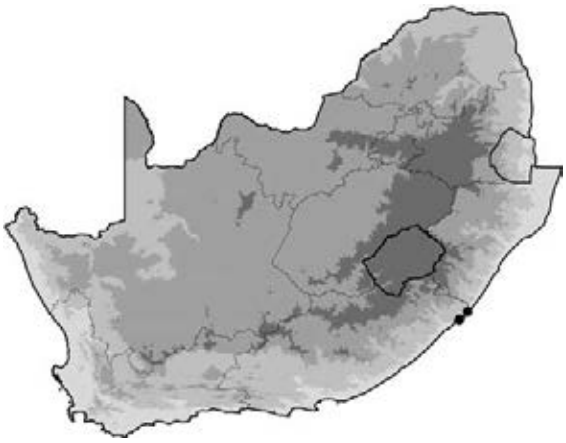
Distribution and ecology: a local endemic of the East Coast of South Africa, from Umtamvuna Nature Reserve near Port Edward in southern KwaZulu-Natal to Kokstad in Eastern Cape; in open, stony grassland, flowering best after fire or grazing.

Diagnosis: recognised by its inclined, unbranched stem and relatively lax spike of pink, funnel-shaped flowers with largely herbaceous bracts 18–27 mm long. *Watsonia pondoensis* from marshy habitats in the same region forms small clumps, with stiffly erect stems, glaucous leaves, and slightly smaller, purple flowers with tepals 20–22 mm long.

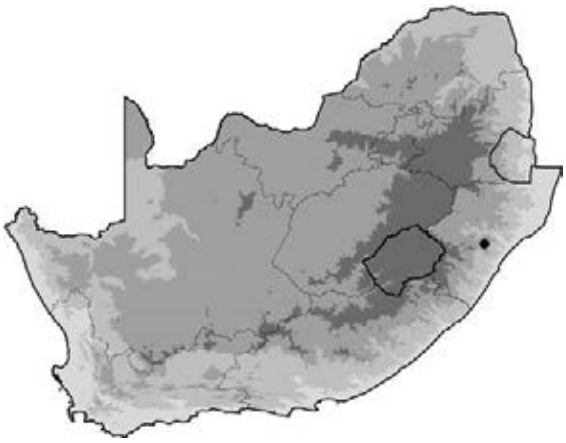
20. **Watsonia pondoensis** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 69 (1989). Type: South Africa, [KwaZulu-Natal], Umtamvuna Nature Reserve, vlei in swamp forest, *Abbott 2760* (PRU, holo.; MO, iso.).

Plants 300–600 mm high, forming small clumps. *Corm* subglobose, 20–30 mm diam.; tunics coarsely netted. *Stem* erect, simple. *Leaves* 3 or 4, lower 2 basal, ± half as long as stem, narrowly lanceolate, 4–12 mm wide, glaucous with bluish tinge, midrib and margins thickened and hyaline, uppermost leaf or leaves smaller and inserted on lower part of stem, largely sheathing and becoming bract-like; bract-like cauline leaves 2 or more, inserted on upper part of stem, overlapping. *Spike* 3- to 8-flowered; bracts green and herbaceous flushed purple, becoming dry and brown apically, 17–25 mm long, clasping stem in lower half, up to 1.5 internodes long, inner shorter and concealed, acute. *Flowers* zygomorphic, mauve or purplish pink with whitish throat and darker median streak near base of tepals; perianth tube with lower part 15–20 mm long, included or shortly exserted from bracts, upper part horizontal and funnel-shaped, 7–10 mm long, ± 6 mm diam. at mouth; tepals spreading distally, obovate, 20–22 × ± 7 mm. *Filaments* unilateral and arcuate, 6–10 mm long, included or just reaching mouth of tube; anthers ± 9 mm long, purple. *Style* arching over stamens, dividing near apex of anthers, branches slender and not recurving, 3–4 mm long. *Capsules* narrowly obovate-truncate, 10–13 mm long. *Seeds* elongate-angular, usually with wing-like ridge at distal end, 5–6 × ± 2 mm. *Flowering time*: September to October.

Distribution and ecology: a poorly known species endemic to the East Coast of South Africa, from Umtamvuna



Distribution of ***Watsonia pondoensis***.



Distribution of ***Watsonia vicschuettei***.

Nature Reserve near Port Edward in southern KwaZulu-Natal and nearby Port Grosvenor in Eastern Cape; forming small clumps in marshy grassland and vleis.

Diagnosis: recognised by its clump-forming habit, erect, unbranched stems, and relatively lax spike of dark pink or mauve, funnel-shaped flowers with largely herbaceous bracts 17–25 mm long, and the relatively long lower part of the perianth tube, 15–20 mm long. *Watsonia inclinata* from drier grasslands in the same region has pale green leaves and inclined stems of slightly larger flowers with tepals 24–28 mm long.

21. **Watsonia vicschuettei** *C.J.Potgieter & I.M. Johnson* in Phytotaxa 364: 209 (2018), as a replacement name for *W. palustris* Goldblatt & J.C.Manning in South African Journal of Botany 106: 151 (2016), illegitimate homonym, not *W. palustris* Pers. (1805). Type: South Africa, KwaZulu-Natal, Umvoti District, Lake Merthley, western shores, 1 350 m, 15 Feb. 2011, *Johnson 1487* (NBG, holo.; MO, iso.).

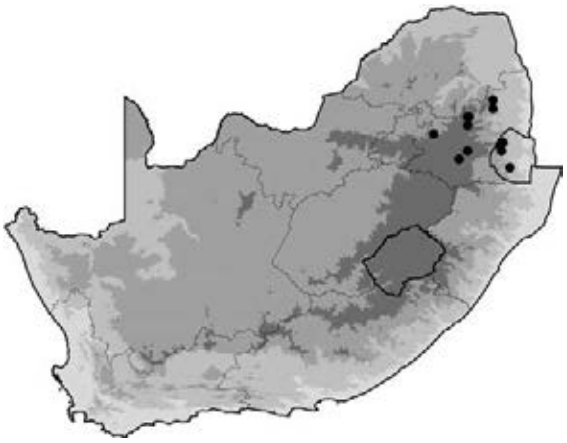
Plants 450–600 mm high, forming large clumps. *Corm* subglobose, 10–20 mm diam.; tunics finely netted, extending upward as a collar. *Stem* erect, simple. *Leaves* 3 to 5, lower 2 to 4 basal, ± as stem, linear, 3–5 mm wide, midrib lightly and margins moderately thickened and hyaline, sometimes dry and broken at flowering, uppermost leaf or leaves smaller and inserted on lower part of stem, partly or largely sheathing and becoming bract-like; bract-like cauline leaves 3 or more, inserted on upper part of stem, overlapping. *Spike* 6- to 15-flowered, internodes mostly 8–10 mm long; bracts green and herbaceous flushed purple, with brown papery margins, becoming dry and brown apically, (15–)20–25 mm long, not clasping stem, apiculate to attenuate, 2.0–2.5 internodes long, inner shorter and concealed, acute. *Flowers* zygomorphic, bright pink or purplish; perianth tube with lower part 13–15 mm long, included in bracts, upper part ascending to horizontal and funnel-shaped, 7–10 mm long, ± 6 mm diam. at mouth; tepals spreading distally, obovate, 13–15 × 5–6 mm. *Filaments* unilateral and arcuate, 10–12 mm long, exserted 3 mm from tube; anthers 6–7 mm long, purple. *Style* arching over stamens, dividing near apex of anthers, branches slender and not recurving, ± 5 mm long. *Capsules* and *seeds* unknown. *Flowering time*: February to March.

Distribution and ecology: a highly localised endemic of north-central KwaZulu-Natal, South Africa, known only from around Greytown and specifically Lake Merthley; forming large clumps in seasonal wetlands in grassland at 1 000 m elevation or above.

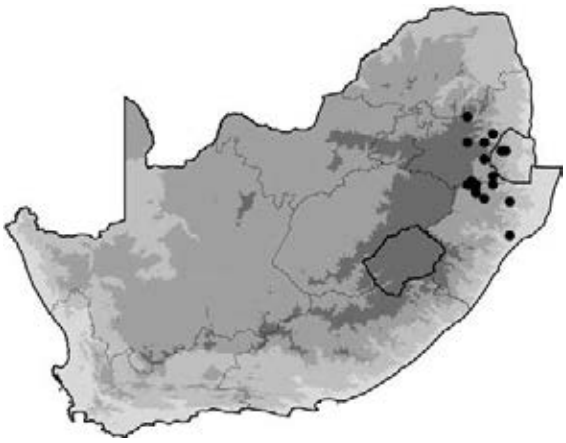
Diagnosis: a slender species with small, dark pink, funnel-shaped flowers, linear leaves 3–5 mm wide, and simple, erect stems forming large clumps, distinguished from other pink-flowered species by its narrow, largely herbaceous bracts, (15–)20–25 mm long, not clasping the stem at the base. The flowers are among the smallest in the group, with the lower part of the perianth tube 13–15 mm long and the upper part 7–10 mm long, and are distinctive in having the filaments exserted ± 3 mm from the perianth tube, with short anthers, 6–7 mm long. The late summer flowering, in February and March, is also characteristic. *Watsonia bella* has similarly small flowers with short anthers but has shorter, dry brown bracts, (10–)12–16 mm long, clasping the stem in the lower part, and filaments included in the tube. Spring-flowering *Watsonia inclinata* and *W. pondoensis* have similar, largely herbaceous bracts 17–30 mm long but larger flowers with the lower part of the perianth tube 15–20 mm long, tepals 20–28 mm long, and included filaments with larger anthers, ± 9 mm long.

22. **Watsonia bella** *N.E.Br. ex Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 71 (1989). Type: Swaziland [Eswatini], Mbabane, Dalriach, *H. Bolus s.n.* (BOL 12344, holo.; K, iso.).

Plants 500–600 mm high. *Corm* subglobose, 20–30 mm diam.; tunics finely netted. *Stem* erect, simple. *Leaves* 3 or 4, lower 2 or 3 basal, usually ± half as long as stem or as long as, narrowly lanceolate, 4–6 mm wide, midrib hardly and margins moderately thickened and hyaline,



Distribution of ***Watsonia bella***.



Distribution of ***Watsonia latifolia***.

uppermost leaf or leaves sheathing below; bract-like cauline leaves 2 or 3, overlapping. *Spike* 8- to 10-flowered, internodes 8–15 mm long; bracts dry and brown, (10–)12–16 mm long, clasping stem in lower ⅓–½, usually not reaching node above, often apiculate to attenuate, inner shorter and concealed, usually forked apically for 2 mm or more. *Flowers* zygomorphic, pink to purple; perianth tube with lower part 10–12 mm long, emerging 2–4 mm from bracts, upper part horizontal and funnel-shaped, 8–10 mm long, ± 6 mm diam. at mouth; tepals spreading distally, obovate, 15–18 × 6–8 mm. *Filaments* unilateral and arcuate, 10–12 mm long, included in tube; anthers 5–6 mm long, ?yellow. *Style* arching over stamens, dividing near apex of anthers, branches 2–3 mm long. *Capsules* and *seeds* unknown. *Flowering time*: late October to December.

Distribution and ecology: a relatively rare species of the eastern highveld and escarpment, from Pilgrim's Rest and Dullstroom in Mpumalanga, South Africa to western Eswatini; in wet and marshy grassland on lower slopes.

Diagnosis: distinguished from other species with similar dry, clasping bracts and pink, funnel-shaped flowers with included filaments, by the relatively few-flowered spike with non-overlapping bracts 10–16 mm long, and small flowers with tepals 15–18 mm long and anthers 5–6 mm long.

23. **Watsonia latifolia** *N.E.Br. ex Oberm.* in Bothalia 8: 115 (1962). Type: South Africa, [KwaZulu-Natal], Ngotshe District, near Ngome, foot of granite slopes, *Codd & Robertson 6403* (PRE, lecto., designated by Goldblatt: 72 (1989); K, NBG, PRE, SRGH, isolecto.).

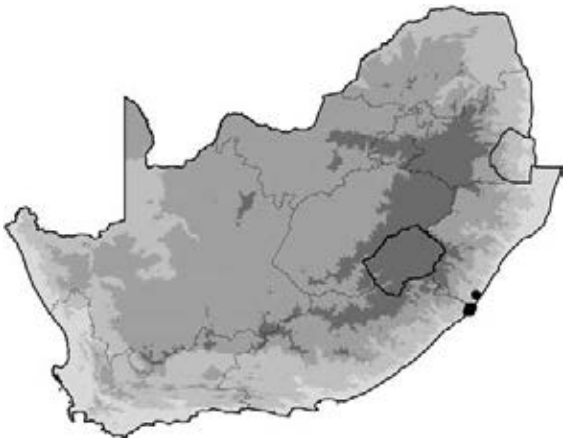
Plants 700–1 500 mm high. *Corm* subglobose, 40–60 mm diam.; tunics coarsely netted. *Stem* erect, usually simple. *Leaves* 4 to 6, lower 3 or more basal, ½–⅔ as long as stem, lanceolate, (30–)50–90 mm wide, bright glossy green, midrib hardly and margins lightly thickened and hyaline, uppermost leaf partly or entirely sheathing; bract-like cauline leaves several, decreasing in size above. *Spike* 15- to 25-flowered; bracts becoming dry and brown above, 15–30 mm long, clasping stem in lower ½, inner ⅔ to ± as long, forked apically for up to 2 mm. *Flowers* zygomorphic, dull red to maroon; perianth tube with lower part 15–25 mm long, emerging from bracts, upper part horizontal and nearly cylindric, 18–20(–24) mm long, 5–6 mm diam. in middle; tepals spreading outward, lanceolate, 20–30 × 4.5–8.0 mm. *Filaments* unilateral and arcuate, 28–35 mm long, exserted up to 10 mm from tube; anthers 7–10 mm long, dark violet. *Style* arching over stamens, dividing near or just beyond anther apices, branches 6–8 mm long. *Capsules* oblong-fusiform, 14–20 mm long. *Seeds* angular, up to 4 × 2 mm. *Flowering time*: December to February.

Distribution and ecology: a summer-flowering species of the eastern escarpment of South Africa, from Nelshoogte in southern Mpumalanga to Vryheid and Ngome in northern KwaZulu-Natal; on rocky quartzite slopes and granite outcrops in grassland, usually above 1 800 m elevation.

Diagnosis: a distinctive species with broad, bright green leaves, 30–60 mm wide, and long-tubed, dull red to maroon flowers with the upper part of the perianth tube subcylindric, 18–24 mm long and slightly shorter than the tepals. *Watsonia gladioloides* from the Eastern Cape Drakensberg has similar, orange to scarlet flowers but narrower leaves, less than 18 mm wide, and bracts completely dry at flowering.

24. **Watsonia mtamvunae** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 74 (1989). Type: South Africa, [KwaZulu-Natal], Port Shepstone, Umtamvuna [Mtamvuna] River Bridge, *Strey 5987* (PRE, holo.; E, MO, NH, NU, iso.).

Plants 300–450 mm high. *Corm* subglobose, 12–16 mm diam.; tunics finely netted, extended into a fibrous collar. *Stem* erect, simple. *Leaves* 3 to 5, sometimes dry and broken at flowering, ± basal, ± as long as spike, linear, 3–4 mm wide, midrib and margins thickened and hyaline,



Distribution of ***Watsonia mtamvunae***.

uppermost leaf sometimes short and partly sheathing stem; bract-like cauline leaves 2 to 4, distant. *Spike* 2- to 12(14)-flowered; bracts dry and brown above or throughout, often flushed purple below, 12–16(–25) mm long, clasping stem in lower half, overlapping, 2 internodes long, inner shorter and concealed, deeply forked apically. *Flowers* zygomorphic, pale pink; perianth tube with lower part 10–12 mm long, included or barely emerging from bracts, upper part horizontal and funnel-shaped, 7–9 mm long, ± 6 mm diam. at mouth; tepals spreading outward, obovate, 14–16 × 5–7 mm. *Filaments* unilateral and arcuate, 7–10 mm long, included in tube; anthers 7 mm long, pale yellow. *Style* arching over stamens, dividing near anther apices, branches 3–4 mm long. *Capsules* narrowly obovoid, 7–9 mm long. *Seeds* angular-elongate, 3.0–3.5 × 1.3 mm. *Flowering time*: August to early October.

Distribution and ecology: a narrow endemic of the East Coast of South Africa, restricted to the plateau and slopes surrounding the Mtamvuna River Gorge near Port Edward in southern KwaZulu-Natal and across the border in Eastern Cape; on well-drained, grassy slopes on quartzite.

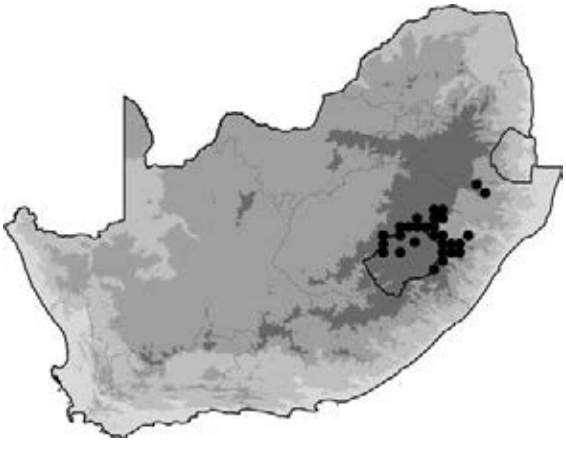
Diagnosis: one of three early flowering, locally endemic species with pink, funnel-shaped flowers restricted to the southeast coast around the Mtamvuna River Gorge, distinguished by its linear leaves, 3–4 mm wide and usually dry and broken at flowering, the plants thus sometimes apparently leafless, the ± dry bracts, and the small flowers with tepals 14–16 mm long. *Watsonia pondoensis* from marshy sites has leaves 4–14 mm wide, ± herbaceous bracts, and larger flowers with the lower part of the tube 15–20 mmm long and tepals 20–22 mm long.

25. **Watsonia lepida** *N.E.Br.* in Bulletin of Miscellaneous Information Kew 1931: 194 (1931). Type: South Africa, [Free State], near Harrismith, *Cooper 886* (K, lecto., designated by Goldblatt: 76 (1989); BOL, Z, isolecto.).

Plants 250–650 mm high, usually solitary but sometimes forming small clumps. *Corm* subglobose, 20–40 mm diam.; tunics coarsely netted. *Stem* erect, simple. *Leaves* 3 or 4, dry and sometimes broken at flowering, lower 2 or 3 basal, ± as long as spike or longer, linear to lanceolate, (3–)5–15 mm wide, midrib and margins strongly thickened and hyaline, uppermost leaf or leaves partly sheathing stem; bract-like cauline leaves 2 or more, overlapping, large and somewhat inflated. *Spike* 12- to 22(30)-flowered; bracts dry and cinnamon- to dark brown, veins not evident, 16–25(–40) mm long, 10–12 mm wide, clasping stem in lower ⅓ or less, strongly overlapping, inner shorter and concealed, usually forked apically up to 2 mm. *Flowers* zygomorphic, weakly bilabiate, pink to pinkish purple, paler in throat and tube; tepals usually with dark median streak in lower half; perianth tube with lower part 12–18 mm long, included in bracts, upper part horizontal and funnel-shaped, ± 15 mm long, ± 8 mm diam. at mouth; tepals lanceolate, upper three spreading, lower three nearly horizontal, ± 20 × 8–9 mm. *Filaments* unilateral and arcuate, 12–16 mm long, reaching mouth of tube; anthers 9–10 mm long, mauve to whitish. *Style* arching over stamens, dividing near anther apices, branches ± 4 mm long. *Capsules* narrowly ovoid, 10–14 mm long. *Seeds* angular-elongate, 4–5 × 2 mm. *Flowering time*: mainly November to early January (July).

Distribution and ecology: centred in the KwaZulu-Natal Drakensberg, South Africa and the Maluti Mtns, from Richmond to Harrismith and inland through northern Lesotho to Clocolan and Ficksburg in eastern Free State; on open grassy slopes. Flowering is delayed for an entire season, the spike appearing in the spring or summer following the development of the basal leaves, by which time they are dry and broken.

Diagnosis: one of several species with dense spikes of moderate-sized, pink, funnel-shaped flowers and coarse, dry, brown, overlapping bracts and distinguished by its solitary habit and comparatively short, stout, erect stem up to 650 mm tall with the basal leaves dry and withered at flowering time. It is most likely to be confused with *Watsonia confusa*, often a taller plant up to 1 500 mm tall with the leaves green at flowering and broader bracts, 14–18 mm wide.



Distribution of ***Watsonia lepida***.

26. **Watsonia gladioloides** *Schltr.* in Journal of Botany, British and foreign 35: 222 (1897). Type: South Africa, [Eastern Cape], Queenstown, Hangklip Mtn., *Galpin 1784* (B, holo.; BOL, GRA, K, PRE, SAM, iso.).

Watsonia baurii L.Bolus: 49 (1926). Type: South Africa, [Eastern Cape], Transkei, Baziya Mtn, *Baur 499* (K, holo.; GRA, SAM, iso.).

Plants (250–)350–500 mm high. *Corm* subglobose, 20–50 mm diam.; tunics coarsely netted. *Stem* erect, simple. *Leaves* 2 to 4, lower 2 basal, reaching to base or middle of spike, linear to lanceolate, 3–15 mm wide, midrib and margins strongly thickened and hyaline, remaining leaves partly or entirely sheathing and grading into bract leaves; bract-like cauline leaves 1 or more, overlapping. *Spike* up to 25-flowered; bracts dry and brown, (20–)24–32 mm long, wide and clasping below, inner ± ⅔ as long and concealed, deeply forked apically for 3 mm or more. *Flowers* zygomorphic, dark red with darker median streak in basal half of lower tepals; perianth tube with lower part ± 20 mm long, included in bracts, upper part ascending to horizontal and subcylindric, (20–)25–30 mm long, ± 5 mm diam. at mouth; tepals spreading, lanceolate, 20–22 × 7–8 mm. *Filaments* unilateral and arcuate, 25–35 mm long, exserted 5–7 mm from tube; anthers ± 9 mm long, violet. *Style* arching over stamens, dividing near anther apices, branches ± 5 mm long. *Capsules* and *seeds* unknown. *Flowering time*: November to January.

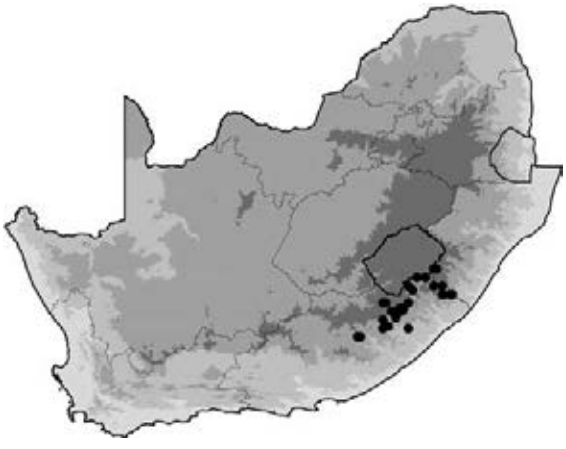
Distribution and ecology: widely distributed through the southern Drakensberg, from Queenstown in Eastern Cape to Kokstad in KwaZulu-Natal, South Africa and Sehlabathebe in southeastern Lesotho; on open grassy slopes and ridges among rocks, mostly above 1 000 m elevation.

Diagnosis: recognised by the narrow leaves, 3–15 mm wide and unbranched stem of tubular, dark red flowers, the upper part of the tube subcylindric, (20–)25–30 mm long and slightly longer than the tepals, and dry, brown bracts. The filaments are 25–35 mm long, exserted 5–7 mm from the perianth tube. *Watsonia latifolia* from northern KwaZulu-Natal and southern Mpumalanga with similar long-tubed, red flowers has broad, bright green leaves, 30–60 mm wide, and the upper part of the perianth tube 18–24 mm long and slightly shorter than the tepals.

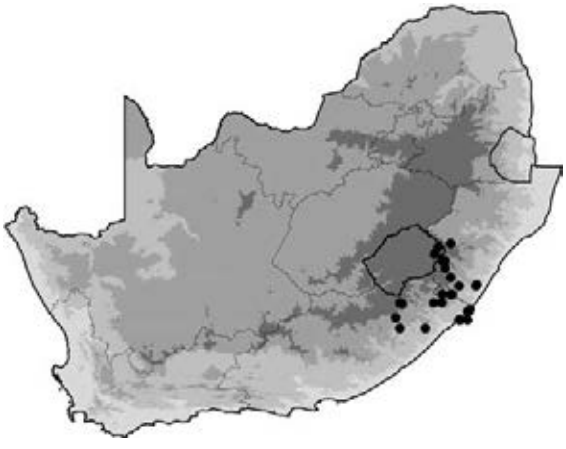
27. **Watsonia confusa** *Goldblatt* in South African Journal of Botany 57: 226 (1991). Type: South Africa, [KwaZulu-Natal], Ellesmere, Alexandria, *Rudatis 1276* (K, holo.; BM, E, G, P, NBG, Z, iso.).

Plants 500–1 500 mm high, growing singly or in small clumps. *Corm* subglobose, 30–50 mm diam.; tunics coarsely netted. *Stem* erect, simple. *Leaves* 3 or 4, lower 2 or 3 ± basal, usually reaching to base of spike or higher, lanceolate, (6–)15–25 mm wide, midrib and margins moderately to strongly thickened and hyaline, pale to glaucous green, upper leaf partly or entirely sheathing; bract-like cauline leaves 3 or more, overlapping and often slightly inflated. *Spike* 15- to 30-flowered, internodes (7–)9–12(–15) mm long; bracts initially herbaceous below but later dry and pale to medium brown, usually darker below, (18–)22–30(–35) mm long, clasping stem in lower ½–⅔, strongly overlapping, 2 or 3 internodes long, often apiculate to attenuate, inner shorter and concealed, deeply forked apically for 2 mm or more. *Flowers* zygomorphic, pink to purple, often with darker median streak in basal half of lower tepals; perianth tube with lower part 22–25 mm long, shortly exserted from bracts, upper part ascending to horizontal and funnel-shaped, 12–18 mm long, 6–8 mm diam. at mouth; tepals curving outward, lanceolate, (22–)25–32 × 8–11 mm. *Filaments* unilateral and arcuate, 10–12 mm long, reaching to mouth of tube; anthers 9–11 mm long, whitish to mauve. *Style* arching over stamens, dividing near anther apices, branches ± 6 mm long. *Capsules* narrowly ovoid, 8–10 mm long. *Seeds* elongate-angular, with rudimentary terminal wings, 4–5 × 2 mm. *Flowering time*: (October) December to March.

Distribution and ecology: restricted to the East Coast and near interior South Africa, from Engcobo and Umtata in Eastern Cape to Durban in KwaZulu-Natal; on damp or



Distribution of ***Watsonia gladioloides***.



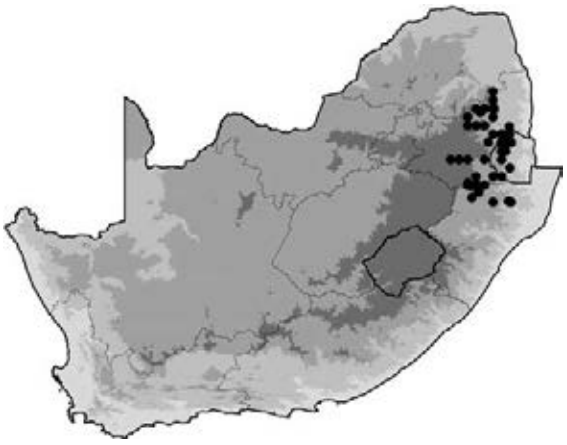
Distribution of ***Watsonia confusa***.

south-facing grassy slopes, sometimes among boulders, seldom above 1 000 m elevation. Plants are solitary or form small clumps.

Diagnosis: one of several species with dense spikes of moderate-sized, pink, funnel-shaped flowers and coarse, dry, brown, overlapping bracts and distinguished by its comparatively tall, erect stem, 500 to 1 500 mm tall. The bracts are broad, 14–18 mm wide, and usually noticeably darker in the upper half, and the flowers are often large, with tepals (22–)25–32 × 8–11 mm. It is most likely to be confused with *Watsonia lepida*, a shorter species up to 650 mm tall, with the leaves dry and withered at flowering, and with narrower bracts, mostly occurring above 1 000 m.

28. **Watsonia pulchra** *N.E.Br. ex Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 81 (1989). Type: Swaziland [Eswatini], Mbabane, Dalriach, *H. Bolus s.n.* (BOL [*BOL 12345*], holo.; K, iso.).

Plants 600–1 200 mm high, growing in clumps. *Corm* subglobose, 30–50 mm diam.; tunics coarsely netted. *Stem* sometimes inclined below, simple (abnormally with 1 or 2 branches). *Leaves* 4 to 7, mostly ± basal, usually half as long as spike or reaching to base of spike, lanceolate or narrowly lanceolate, (10–)15–30 mm wide, midrib hardly and margins moderately to strongly thickened and hyaline, upper leaf or leaves partly sheathing; bract-like cauline leaves 3 or more, overlapping. *Spike* densely 30- to 60-flowered, internodes 4–8 mm long; bracts dry and cinnamon-brown with darker margins, 18–30 mm long, clasping stem in lower ⅓–⅔, strongly overlapping, 2 to 3 internodes long, often apiculate to attenuate, inner shorter and concealed, deeply forked apically for 2 mm or more. *Flowers* zygomorphic, weakly bilabiate, pink to purple, or maroon (rarely white), often with darker median streak in basal half of tepals; perianth tube with lower part 14–20 mm long, shortly exserted from bracts, upper part ascending to horizontal and funnel-shaped, 10–15 mm long, 8 mm diam. at mouth; tepals lanceolate, 16–25 × 8–11 mm, upper three spreading and lower three nearly horizontal. *Filaments* unilateral and arcuate, 10–15 mm long, included in tube; anthers 7–9 mm long, whitish to mauve or violet. *Style* arching over stamens, dividing near anther apices, branches 4–6 mm long. *Capsules* narrowly ovoid, 10–14 mm long. *Seeds* unknown. *Flowering time*: mainly December to March.



Distribution of ***Watsonia pulchra***.

Distribution and ecology: common along the northeastern escarpment, from Mariepskop and Pilgrim's Rest in Mpumalanga, South Africa through western Eswatini to Vryheid and Ngome in northern KwaZulu-Natal; in grassland and open savanna, typically growing in small clumps but also as solitary plants.

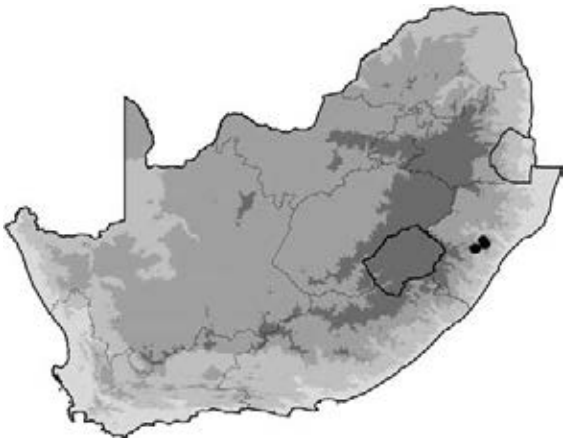
Diagnosis: distinguished from other species with dense spikes of moderate-sized, pink, funnel-shaped flowers and coarse, dry, brown, overlapping bracts by its comparatively tall, erect stem, 600–1 200 mm tall, lanceolate leaves (10–)15–30 mm wide, with strongly thickened margins but only weakly thickened midrib, and dark brown bracts without paler venation.

29. **Watsonia canaliculata** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 83 (1989). Type: South Africa, [KwaZulu-Natal], Karkloof, 17 Jan. 1987, *Goldblatt & Manning 8357* (NU, holo.; E, MO, NBG, PRE, iso.).

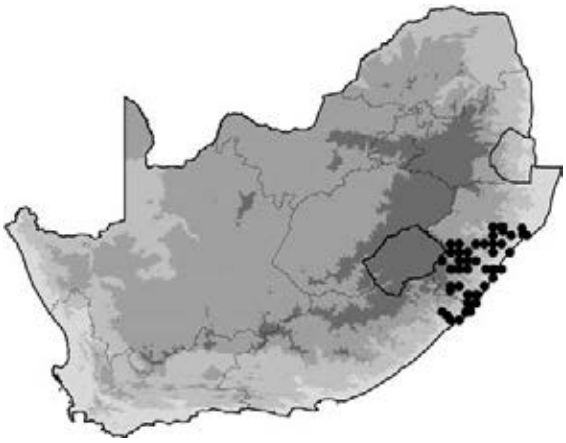
Plants 300–450 mm high, solitary. *Corm* subglobose, 25–40 mm diam.; tunics coarsely netted, extending into a fibrous collar. *Stem* erect, simple. *Leaves* 3 or 4, ± basal or uppermost sub-basal, reaching to base of spike or more, linear to narrowly lanceolate, 4–7 mm wide, channelled or sigmoid in section with margins curved up, midrib and margins moderately thickened and hyaline; bract-like cauline leaves 2 or 3, large. *Spike* densely 10- to 20(30)-flowered, internodes 4–8 mm long; bracts dry and cinnamon-brown, often greenish brown, with evident pale netted veins, 16–20(–25) mm long, clasping stem in lower ⅓–½, strongly overlapping, acute to attenuate, inner shorter, concealed, forked apically for up to 2 mm. *Flowers* zygomorphic, weakly bilabiate, pink to purple with paler throat, often with darker median streak in basal ½ of tepals; perianth tube with lower part 12–18 mm long, upper part ascending and funnel-shaped, ± 15 mm long, 8 mm diam. at mouth; tepals lanceolate, 20–25 × 9–13 mm, upper 3 spreading and lower 3 nearly horizontal. *Filaments* unilateral and arcuate, 14–20 mm long, reaching mouth of tube; anthers 8–11 mm long, whitish to mauve or violet. *Style* arching over stamens, dividing near anther apices, branches 5–6 mm long. *Capsules* narrowly ovoid, ± 10 mm long. *Seeds* unknown. *Flowering time*: November to December (January).

Distribution and ecology: a narrow endemic of central KwaZulu-Natal, South Africa, on the Noodsberg and Karkloof; in open grassland.

Diagnosis: distinguished from other species with dense spikes of moderate-sized, pink, funnel-shaped flowers



Distribution of ***Watsonia canaliculata***.



Distribution of ***Watsonia densiflora***.

and coarse, dry, brown, overlapping bracts by its comparatively short, erect stem, 300–450 mm tall, and narrow leaves, 4–7 mm wide, with the margins curved inward so that the leaves are markedly channelled or sometimes sigmoid in section. *Watsonia lepida*, also a solitary-growing species, has flat leaves 5–15 mm wide, the lowermost dry and broken at flowering, and uniformly dark brown bracts.

30. **Watsonia densiflora** *Baker* in Journal of Botany, British and foreign 14: 336 (1876). Type: South Africa, [Eastern Cape], between the St Johns [Umzimvubu] and Umtata rivers, *Drège 4536* (K, lecto., designated by Brown: 194 (1931); BM, CGE, E, OXF, P, S, isolecto.).

Watsonia densiflora var. *alba* N.E.Br.: 393 (1891). Type: South Africa, [KwaZulu-Natal], without precise locality or collector (K, holo.).

Watsonia neglecta N.E.Br.: 195 (1931). Type: South Africa, [KwaZulu-Natal], without precise locality, *Cooper 3186* (K, lecto., designated by Goldblatt: 85 (1989); Z, isolecto.).

Watsonia plantii N.E.Br.: 194 (1931). Type: South Africa, [KwaZulu-Natal], near Durban, *Plant s.n.* (K, holo.; BM, CGE, G, OXF, P, S, iso.).

Plants 600–1 200(–1 500) mm high, growing in clumps. *Corm* subglobose, 30–50 mm diam.; tunics coarsely netted, extending into a fibrous collar. *Stem* inclined below then erect, simple. *Leaves* 4 or 5, lower 2 or 3 basal, usually ± half as long as spike or rarely reaching to base of spike, linear to narrowly lanceolate, 10–15(–18) mm wide, midrib and margins lightly to moderately thickened and hyaline, uppermost leaf or leaves partly sheathing; bract-like cauline leaves 3 or more, tightly sheathing. *Spike* densely 30- to 42-flowered, internodes 4–6(–8) mm long; bracts dry and brown, often greenish straw-coloured with darker brown margins, with evident pale netted veins, 22–25(–28) mm long, clasping stem in lower half, strongly overlapping, apiculate to attenuate, inner shorter and concealed, forked apically for at least 2 mm. *Flowers* zygomorphic, weakly bilabiate, bright pink (rarely white), often with darker median streak in basal half of tepals; perianth tube with lower part 12–18 mm long, upper part ascending and funnel-shaped, 9–12 mm long, 8 mm diam. at mouth; tepals lanceolate, 18–24 × 7–9 mm, upper three spreading and lower three nearly horizontal. *Filaments* unilateral and arcuate, 10–12 mm long, included in tube; anthers 9–11 mm long, whitish to mauve or violet. *Style* arching over stamens, dividing near anther apices, branches ± 6 mm long. *Capsules* narrowly ovoid, 10–12 mm long. *Seeds* elongate-angular, with rudimentary distal and proximal wings, 4–5 × 2 mm. *Flowering time*: mainly December to March.

Distribution and ecology: widely distributed along the East Coast and near interior South Africa, from Port St Johns in Eastern Cape to St Lucia Bay in northern KwaZulu-Natal, extending inland to Dundee; on open grassy slopes, usually in well-watered sites, rarely above 1 000 m elevation.

Diagnosis: distinguished from other species with dense spikes of moderate-sized, pink, funnel-shaped flowers and coarse, dry, brown, overlapping bracts by its densely clumped habit, with the stems inclined at the base and then sharply erect below the spike. The bracts are greenish straw-coloured with noticeably darker brown margins and pale venation. *Watsonia canaliculata* has similar pale bracts but is a solitary-growing species with erect stems and channelled leaves; *W. pulchra* has dark brown bracts and broad leaves, (10–)15–30 mm wide with heavily thickened margins; and *W. lepida* is a shorter, solitary-growing species, with the lowermost leaves dry and broken at flowering, and uniformly dark brown bracts.

Sect. 4. **Watsonia**

Stems branched or simple; bracts firm-textured. *Flowers* zygomorphic, usually red to orange, sometimes pink to purple; perianth tube trumpet-shaped, with upper part cylindric (rarely funnel-shaped); tepals half as long to ± as long as upper part of tube (rarely longer). *Stamens* arcuate. *Capsules* obovoid to elongate or fusiform. *Seeds* elongate-angular, or prominently winged and then usually 2-winged with distal wing larger, or 1-winged with proximal wing reduced, or with circumferential wing.

Species 23: mainly winter-rainfall South Africa extending along into eastern southern Africa.

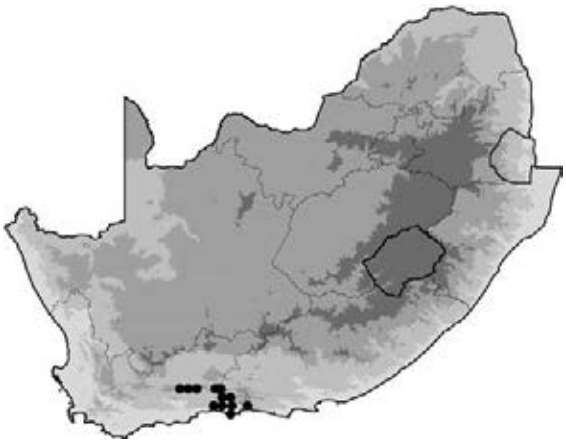
Ser. **Brevibractea** *(Goldblatt) Goldblatt & J.C.Manning*, new rank. *Watsonia* subsection *Brevibractea* Goldblatt in Annals of Kirstenbosch Botanic Gardens 19: 87 (1989). Type: *W. wilmaniae* J.W.Mathews & L.Bolus

Stems usually branched; bracts short, less than 12 mm long. *Capsules* obovoid, shorter than bracts. *Seeds* elongate-angular.

31. **Watsonia wilmaniae** *J.W.Mathews & L.Bolus* in Bolus in Annals of the Bolus Herbarium 4: 114 (1927). Type: South Africa [Western Cape], without precise locality, ex hort. Kirstenbosch, *Wilman s.n.* (BOL [BOL18578], lecto., designated by Goldblatt: 88 (1989); BOL, isolecto.).

Watsonia starkeae L.Bolus: 134 (1929b). Type: South Africa [Western Cape], Oudtshoorn, Swartberg, *Starke s.n.* (BOL [*Nat. Bot. Gard. 10/27*], lecto., designated by Goldblatt: 88 (1989); BOL, K, isolecto.).

Watsonia desmidtii L.Bolus: 124 (1933). Type: South Africa [Western Cape], Wilderness, Touws River, *Flugge de Smidt s.n.* (BOL 20071, lecto., designated by Goldblatt: 88 (1989); BOL, isolecto.).



Distribution of ***Watsonia wilmaniae***.

Plants 800–1 500 mm high. *Corm* depressed-globose, 20–30 mm diam.; tunics coarsely netted. *Stem* erect, usually with 1 or more short, suberect branches. *Leaves* 5 to 7, ± basal but upper partly sheathing stem, ± half as long as spike, lanceolate, 16–30 mm wide, midrib and margins lightly thickened and narrowly hyaline; bract-like cauline leaves 1 or more, tightly sheathing. *Spike* moderately densely 20- to 35-flowered; bracts green below, dry and brownish above, 7–12 mm long, inner slightly shorter to slightly longer, acute. *Flowers* zygomorphic, usually red to purple, sometimes pink, orange or cream-coloured; perianth tube with lower part ± 15 mm long, emerging ± 10 mm from bracts, upper part horizontal, subcylindric, 15–20 mm long, 5 mm diam.; tepals ovate, 18–22 × 7–10 mm, uppermost somewhat hooded, others widely spreading. *Filaments* unilateral and arcuate, 20–30 mm long, exserted 10–15 mm from tube; anthers 7–10 mm long, mauve to grey. *Style* arching over stamens, dividing near anther apices, branches 3–4 mm long. *Capsules* narrowly obovoid, 10–12 mm long. *Seeds* elongate-angular, with rudimentary distal and proximal wings, 4–5 × 2 mm. *Flowering time*: mainly November to January (February).

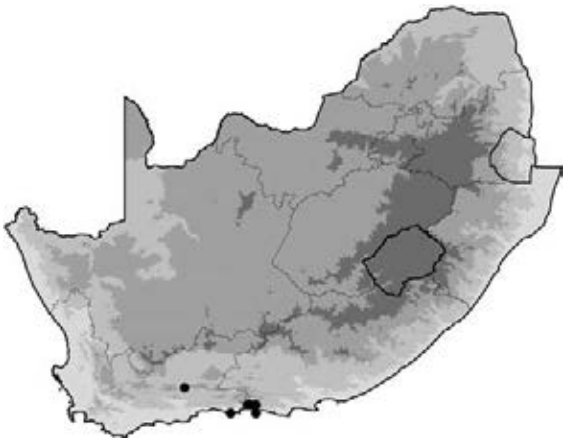
Distribution and ecology: endemic to the mountains along the southern seaboard of South Africa, inland on the Swartberg and Kammanassie Mtns in Western Cape and along the coast in the lower valleys and foothills of the Outeniqua and Tsitsikamma mtns, from George to Uniondale in Eastern Cape; along streams and the edges of marshes, forming dense clumps and blocking streambeds.

Diagnosis: characterised by the short bracts, 7–12 mm long, long-tubed flowers with the upper part 15–20 mm long, and obovoid capsules 10–12 mm long. *Watsonia angusta* from similar habitats has slightly longer bracts, 9–16 mm long, and characteristic fusiform capsules, 25–30 mm long, with longer seeds 9–10 mm long.

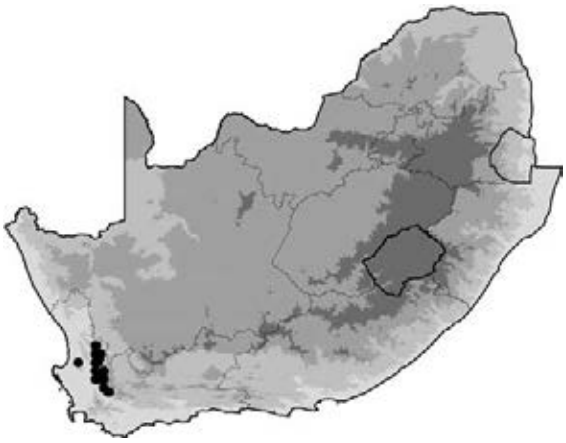
32. **Watsonia galpinii** *L.Bolus* in Annals of the Bolus Herbarium 3: 11 (1920). Type: South Africa, [Eastern Cape], Lottering Bush, river's edge, *Galpin 4698* (BOL [*BOL19031*], lecto., designated by Goldblatt: 90 (1989); K, isolecto.).

Watsonia starkeae var. *rubra* L.Bolus: 134 (1929b). Type: South Africa, [Western Cape], Swartberg, *Starke s.n.* (BOL as *Nat. Bot. Gard. 10A/27*, lecto., designated by Goldblatt: 90 (1989); BOL, isolecto.).

Plants 1 200–2 000 mm high. *Corm* depressed-globose, 20–30 mm diam.; tunics coarsely netted. *Stem* slender, erect to inclined, usually with 1 or 2 short, suberect branches. *Leaves* 5 to 7, ± basal but upper partly sheathing stem, much shorter than spike, lanceolate, up to 300 mm long, 16–30 mm wide, midrib and margins narrowly hyaline but not noticeably thickened; bract-like cauline leaves 1 or more, tightly sheathing. *Spike* moderately densely 30- to 40-flowered; bracts green below,



Distribution of ***Watsonia galpinii***.



Distribution of ***Watsonia stokoei***.

dry and brownish apically, 6–12 mm long, inner slightly shorter to slightly longer, acute. *Flowers* zygomorphic, reddish orange or sometimes mauve-pink; perianth tube with lower part 10–13 mm long, emerging 6–7 mm from bracts, upper part nearly horizontal, subcylindric to flared, 4–8 mm long, 5 mm diam. at mouth; tepals obovate, 15–20 mm long, outer 7–8 mm wide, inner ± 13 mm wide, all widely spreading. *Filaments* unilateral and arcuate, 12–15 mm long, exserted 7–10 mm from tube; anthers 7–9 mm long, yellow. *Style* arching over stamens, dividing near anther apices, branches ± 4 mm long. *Capsules* obovoid, 10–12 mm long. *Seeds* elongate-angular to shortly winged with flattened distal ridge, 4–5 mm long. *Flowering time*: mainly January to April.

Distribution and ecology: a rare species of southern South Africa, from the Swartberg in Western Cape, and in the Outeniqua and Tsitsikamma mtns between Knysna and Humansdorp in Eastern Cape; confined to wet sites along streams.

Diagnosis: easily distinguished by its slender stems up to 2 m tall, short bracts 6–12 mm long, and short perianth tube with the upper part 4–8 mm long but relatively long filaments 12–15 mm long, thus ± twice as long as the upper part of the tube. *Watsonia wilmaniae* from much the same habitats and location and with similar short bracts has the upper part of the perianth tube 15–20 mm long.

33. **Watsonia stokoei** *L.Bolus* in South African Gardening and Country Life 25: 56 (1935). Type: South Africa, [Western Cape], Ceres, summit plateau of the Schurfdeberge, *Stokoe s.n. Nat. Bot. Gard. 8/34* (BOL, holo.).

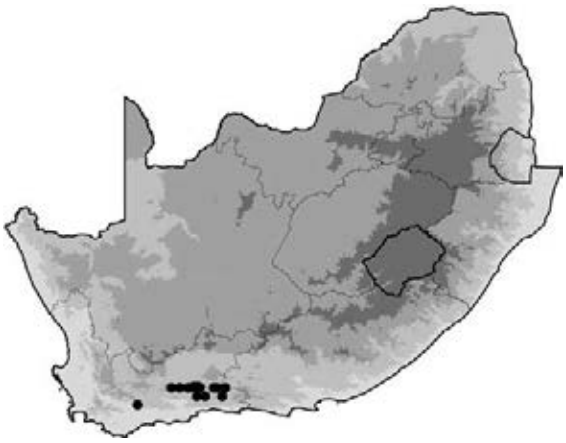
Plants 350–900 mm high. *Corm* depressed-globose, 20–30 mm diam.; tunics coarsely netted, outer becoming finely fibrous. *Stem* with (1) several short, suberect branches. *Leaves* 5 or 6, ± basal but upper partly sheathing stem, ½–⅔ as long as spike, linear-lanceolate, 8–15 mm wide, midrib and margins lightly thickened and hyaline; bract-like cauline leaves 2 or more, long and tightly sheathing. *Spike* 10- to 18-flowered; bracts ± dry and brown, 5–8 mm long, inner as long as or slightly longer, somewhat membranous, forked apically. *Flowers* zygomorphic, pale red; perianth tube with lower part 10–14 mm long, emerging 7–8 mm from bracts, upper part horizontal, subcylindric, 12–15(–20) mm long, 4–5 mm diam. at mouth; tepals oblanceolate, 12–15 × 5–8 mm, all widely spreading. *Filaments* unilateral and arcuate, 22–26(–30) mm long, exserted 8–12 mm from tube; anthers 6.5–8.0 mm long. *Style* arching over stamens, dividing near anther apices, branches 3–4 mm long. *Capsules* obovoid-globose, up to 10 mm long. *Seeds* angular with distal ridge, 5–6 × 2 mm. *Flowering time*: November to early January (February).

Distribution and ecology: widely distributed through the mountains along the Atlantic coast of Western Cape, South Africa, from the Gifberg through the Cederberg to the Cold Bokkeveld and Twenty Four Rivers mtns and the Piketberg; in damp sites, mostly in seeps but also along streambanks, flowering well only after fire.

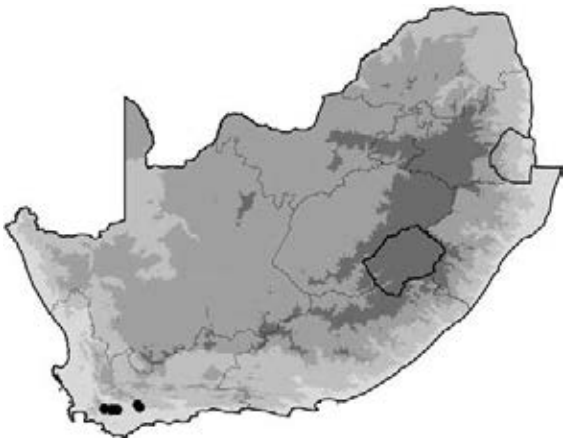
Diagnosis: recognised by the small bracts, 5–8 mm long and dry at flowering, and the dull red, tubular flowers with the upper part of the perianth tube 12–15(–20) mm long, and relatively small tepals, 12–15 × 5–8 mm. The small flowers separate it from the southern Cape *Watsonia wilmaniae*, which has the upper part of the perianth tube 15–20 mm long and tepals 18–22 mm long. *Watsonia angusta* also has larger flowers with the upper part of the perianth tube 20–22 mm long, tepals 19–25 mm long, and filaments 30–38 mm long; and characteristic fusiform capsules 25–35 mm long.

34. **Watsonia marlothii** *L.Bolus* in Annals of the Bolus Herbarium 4: 50 (1926). Type: South Africa, [Western Cape], Swartberg Pass, Oudtshoorn side, *Mathews s.n.* (BOL [*Nat. Bot. Gard. 4312/14*], lecto., designated by Goldblatt: 94 (1989); BOL, isolecto.).

Plants 600–1 200 mm high. *Corm* depressed-globose, 30–45 mm diam.; tunics coarsely netted. *Stem* with up



Distribution of ***Watsonia marlothii***.



Distribution of ***Watsonia minima***.

to 6 short, stiffly erect branches. *Leaves* 4 to 6, lower 3 or 4 ± basal, uppermost partly sheathing stem, ± half as long as spike, narrowly lanceolate, 14–30 mm wide, midrib and margins heavily thickened and hyaline; bract-like cauline leaves 1 or more, tightly sheathing. *Spike* 16- to 40-flowered; bracts green below, dry and brown apically, 9–12 mm long, acuminate, inner ⅔ to ± as long, somewhat membranous, deeply forked up to halfway. *Flowers* zygomorphic, red to pale pink, rarely purple or whitish; perianth tube with lower part 10–12 mm long, emerging 3–4 mm from bracts, upper part ascending to horizontal, subcylindric, 14–18(–22) mm long, 4–5 mm diam. at mouth; tepals oblanceolate, 12–16 × 6–8 mm, all widely spreading. *Filaments* unilateral, arcuate, 25–30 mm long, exserted 7–12 mm from tube; anthers 5–9 mm long. *Style* arching over stamens, dividing near middle of anthers, branches ± 7 mm long. *Capsules* ovoid to subglobose, 9–11 mm long. *Seeds* unknown. *Flowering time*: late November to February.

Distribution and ecology: originally thought to be endemic to the Swartberg in Western Cape, South Africa, but now also known from the Kammanassie Mtns, and a single collection from the Langeberg above Swellendam; on open slopes above 1 000 m elevation, flowering well after fire.

Diagnosis: distinguished from other species with small bracts up to 12 mm long by the heavily thickened leaf margins and branched, multi-flowered spike of relatively small flowers with the upper part of the perianth tube 14–18(–22) mm long, and deeply forked inner bracts. *Watsonia fourcadei* is a superficially similar species with forked inner bracts but larger flowers, the upper part of the tube 22–26 mm long, and elongate, tapering capsules 18–20 mm long.

35. **Watsonia minima** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 95 (1989). Type: South Africa, [Western Cape], Riviersonderend Mtns above Greyton, 3 000 ft [900 m], 5 Dec 1987, *Goldblatt 8708* (NBG, holo.; K, MO, PRE, US, WAG, iso.)

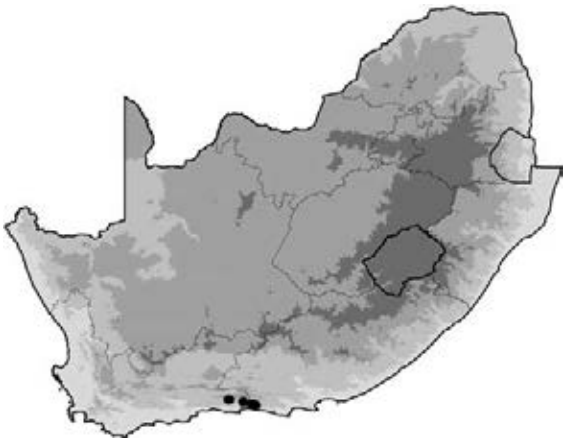
Plants 100–300(–450) mm high. *Corm* subglobose, ± 15 mm diam.; tunics finely netted. *Stem* usually simple or occasionally with 1 or 2 branches. *Leaves* 2 to 4, lower 2 or 3 basal, uppermost partly sheathing stem, reaching ± base of spike, linear to narrowly lanceolate, (2–)3–5 mm wide, margins lightly thickened and purplish; bract-like cauline leaves 1 or 2. *Spike* (3)6- to 12-flowered; bracts dry and brown in upper half, 8–14 mm long, inner slightly shorter, forked apically for ± 2 mm. *Flowers* zygomorphic, orange to orange-red, lower tepals with darker median streak; perianth tube with lower part 8–10 mm long, upper part ascending, subcylindric, 9–10 mm long, ± 3 mm diam. at mouth; tepals oblanceolate, 13–15 × 5–7 mm, all widely spreading. *Filaments* unilateral and arcuate, 15–16 mm long, exserted ± 5 mm from tube; anthers ± 5 mm long, violet. *Style* arching over stamens, dividing near apex of anthers, branches ± 3.5 mm long. *Capsules* obovoid-truncate, ± 7 mm long. *Seeds* unknown. *Flowering time*: mid-November to mid-December.

Distribution and ecology: a local endemic of Western Cape, South Africa, recorded from the Riviersonderend Mtns and the central Langeberg above Swellendam; on sandstone slopes above 700 m elevation, often in seasonal seepages.

Diagnosis: a small species with short bracts 8–14 mm long and relatively small, orange-red flowers, the upper part of the perianth tube 9–10 mm long and slightly shorter than the tepals.

36. **Watsonia elsiae** *Goldblatt* in Annals of the Kirstenbosch Botanic Gardens 19: 97 (1989). Type: South Africa, [Western Cape], Potjieshoogte Pass, south of Uniondale, 6 Dec 1985, *Goldblatt 7464* (NBG, holo.; BOL, E, K, MO, NBG, PRE, S, US, WAG, iso.)

Plants 450–650 mm high. *Corm* subglobose, 25–35 mm diam.; tunics coarsely netted. *Stem* simple. *Leaves* 3 or 4, ± basal but uppermost partly sheathing stem, seldom reaching base of spike, linear to narrowly lanceolate,



Distribution of ***Watsonia elsiae***.

7–10(–12) mm wide, midrib and margins moderately to heavily thickened and hyaline; bract-like cauline leaves 2 or 3, tightly sheathing. *Spike* moderately densely 20- to 30-flowered; bracts green below, dry and brown above, 8–12(–15) mm long, inner ⅔ to ± as long, acute to bifid apically. *Flowers* zygomorphic, bright scarlet-red; perianth tube with lower part 10–12 mm long, upper part nearly horizontal becoming somewhat pendent, bent at right angles to lower part, subcylindric, 12–15 mm long, ± 4 mm diam. at mouth; tepals oblanceolate, 13–16 × 6–8 mm, widely spreading. *Filaments* unilateral, arcuate, 8–10 mm long, included in tube; anthers included in tube, 4.5–6.0 mm long, yellow. *Style* included in tube, dividing near middle of filaments, branches 3–4 mm long. *Capsules* obovoid, 7–9 mm long. *Seeds* ± compressed, up to 5 mm long, with flattened wing-like ridge distally. *Flowering time*: November to mid-December and March.

Distribution and ecology: endemic to the central Long Kloof, extending from near Uniondale in Western Cape to Joubertina and Misgund in Eastern Cape, South Africa; on relatively dry stony slopes, flowering well only after fire.

Diagnosis: the scarlet-red flowers are unique in the genus in having the stamens and style included in the perianth tube, the filaments reaching to ± the middle of the upper part of the tube with the anthers reaching almost to the mouth, and the style branching below the anthers.

Ser. **Grandibractea** *(Goldblatt) Goldblatt & J.C.Manning*, new rank. *Watsonia* subsection *Grandibractea* Goldblatt in Annals of Kirstenbosch Botanic Gardens 19: 99 (1989). Type: *W. pillansii* L.Bolus

Stems simple; bracts large and relatively broad, more than 15 mm long. *Capsules* obovoid, shorter than bracts. *Seeds* 2-winged.

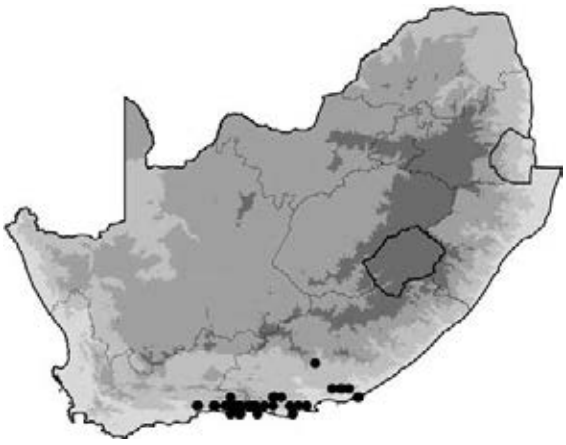
37. **Watsonia knysnana** *L.Bolus* in South African Gardening and Country Life 20: 63 (1930b). Type: South Africa, [Western Cape], Knysna [?District], *Willis s.n.* (BOL [*Nat. Bot. Gard. 382/24*], lecto., designated by Goldblatt: 99 (1989); BOL, isolecto.).

[?*Neuberia longifolia* Eckl.: 37 (1827), invalid name without description.]

Plants (500–)1 200–1 600 mm high. *Corm* depressed-globose, 35–70 mm diam.; tunics coarsely netted. *Stem* usually simple, or with 1 to 3 branches. *Leaves* 3 to several, lower ± basal but uppermost partly sheathing stem, ± half as long as spike, lanceolate, 8–24 mm wide, midrib and margins lightly to moderately thickened and hyaline; bract-like cauline leaves 2 or more, long and tightly sheathing. *Spike* 10- to 30-flowered; bracts green below, drying above and reddish to brown, (12–)14–20(–24) mm long, inner ⅔ to ± as long, acute to bifid for 1 mm. *Flowers* zygomorphic, pale pink to purple or rarely scarlet, sometimes faintly scented; perianth tube with lower part 12–20 mm long, usually exserted 2.5 mm from bracts, upper part ascending to nearly horizontal, subcylindric, 17–20(–24) mm long, ± 6 mm diam. at mouth; tepals obovate, 19–22(–25) × 8–12(–15) mm, widely spreading. *Filaments* unilateral, arcuate, 16–28 mm long, usually well exserted from tube; anthers 7–11 mm long, violet. *Style* dividing near middle of anthers, branches 5–6 mm long. *Capsules* narrowly obovoid, 12–15 mm long. *Seeds* elongate, 8–10 mm long, unequally winged. *Flowering time*: (October) November to January, rarely later.

Distribution and ecology: widespread along the southern coast of South Africa, from Robinson Pass in Western Cape to East London in Eastern Cape, extending inland through the Baviaanskloof Mtns to Grahamstown and between Somerset East and Hogsback; on well-drained rocky slopes and mesic grassland.

Diagnosis: distinguished from other species with similar long-tubed flowers by the mostly pink to purple (only rarely red) perianth, the lower part of the tube 12–20 mm long and the upper part 17–20(–24) mm long, the mostly unbranched stem, and the herbaceous bracts (12–)14–20(–24) mm long. Populations from the



Distribution of ***Watsonia knysnana***.

mountains around George, especially Ruitersberg at Robinson's Pass, are unusual in their dry bracts, suberect tepals and shorter filaments only shortly exserted from the tube.

Closely related *Watsonia pillansii* has consistently orange flowers with bracts (19–)23–33(–40) mm long, and a perianth tube with both the lower and upper parts 17–25 mm long, the filaments thus slightly longer, 30–40 mm long. The two species hybridise extensively along the southern Cape coast, notably near Prince Alfred's Pass and Kareedouw Pass but also elsewhere.

38. **Watsonia pillansii** *L.Bolus* in Annals of the Bolus Herbarium 3: 75 (1921). Type: South Africa, [Western Cape], Montagu Pass, *Pillans s.n.* (BOL [*Nat. Bot. Gard. 1549/14*], holo.).

Watsonia priorii L.Bolus: 49 (1926). Type: South Africa, [Western Cape], Georgetown [George], Aug. 1847, *Proir s.n.* (K, holo.).

Watsonia masoniae L.Bolus: 50 (1926). Type: South Africa, without precise locality, ex hort. Cantabr., *Mason s.n.* (K, holo.).

Watsonia beatricis J.W.Mathews & L.Bolus in Bolus: 52 (1926). Type: South Africa, [Western Cape], George District, ex hort. Kirstenbosch, flor. 1925, *Hops s.n.* (BOL, lecto., designated by Goldblatt: 102 (1989); BOL, isolecto.).

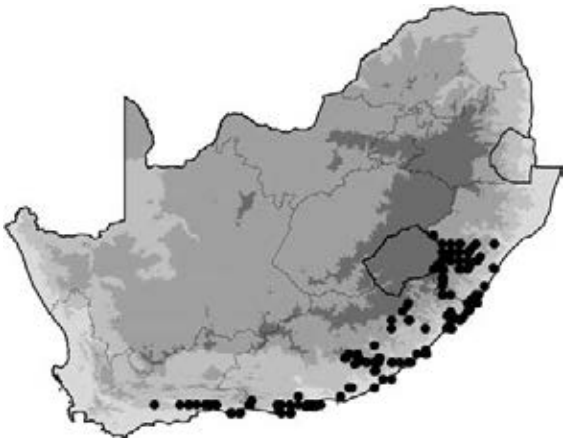
?*Watsonia westiae* L.Bolus: 50 (1926). Type: South Africa, [Eastern Cape], Port Elizabeth, *West s.n.* (K, holo.).

Watsonia socium J.W.Mathews & L.Bolus in Bolus: 134 (1929b). Type: South Africa, [KwaZulu-Natal], Pietermaritzburg, Swartkop, *Der Mole & Kitsh s.n* (BOL [*Nat. Bot. Gard. 937/25*], lecto., designated by Goldblatt: 102 (1989); BOL, isolecto.).

Watsonia hutchinsonii L.Bolus: 328 (1932). Type: South Africa, without precise locality, *Hutchinson s.n.* (BOL [*Nat. Bot. gard. 2563/30*], lecto., designated by Goldblatt: 66 (1989); BOL, isolecto.).

Watsonia archbelliae L.Bolus: 329 (1932). Type: South Africa, [KwaZulu-Natal], Underberg, 5 120 ft [1 560 m], *Archbell 1439* (BOL [*Nat. Bot. Gard. 772/30*], lecto., designated by Goldblatt: 102 (1989); BOL, K, isolecto.).

Plants 500–1 200 mm high, often forming clumps. *Corm* depressed-globose, 30–50 mm diam.; tunics coarsely netted. *Stem* usually simple, or with 1 to 3 branches. *Leaves* 4 to 6, lower 3 or 4 basal, uppermost partly or entirely sheathing stem, ± half as long as spike, linear-lanceolate to lanceolate, (7–)12–18 mm wide, midrib and margins moderately thickened and hyaline; bract-like cauline leaves several, sheathing. *Spike* (20)25- to 35-flowered; bracts green or often partly reddish, dry and brown apically, (19–)23–33(–40) mm long, inner ⅔ to ± as long, greenish and completely enclosed, obtuse to barely bilobed. *Flowers* zygomorphic, bright orange to orange-red; perianth tube with lower part 17–25 mm long, included or shortly emerging from bracts, upper part ascending to horizontal, subcylindric, 18–25 mm long, ± 6 mm diam. at mouth, usually with longitudinal ridges between filament bases; tepals lanceolate, 20–26 × 9–15 mm, all widely spreading or dorsal somewhat hooded. *Filaments* unilateral, arcuate, 30–40 mm long, well exserted from tube; anthers 7–11 mm long, violet to cream-coloured. *Style* dividing near middle of anthers, branches ± 7 mm long. *Capsules* globose to narrowly obovoid, 10–12 mm long. *Seeds* elongate, 7–10 mm long, shortly 2-winged. *Flowering time*: (November) December to January (February).



Distribution of ***Watsonia pillansii***.

Distribution and ecology: widespread along the southern and eastern seaboard of South Africa, from the Langeberg at Swellendam in Western Cape along the Outeniqua and Tsitsikamma Mtns through Eastern Cape to Dundee in KwaZulu-Natal, extending inland along the foothills of the Drakensberg; on stony slopes in rock outcrops in grassland.

Diagnosis: distinguished by the long-tubed, orange flowers with the lower and upper parts of the perianth tube 17–25 mm long, the filaments 30–40 mm long, and the mostly herbaceous bracts (19–)22–35(–40) mm long. The perianth tube usually bears internal longitudinal ridges between the lower part of the filaments. Populations from the Hogsback–Katberg mountains represent a distinct race of tall plants with up to 35 flowers per spike, and unusually short inner bracts up to ± half as long as the outer.

Watsonia knysnana has mostly pink to purple (rarely red) flowers with the lower part of the perianth tube 12–20 mm long, the filaments thus 16–28 mm long, and bracts (12–)14–20(–24) mm long. The two species hybridise extensively along the southern Cape coast, notably near Prince Alfred's Pass and Kareedouw Pass but also elsewhere.

Watsonia schlechteri from further west and inland has similar bracts and flowers but lacking the ridges inside

the perianth tube and mostly narrower leaves 6–15 mm wide with heavily thickened midrib and margins. The two species converge in the Langeberg between Cloete's Pass and Riversdale, and plants from this area are difficult to identify with confidence.

39. **Watsonia bachmannii** *L.Bolus* in Annals of the Bolus Herbarium 4: 47 (1926). Type: South Africa, [KwaZulu-Natal], Pondoland, *Bachmann 355* (B, lecto., designated by Goldblatt: 105 (1989); BOL, isolecto.).

Plants 250–500 mm high. *Corm* subglobose, 14–20 mm diam.; tunics finely netted. *Stem* simple. *Leaves* usually 2, lower 1 basal, sometimes burned and apparently lacking, upper leaf partly sheathing stem, ± half as long as spike, linear to narrowly lanceolate, 2.5–6.0(–9.0) mm wide, midrib and margins lightly thickened and hyaline; bract-like cauline leaves 2 to 4, short, green, sheathing, sometimes overlapping. *Spike* 2- to 7-flowered; bracts green below, dry and brownish apically, 10–16 mm long, inner ± ⅔ as long, bifid apically. *Flowers* zygomorphic, orange; perianth tube with lower part 8–12 mm long, included or shortly emerging from bracts, upper part horizontal, tubular or narrowly flared, 10–12 mm long, ± 5 mm diam. at mouth; tepals obovate, 18–20 × 7–10 mm, all somewhat spreading. *Filaments* unilateral, arcuate, ± 10 mm long, not or barely exserted from tube; anthers 7–9 mm long, white. *Style* dividing shortly beyond anther apices, branches 2–4 mm long. *Capsules* obovoid, 8–10 mm long. *Seeds* elongate-angular, up to 4.5 mm long, distal end shortly winged. *Flowering time*: early July to mid-October.

Distribution and ecology: restricted to the southeastern coast of South Africa, from Lusikisiki in Eastern Cape to Port Edward in southern KwaZulu-Natal; in open or marshy grassland.

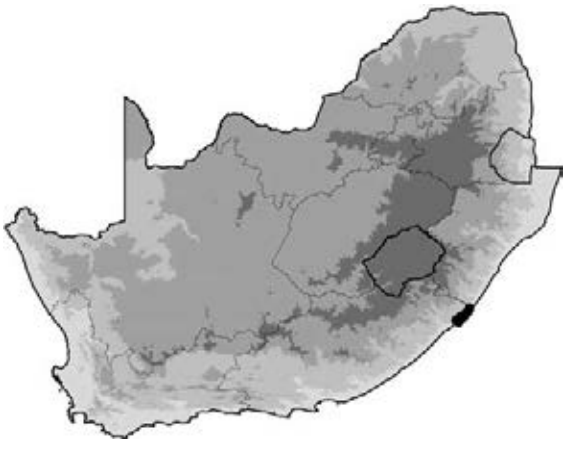
Diagnosis: a small, orange-flowered species up to 500 mm high, with the upper part of the perianth tube narrowly trumpet-shaped, 10–12 mm long and slightly shorter than the tepals, and short filaments ± 10 mm long just included in the tube.

40. **Watsonia schlechteri** *L.Bolus* in Annals of the Bolus Herbarium 4: 47 (1926). Type: South Africa, [Western Cape], Houw Hoek Mtns, *R. Schlechter 7349* (K, lecto., designated by Goldblatt: 106 (1989); B, BM, BOL, G, K, PRE, Z, isolecto.).

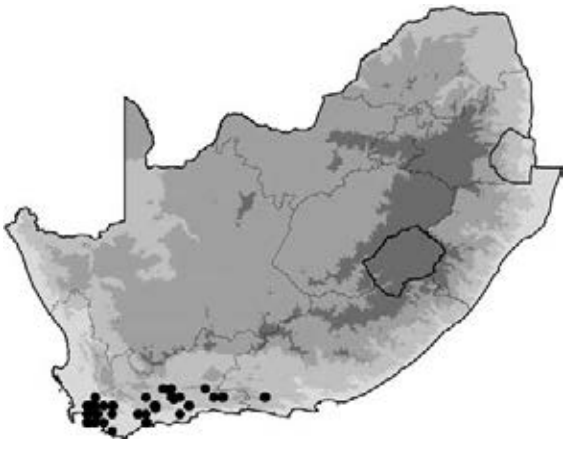
Watsonia schinzii L.Bolus: 53 (1926). Type: South Africa, [Western Cape], Table Mtn., *Schinz s.n.* (Z, lecto., designated by Goldblatt: 106 (1989); Z, isolecto.).

Plants 400–1 000 mm high. *Corm* depressed-globose, 30–50 mm diam.; tunics coarsely netted. *Stem* usually simple, rarely with short erect branches. *Leaves* 3 or 4, lower 2 or 3 ± basal, uppermost leaf partly sheathing stem, ½–⅔ as long as spike, narrowly lanceolate, 6–15 mm wide, midrib and margins heavily thickened and hyaline; bract-like cauline leaves 2 or 3, sheathing. *Spike* (6)12- to 30-flowered; bracts herbaceous and reddish below, becoming dry and brownish apically, 18–30 mm long, inner enclosed, greenish, up to 17 mm long, entire or forked apically for 1–2(–5) mm. *Flowers* zygomorphic, bright reddish orange or occasionally deep pink, paler in tube; perianth tube with lower part 17–20 mm long, included or shortly emerging from bracts, upper part ascending to horizontal, subcylindric, 22–30 mm long, ± 9 mm diam. at mouth; tepals obovate-oblong, 20–24 × 12–15 mm, all spreading widely. *Filaments* unilateral, arcuate, 35–45 mm long, well exserted from tube; anthers 7–10 mm long, violet. *Style* dividing between middle and apex of anthers, branches ± 6 mm long. *Capsules* subglobose to obovoid, up to 10 mm long. *Seeds* elongate-angular, 4–5 × 2 mm, distal end ridged or shortly winged. *Flowering time*: late November to early February.

Distribution and ecology: relatively widespread through the mountains of Western Cape, South Africa, from near Citrusdal south to Cape Hangklip, Bredasdorp, Potberg and the Langeberg and inland on the Klein Swartberg, Rooiberg and Kammanassie mtns as far east as the Kouga Mtns in Eastern Cape; growing singly or in small



Distribution of ***Watsonia bachmannii***.



Distribution of ***Watsonia schlechteri***.

clumps on exposed, sandstone slopes and plateaus. Flowering is stimulated by fire.

Diagnosis: recognised by the long-tubed, orange flowers with the lower part of the perianth tube 17–20 mm long and the upper part 22–30 mm long, filaments 35–45 mm long, and reddish, mostly herbaceous bracts 18–30 mm long. *Watsonia pillansii* from further east and along the coast has similar bracts and flowers, often with longitudinal ridges inside the perianth tube between the bases of the filaments, and mostly broader leaves, (7–)12–18 mm wide, with moderately thickened midrib and margins. The two species converge in the Langeberg between Cloete's Pass and Riversdale, and plants from this area are difficult to identify with confidence.

Watsonia fourcadei may have similar red to orange-red flowers but typically has shorter bracts, 13–18(–25) mm long, attenuate and somewhat scarious with the inner strongly forked, and diagnostic, obconic capsules tapering above.

Ser. **Angustae** *(Goldblatt) Goldblatt & J.C.Manning*, new rank. *Watsonia* subsection *Angustae* Goldblatt in Annals of Kirstenbosch Botanic Gardens 19: 109 (1989). Type: *W. angusta* Ker Gawl.

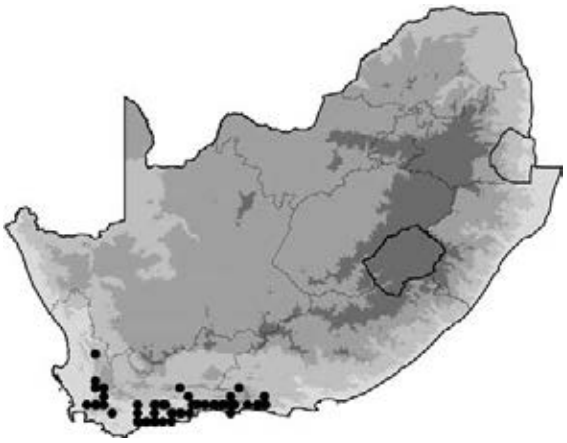
Stems branched; bracts of intermediate size, 9–18(–25) mm long. *Capsules* obconic-tapering or elongate-fusiform, longer than bracts. *Seeds* 2-winged.

41. **Watsonia fourcadei** *J.W.Mathews & L.Bolus* in Bolus in Annals of the Bolus Herbarium 4: 26 (1925). Type: South Africa, [Eastern Cape], Witte Els Bosch, *Fourcade s.n.* (BOL [Nat. Bot. Gard.], holo.; BOL, iso.).

Watsonia stanfordiae L.Bolus: 133 (1929b). Type: South Africa, [Western Cape], kloof at Banhoek, Stellenbosch, ex hort. K, *Stanford s.n.* (BOL [*BOL18893*], holo.).

Watsonia ryderae L.Bolus: 326 (1932). Type: South Africa, [Western Cape], Riversdale, Garcia's Pass, *Ryder s.n.* (BOL [19974], holo.; BOL, iso.).

Plants 900–1 800 mm high. *Corm* depressed-globose, 30–50 mm diam.; tunics coarsely netted. *Stem* with up to 4 short, suberect branches. *Leaves* 5 to 8, lower ± basal, uppermost leaf partly sheathing stem, ± ⅓ as long as spike, lanceolate, (15–)20–40 mm wide, midrib and margins lightly to moderately thickened and hyaline; bract-like cauline leaves 1 or 2, sheathing. *Spike* 25- to 40-flowered; bracts herbaceous and usually reddish, becoming dry and brownish above, 10–18(–25) mm long, acute to attenuate, inner ⅔ to as long, deeply forked apically for 3–6 mm. *Flowers* zygomorphic, pink or purple to orange-red or orange, sometimes with a paler tube and tepals, then darker on the reverse; perianth tube with lower part (20–)25–30 mm long, usually well exserted from bracts for up to 20 mm, upper part horizontal to drooping, subcylindric, ± 22–26 mm long, 6–8 mm diam. at mouth; tepals oblanceolate, 24–33 × 9–13 mm, all suberect and weakly cupped. *Filaments* unilateral, arcuate, 38–45 mm long, well exserted from tube; anthers 9–12 mm long, violet. *Style* dividing between upper ⅓ and apex of anthers, branches ± 4.5 mm long. *Capsules* obconic, tapering above, 18–20 × 5–6 mm. *Seeds* elongate-angular, 9–12 mm long, with well-developed distal wing and rudimentary proximal wing. *Flowering time*: October to early January (February).



Distribution of ***Watsonia fourcadei***.

Distribution and ecology: relatively widespread through the mountains in southwestern South Africa, from the Cederberg to Villiersdorp thence eastward along the Langeberg and coastal plain of Western Cape to the Van Stadens River Mtns in Eastern Cape; on moist sandstone slopes, flowering mainly after fire. The species is absent from the Cape Peninsula, the Kogelberg–Klein River–Bredasdorp Mtns and the Riviersonderend Mtns.

Diagnosis: distinguished by the combination of acute to attenuate, moderate-sized bracts, 10–18(–25) mm long, the inner deeply forked apically for 3–6 mm, and the very long flowers, typically rather drooping, with the lower part of the tube (20–)25–30 mm long and usually well-exserted from the bracts. The obconic, tapering capsules are diagnostic. *Watsonia angusta* has acute or shortly bilobed inner bracts and smaller flowers, with the lower part of the tube (15–)18–22 mm long and narrower tepals 4–10 mm wide, and elongate, fusiform capsules. *Watsonia schlechteri*, also with entire or shortly forked inner bracts and shorter lower and upper parts of the perianth tube, 15–20 mm long, has subglobose to obovoid capsules up to 10 mm long.

42. **Watsonia zeyheri** *L.Bolus* in Annals of the Bolus Herbarium 4: 48 (1926). Type: South Africa, [Western Cape], Caledon, *Ecklon & Zeyher s.n.* or *Irid. 181* (K, holo.).

Watsonia elimensis L.Bolus: 48 (1926). Type: South Africa, [Western Cape], hills near Elim, *Schlechter 9692* (K, lecto., designated by Goldblatt: 115 (1989); B, BOL, G, GRA, K, PRE, Z, isolecto.).

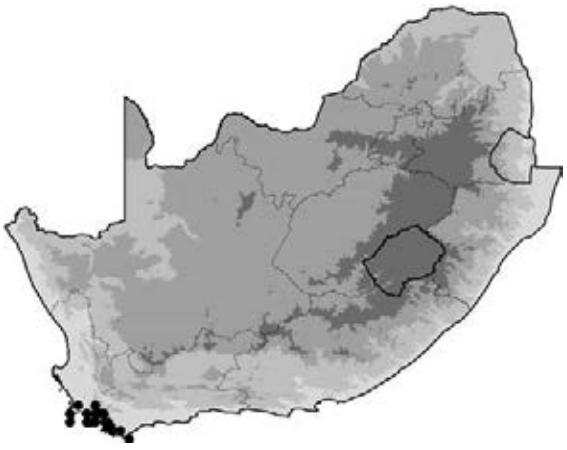
Watsonia comptonii L.Bolus: 330 (1932). Type: South Africa, [Western Cape], Cape Peninsula, marsh near Smitswinkel, *Salter 1840* (BOL, lecto., designated by Goldblatt: 115 (1989); BM, BOL, K, isolecto.).

Watsonia comptonii var. *angustifolia* L.Bolus: 330 (1932). Type: South Africa, [Western Cape], marsh near Redhill, *Salter 1900* (BOL, lecto., designated by Goldblatt: 115 (1989); BOL, K, SAM, isolecto.).

[*Watsonia strictiflora* Eckl.: 36 (1827), invalid name without description.]

Plants (150–)350–800 mm high. *Corm* depressed-globose, 18–25 mm diam.; tunics finely netted. *Stem* simple or with 2 to 4 short, erect branches. *Leaves* ± 4, lower 3 ± basal, upper leaves partly sheathing stem, ± half as long as spike, narrowly lanceolate to lanceolate, 12–18 mm wide, midrib and margins thickened and hyaline; bract-like cauline leaves 2, sheathing, 60–90 mm long. *Spike* (3)9- to 14-flowered; bracts green, often reddish above, dry and brown on upper margins for ± 1 mm, (10–)14–18 mm long, inner ⅔ to as long, forked apically for 2–4 mm. *Flowers* zygomorphic, orange or salmon-pink; tepals with darker median streak in lower midline; perianth tube with lower part 15–18 mm long, emerging up to 10 mm from bracts, upper part ascending, subcylindric, 16–20 mm long, ± 5 mm diam. at mouth; tepals oblanceolate, 20–22 × 9–11 mm, all spreading wide. *Filaments* unilateral and arcuate, 25–33 mm long, well exserted from tube; anthers ± 7 mm long, violet. *Style* dividing near middle of anthers, branches ± 5 mm long. *Capsules* oblong-fusiform, 20–24 × 5–6 mm. *Seeds* nearly linear, 10–12 × 1.5–2.0 mm, 2-winged. *Flowering time*: (September) October to early December.

Distribution and ecology: restricted to the extreme south-western part of Western Cape, South Africa, from the southern Cape Peninsula and Hottentots Holland Mtns to Bredasdorp and Cape Infanta, usually at lower elevations but occurring at higher altitudes in the marshes at the eastern end of Franschhoek Pass and at Grabouw; usually in marshes and seeps or along streambanks.



Distribution of ***Watsonia zeyheri***.

Diagnosis: distinguished from other species with similar long-tubed, red to orange flowers by the relatively short bracts, (10–)14–18 mm long and the oblong-fusiform capsules tapering at the tips. *Watsonia angusta* is a generally taller species, with dull red flowers with narrower tepals mostly 4–8 mm wide and a longer upper perianth tube, 20–22 mm long. *Watsonia fourcadei* is likewise a more robust species with much longer, typically rather drooping flowers with the upper part of the tube 22–26 mm long, and deeply forked inner bracts.

43. **Watsonia angusta** *Ker Gawl.* in König & Sims, Annals of Botany 1: 230 (1804). *Gladiolus jacquinii* Schrank: 195 (1822), illegitimate superfluous name based on same type. Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 231 (1795 [1788–1795]) '*Gladiolus merianus* var.'.

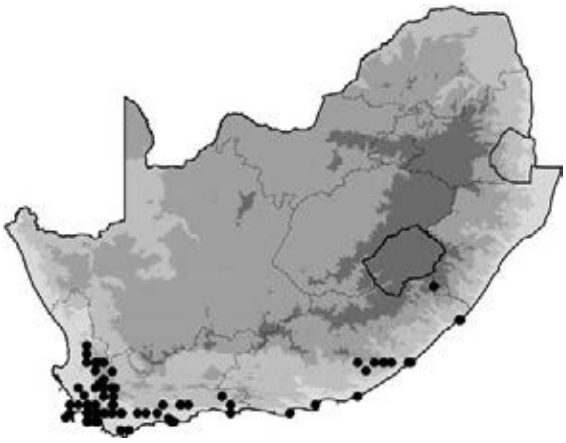
Antholyza ludwigii Eckl.: 34 (1827). Type: South Africa, [Western Cape], ex hort. Ludwig, Cape Town, *Ecklon s.n.* (S, holo.).

Watsonia atrosanguinea Klatt: 738 (1864). Type: South Africa [but said to be from Java], *Zollinger 440* (†B, holo.; P, iso.).

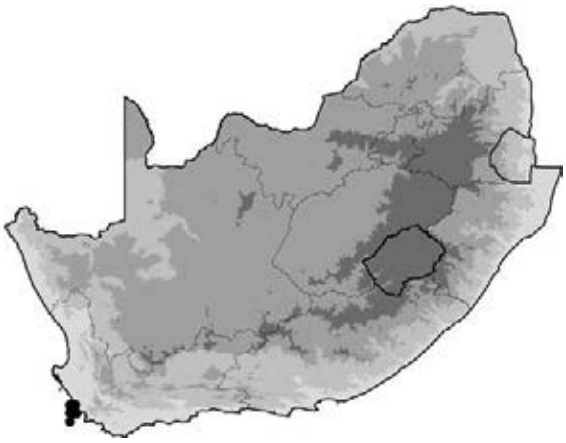
Plants 1 000–1 200 mm high. *Corm* depressed-globose, 40–60 mm diam.; tunics coarsely netted. *Stem* branched, with 1 to several short, suberect branches. *Leaves* 5 to several, lower ± basal, upper leaves partly sheathing stem, ± half as long as spike, narrowly lanceolate to lanceolate, 12–20 mm wide, midrib and margins lightly thickened and narrowly to obscurely hyaline; bract-like cauline leaves 1 or more, long and tightly sheathing. *Spike* lax, up to 18-flowered; bracts herbaceous and often dull reddish purple, dry and brownish apically, 9–14(–16) mm long, inner as long as or slightly longer, acute or bilobed apically for up to 1 mm. *Flowers* zygomorphic, scarlet (rare yellow mutants recorded), often with pale longitudinal streaks running down tube from tepal sinuses; perianth tube with lower part (15–)18–22 mm long, emerging 10–14 mm from bracts, upper part horizontal, subcylindric, 20–22 mm long, 5–7 mm diam. at mouth; tepals narrowly oblanceolate, 19–25 × 4–8(–10) mm, upper ascending to horizontal, lower recurved. *Filaments* unilateral and arcuate, 30–38 mm long, well exserted from tube; anthers 7–10 mm long, purple-black. *Style* dividing near apex of anthers, branches ± 4 mm long. *Capsules* fusiform, 25–35 × 8 mm. *Seeds* nearly linear, 9–15 × 1.5–2.0 mm, 2-winged with distal wing largest. *Flowering time*: November to December or February at high elevations.

Distribution and ecology: widely distributed through southern and southeastern South Africa, from the Cederberg in Western Cape to the Cape Peninsula thence eastward along the coastal ranges through Eastern Cape to near Underberg in southern KwaZulu-Natal; in marshes and seeps and along streams.

Diagnosis: diagnosed by the lanceolate leaves without strongly thickened midrib and margins, the branched



Distribution of ***Watsonia angusta***.



Distribution of ***Watsonia tabularis***.

spike with relatively short bracts 9–14(–16) mm long, and long-tubed red flowers with narrow tepals 4–8(–10) mm wide, and fusiform capsule 25–35 mm long. *Watsonia stokoei*, with remarkably similar flowers, has small, obovoid capsules up to 10 mm long containing angular seeds only 5 mm long. *Watsonia zeyheri*, also with fusiform capsules, has the upper part of the perianth tube 16–20 mm long, and broader, slightly cupped tepals 8–11 mm wide.

Ser. **Watsonia**

Stems often branched; bracts moderately large to large and relatively broad, often more than 15 mm long, inner often as long as or longer. *Capsules* obovoid, large and often somewhat inflated. *Seeds* 2-winged, or distally 1-winged, or circumferentially winged.

44. **Watsonia tabularis** *J.W.Mathews & L.Bolus* in Bolus, Annals of the Bolus Herbarium 3: 141 (1922). Type: South Africa, [Western Cape], Table Mtn. and Klaasenbosch, *Mathews s.n.* (BOL [5193], lecto., designated by Goldblatt: 112 (1989); BM, BOL, PRE, isolecto.).

Watsonia tabularis var. *concolor* G.J.Lewis in Barker et al.: 34 (1948). Type: South Africa, [Western Cape], Redhill, *Salter 1896* (SAM, lecto., designated by Goldblatt: 112 (1989); BOL, K, SAM, isolecto.).

[*Watsonia tabularis* Eckl.: 35 (1827), invalid name without description.]

Plants 900–1 500 mm high. *Corm* depressed-globose, 40–60 mm diam.; tunics coarsely netted. *Stem* branched. *Leaves* several, lower ± basal, uppermost leaf partly sheathing stem, ± half as long as spike, lanceolate, 20–35 mm wide, midrib and margins lightly thickened and hyaline; bract-like cauline leaves 80–200 mm long, conspicuously inflated, sheathing. *Spike* 20- to 30-flowered; bracts herbaceous and usually reddish, dry and brownish apically, 10–15 mm long, inner as long as or slightly longer, forked apically for up to 3 mm. *Flowers* zygomorphic, reddish to pinkish orange with paler, nearly white inner tepals, often white at base of tepals and in tube; perianth tube with lower part 20–25 mm long, emerging 10–18 mm from bracts, upper part horizontal, subcylindric, 20–25 mm long, 7–9 mm diam. at mouth; tepals oblanceolate, 20–26 × 9–17 mm, all suberect with dorsal somewhat hooded and lower median slightly recurved. *Filaments* unilateral and arcuate, 35–40 mm long, well exserted from tube; anthers 10–12 mm long, violet. *Style* dividing between middle and apex of anthers, branches ± 6 mm long. *Capsules* large, oblong-truncate, 20–30 × 8–11 mm. *Seeds* 9–11 × 2.5–3.5 mm, with lateral wing enlarged distally and ± twice as long as seed body. *Flowering time*: late November to January (March).

Distribution and ecology: a narrow endemic of Western Cape, South Africa, restricted to the mountains and adjacent flats on the Cape Peninsula; on rocky sandstone slopes and plateaus, from near sea level to 900 m elevation, flowering best after fire.

Diagnosis: readily distinguished from other species with similar, long-tubed orange flowers by the strongly inflated cauline bract leaves and the large, oblong-truncate capsules 20–30 mm long. The floral bracts are relatively short, 10–15 mm long, with the inner as long as or slightly longer and forked apically for up to 3 mm.

Plants from Table Mountain to Vlakkenberg have the inner tepals markedly paler than the outer, almost white but populations from Vlakkenberg to Kalk Bay have more uniformly coloured flowers.

45. **Watsonia meriana** *(L.) Mill.*, Gardener's Dictionary, edn. 8: no. 1 (1768). *Antholyza meriana* L.: 863 (1759). *Gladiolus merianus* (L.) Thunb.: 14 (1784). *Ixia meriana* (L.) Link: 52 (1821). *Gladiolus amoenus* Salisb.: 39 (1796), illegitimate superfluous name for *A. meriana* L. Type: South Africa, without precise locality or collector, illustration in Trew, Plantae selectae: t. 40 (1754).

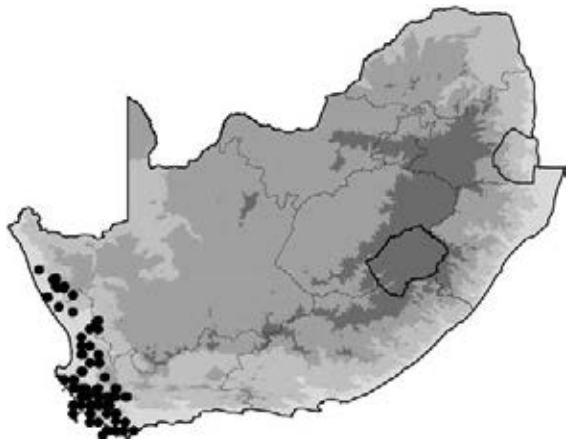
Gladiolus infundibuliformis Schrank: 198 (1822). Type: Unknown, possibly at BR.

Watsonia vivipara J.W.Mathews & L.Bolus in Bolus: 117 (1927). Type: South Africa, [Western Cape], near Montagu, *Compton & Cook fl. 1925* (BOL [*Nat. Bot. Gard. 1894/23I*], lecto., designated by Goldblatt: 94 (1989); BOL, K [fragment], isolecto.).

Watsonia leipoldtii L.Bolus: 328 (1932). Type: South Africa, [Western Cape], Worcester, wet sites between Brandvlei and Villiersdorp, *Leipoldt s.n.* (BOL [*Nat. Bot. Gard. 4312/14*], lecto., designated by Goldblatt: 94 (1989); BOL, isolecto.).

Plants 500–2 000 mm high. *Corm* depressed-globose, 30–50 mm diam.; tunics coarsely netted. *Stem* simple or usually with a few suberect or diverging branches, sometimes with 1 to several cormlets in axils of lower leaves and branches, or at the spike nodes (var. *bulbillifera*). *Leaves* 4 to 6, lower 3 or 4 ± basal, uppermost leaf partly or entirely sheathing stem, ± half as long as spike, lanceolate, 12–25(–35) mm wide, midrib and margins lightly to moderately thickened and hyaline; bract-like cauline leaves 2 or more, progressively smaller above, sheathing. *Spike* up to 25-flowered; bracts herbaceous and usually reddish, dry and brownish above, (18–)24–30 mm long, inner as long as or slightly longer, acute or barely forked apically. *Flowers* zygomorphic, usually orange or red, sometimes pink or purple (rarely yellow mutants recorded); perianth tube with lower part 22–25 mm long, emerging shortly from bracts, upper part horizontal, subcylindric, 20–25 mm long, (4–)5–6 mm diam. at mouth, usually with longitudinal ridges between filament bases; tepals oblanceolate to obovate, 21–26 × 8–15 mm, all widely spreading or dorsal somewhat hooded. *Filaments* unilateral and arcuate, 35–45 mm long, well exserted from tube; anthers 8–10(–12) mm long, violet. *Style* dividing near between middle of anthers, branches 6–7 mm long. *Capsules* large, elongate-oblong, 22–30 × 7–9 mm. *Seeds* (10–)15–18 × 2–4 mm, with distal wing well developed and pale. *Flowering time*: mainly September to November.

Distribution and ecology: widespread along the southwest coast and adjacent interior of South Africa, on the Kamiesberg in Northern Cape and from the Bokkeveld Escarpment in Western Cape to Bredasdorp in the south; usually in seasonally wet situations, vleis and along streams, in sandy soils.



Distribution of ***Watsonia meriana***.

Diagnosis: distinguished from other species with similar flowers by its large stature and relatively long, herbaceous bracts, (18–)24–30 mm long, the inner as long or slightly longer and acute or barely forked apically. The bracts remain relatively soft in texture and do not turn dark brown on drying. The capsules are large and leathery, 22–30 mm long. *Watsonia coccinea* is a shorter species up to 400 mm tall, often unbranched, with narrower leaves mostly 2–8 mm wide and slightly smaller flowers, the filaments 25–30 mm long.

Key to varieties

1a Plants sometimes developing clusters of cormlets in leaf or branch axils but never at spike nodes, developing capsules after pollination .... 45a. var. *meriana*
1b Plants developing clusters of cormlets in leaf and branch axils and at floral nodes, never developing capsules..... 45b. var. *bulbillifera*

45a var. **meriana**

Plants sometimes developing clusters of cormlets in leaf or branch axils but never at floral nodes, developing capsules after pollination. Fertile diploids *2n* = 18.

45b. var. **bulbillifera** *(J.W.Mathews & L.Bolus) D.A.Cooke* in Journal of the Adelaide Botanical Garden 18: 6 (1998). *Watsonia bulbillifera* J.W.Mathews & L.Bolus in Bolus: 140 (1922). Type: South Africa, [Western Cape], Joostenberg, without collector (BOL [*Nat. Bot. Gard. 707/13*], lecto., designated by Goldblatt: 94 (1989); B, M, BOL, K, PRE, SAM, isolecto.).

Plants developing clusters of cormlets in leaf and branch axils and at floral nodes, never developing capsules. Sterile triploids *2n* = 27.

Distribution and ecology: recorded from a few localities in the Breede River Valley and on the flats around Cape Town, notably Joostenberg and Kenilworth Race Course, in seasonal vleis, forming dense and sometimes extensive stands due to its exceptional capacity for vegetative reproduction. It is a weed in Australia, Mauritius and Réunion (Goldblatt 1989).

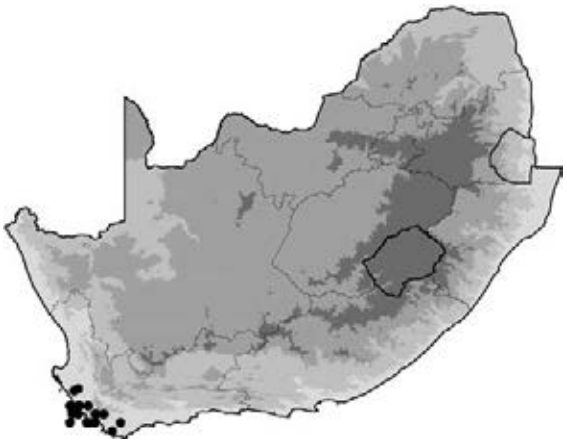
46. **Watsonia coccinea** *(Herb. ex Baker) Baker*, Handbook of the Irideae: 175 (1892). *Watsonia meriana* var. *coccinea* Herb. ex Baker: 158 (1877). Type: South Africa, without precise locality or collector, illustration in Ker Gawl. in Curtis's Botanical Magazine 30: t. 1194 (1809b) '*Watsonia meriana* var. γ.

[*Watsonia merianella* Eckl.: 36 (1827), invalid name without description.]

Plants 150–300(–450) mm high. *Corm* depressed-globose, 18–40 mm diam.; tunics coarsely netted. *Stem* simple or rarely with 1 or 2 suberect branches. *Leaves* 4 to 6, lower 3 or 4 ± basal, uppermost leaf partly or entirely sheathing stem, ± half as long or as long as spike, linear to linear-lanceolate, 2–8 mm wide, midrib and margins lightly thickened and hyaline; bract-like cauline leaves 2 or more, sheathing. *Spike* 3- to 6-flowered; bracts herbaceous and green, dry and brownish apically, 20–25 mm long, inner ± as long as or slightly longer or shorter, barely forked apically. *Flowers* zygomorphic, dull to bright scarlet, purple or translucent pink; tepals usually with dark median line; perianth tube with lower part 20–24 mm long, emerging shortly from bracts, upper part ascending to horizontal, subcylindric, 18–24 mm long, 5–6 mm diam. at mouth; tepals obovate, 16–23 × 8–12 mm, all widely spreading or dorsal somewhat hooded. *Filaments* unilateral, arcuate, 25–30 mm long, well exserted from tube; anthers 5–8 mm long, violet. *Style* dividing between middle and apex of anthers, branches ± 5 mm long. *Capsules* large, often somewhat inflated, narrowly obovoid-ellipsoid, 20–25 × 10–14 mm. *Seeds* 8–12 mm long, either 2-winged or with large asymmetrical circumferential wing. *Flowering time*: August to November.

Distribution and ecology: restricted to the extreme southwestern part of Western Cape, from Malmesbury to the Cape Peninsula to Bredasdorp, on moist sandy flats or plateaus, often in seeps, flowering best after fire. The species is threatened by urban development.

Diagnosis: distinguished from other species with similar flowers by its short stature, mostly less than 400 mm high, and relatively long, herbaceous bracts, 20–25 mm long, the inner as long or slightly longer than the outer and barely forked apically. The bracts remain relatively soft in texture and do not turn dark brown on drying. The capsules are large and leathery, 20–25 mm long. *Watsonia meriana* is a larger species, 500–2 000 mm tall, usually branched, with broader leaves 12–35 mm wide and slightly longer flowers, the filaments 35–45 mm long. *Watsonia humilis* has white to pink flowers with relatively short filaments 10–20 mm long included or scarcely exserted from the tube.



Distribution of ***Watsonia coccinea***.

47. **Watsonia humilis** *Mill.*, Gardener's Dictionary, edn. 8: 2 (1768). Type: South Africa, without precise locality or collector, illustration in Miller, Figures of plants described in the Gardener's Dictionary 2: t. 297, f. 2 (1760).

Gladiolus marmoratus Lam.: 727 (1788). *Peyrousia marmorata* (Lam.) Poir.: 364 (1826). *Lapeirousia marmorata* (Lam.) Steud.: 9 (1840b). Type: South Africa, without precise locality, *Sonnerat s.n.* (P-Herb. Lamarck, holo.).

Gladiolus roseoalbus Jacq.: 7 (1797). *Watsonia roseoalba* (Jacq.) Ker Gawl.: t. 537 (1801b). *W. meriana* var. *roseoalba* (Jacq.) Baker: 158 (1877). Type: South Africa, without precise locality or collector, illustration in Jacq.: 7 (1797).

Watsonia litura Klatt: 353 (1882). Type: South Africa, without precise locality or collector, illustration in Curtis's Botanical Magazine 30: t. 1193 (1809a) '*Watsonia roseo-alba* β'.

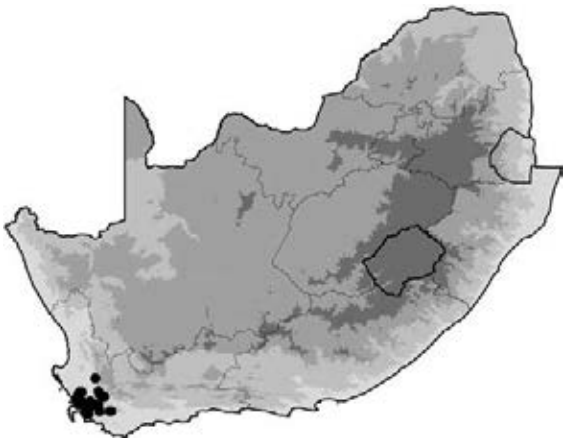
Watsonia maculata Klatt: 352 (1882). Type: South Africa, without precise locality or collector, illustration in Ker Gawl. in Curtis's Botanical Magazine 30: 1195 (1809c) '*Watsonia humilis* β'.

[*Watsonia erubescens* Banks ex Ker Gawl.: t. 631 (1803), invalid name cited as a synonym of *W. laccata* (Jacq.) Ker Gawl.]

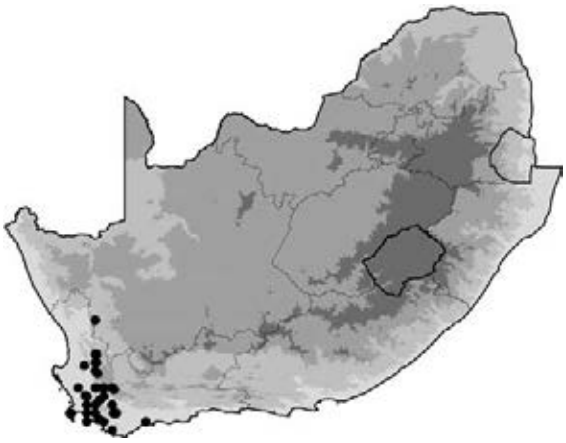
[*Neuberia humilis* Eckl.: 37 (1827), name without description.]

Plants (100–)150–300 mm high. *Corm* subglobose, 10–20 mm diam.; tunics finely netted. *Stem* simple or rarely with 1 suberect branch. *Leaves* 5 or 6, lower 4 or 5 basal, uppermost partly or entirely sheathing stem, ± ½ as long as spike, lanceolate, 8–14 mm wide, midrib and margins not thickened; bract-like cauline leaves 1 or 2, sheathing. *Spike* 6- to 12-flowered; bracts herbaceous and green, sometimes reddish above, recurved apically, (15–)20–30 mm long, inner ± ⅔ as long, forked apically. *Flowers* zygomorphic, white flushed pink with pink tube or pale to deep pink; perianth tube with lower part (13–)17–30 mm long, included to well exserted from bracts, upper part ascending or horizontal to slightly drooping, subcylindric, (13–)17–30 mm long, ± 5 mm diam. at mouth; tepals oblanceolate to obovate, 15–22 × 7–12 mm, all widely spreading. *Filaments* unilateral, arcuate, (10–)15–20(–22) mm long, not or barely exserted up to 5 mm from tube; anthers 5–7 mm long, dark blue or violet. *Style* dividing between middle and apex of anthers, branches 3–4 mm long. *Capsules* oblong, 15–20 mm long. *Seeds* 8–12 mm long, 2-winged with distal wing largest or proximal wing vestigial. *Flowering time*: late September to November.

Distribution and ecology: restricted to the lowlands in the extreme southwestern part of Western Cape, South



Distribution of ***Watsonia humilis***.



Distribution of ***Watsonia spectabilis***.

Africa, from Malmesbury to Gordon's Bay inland to Worcester but absent from the Cape Peninsula; on seasonally wet sandy flats and lower slopes. The species is threatened by urbanisation.

Diagnosis: distinguished by its short stature, up to 300 mm high, relatively long, herbaceous bracts, (15–)20–30 mm long and recurved apically, and moderately to long-tubed, white to pink flowers with relatively short filaments, 10–20 mm long, not or shortly exserted up to 5 mm from the perianth tube. The bracts remain relatively soft in texture and do not turn dark brown on drying. *Watsonia coccinea* has red to pink flowers with longer filaments, 25–30 mm long, well exserted from the perianth tube, and narrower leaves 2–8 mm wide. *Watsonia stenosiphon* from east of Gordon's Bay also has flowers with short filaments 15–20 mm long but an orange to salmon-pink perianth, and the bracts are not recurved apically.

48. **Watsonia spectabilis** *Schinz* in Memoires de l'Herbier Boissier 20: 14 (1900). Type: South Africa, [Western Cape], Sir Lowry's Pass, *Schlechter 1127c* (Z, holo.).

[*Watsonia pellucida* Eckl.: 36 (1827), invalid name without description.]

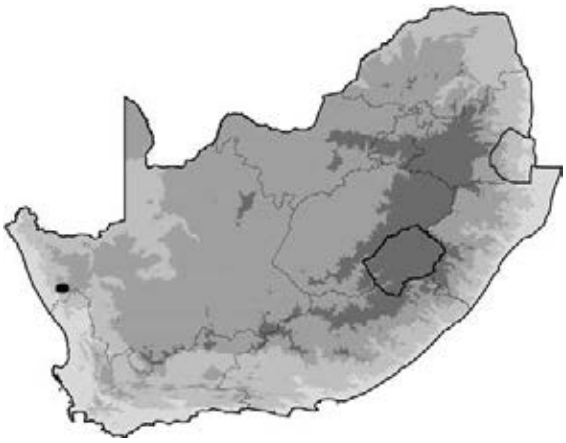
Plants 200–500 mm high. *Corm* subglobose, 20–30 mm diam.; tunics coarsely netted. *Stem* usually simple. *Leaves* 3 to 5, lower 2 to 4 basal, upper leaf partly or entirely sheathing stem, reaching to base of spike or longer, linear to narrowly lanceolate, 2–8 mm wide, midrib lightly thickened but margins not thickened; bract-like cauline leaves 1 to 3, progressively shorter, sheathing. *Spike* 2- to 5(10)-flowered; bracts herbaceous, green or flushed red, 20–40 mm long, inner ± as long or slightly longer, minutely forked apically. *Flowers* zygomorphic, bright red to pale orange, often translucent; perianth tube with lower part 18–22 mm long, not exserted from bracts, upper part horizontal, widening abruptly, subcylindric, 20–25 mm long, slightly compressed, oblique, up to 11 mm diam. at mouth; tepals lanceolate, acute, 30–35 × 7–12 mm, upper tepals connate ± 3 mm beyond lower, dorsal tepal hooded, upper laterals weakly spreading and lower tepals strongly recurved. *Filaments* unilateral and arcuate, 30–40 mm long, well exserted from tube; anthers 9–11 mm long, yellow or violet. *Style* dividing near anther apices, branches 5–6 mm long. *Capsules* large, obovoid to subglobose, 25–30 × 20–30 mm. *Seeds* 9–12 × 4 mm, with large pale wing, sometimes vestigial proximally. *Flowering time*: (July) August to October.

Distribution and ecology: widely distributed along the western near interior of Western Cape, South Africa, from the Bokkeveld Escarpment to Bredasdorp and Potberg; on seasonally moist, stony sandstone flats and slopes. The species is extinct on the Cape Peninsula.

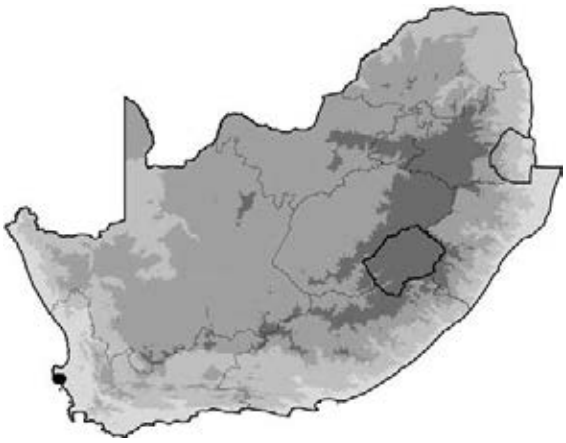
Diagnosis: a short species up to 500 mm high with bracts 20–40 mm long and large, strongly bilabiate, red to orange flowers with acute tepals 30–35 mm long. The perianth tube is markedly oblique at the mouth, the lower three tepals separating ± 3 mm before the upper three tepals and strongly recurved. *Watsonia coccinea* has slightly shorter bracts 20–25 mm long, and smaller flowers with ± obtuse tepals 16–23 mm long, the lower not strongly recurved, and filaments 25–30 mm long.

49. **Watsonia rourkei** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 19: 132 (1989). Type: South Africa, [Northern Cape], Kamiesberg, Rooiberg, upper slopes, *Rourke 1681* (NBG, holo.; NBG, iso.).

Plants 1 500–2 000 mm high. *Corm* subglobose, 35–50 mm diam.; tunics coarsely netted. *Stem* with 3 or more short branches. *Leaves* 5 or 6, lower 4 or 5 basal, upper partly sheathing stem, ± half as spike, lanceolate, 15–25 mm wide, midrib and margins moderately thickened and hyaline; bract-like cauline leaves sheathing. *Spike* 20- to 30-flowered; bracts herbaceous, dry and brownish apically, acuminate, 15–20 mm long, inner ± ⅔ as long, forked apically up to 2 mm. *Flowers* zygomorphic, pale pink with darker tube, evidently scented;



Distribution of ***Watsonia rourkei***.



Distribution of ***Watsonia hysterantha***.

perianth tube with lower part ± 15 mm long, upper part ascending or horizontal, subcylindric, ± 25 mm long, ± 5 mm diam. at mouth; tepals oblanceolate, 20–22 × 6–8 mm, all widely spreading. *Filaments* unilateral and arcuate, ± 30 mm long, well exserted from tube; anthers 10–12 mm long, yellow. *Style* dividing near apex of anthers, branches 5–6 mm long. *Capsules* and *seeds* unknown. *Flowering time*: probably November.

Distribution and ecology: a narrow endemic known only from the type collection from Rooiberg in the Kamiesberg Mtns in Northern Cape, South Africa, from the northern slopes below the summit at 1 600 m elevation; in gullies and seasonal watercourses.

Diagnosis: a tall species, 1 500–2 000 mm high, with herbaceous bracts 15–20 mm long, and pale pink flowers, the upper part of the perianth tube ± 22 mm long and tepals 20–22 mm long. The yellow anthers are diagnostic. The capsules are unknown. *Watsonia meriana*, the only other species of *Watsonia* recorded on the Kamiesberg, has slightly longer bracts, bracts (18–)24–30 mm long, and reddish orange flowers with tepals 21–26 mm long, and violet anthers.

50. **Watsonia hysterantha** *J.W.Mathews & L.Bolus* in L. Bolus in Annals of the Bolus Herbarium 4: 116 (1927). Type: South Africa, [Western Cape], Olifantskop, Langebaan, *Mathews s.n.* (BOL [*Nat. Bot. Gard. 1723/24*], lecto., designated by Goldblatt: 134 (1989); BOL, isolecto.).

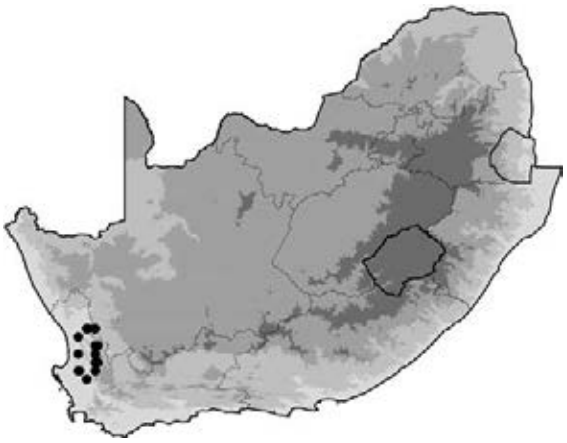
Plants 500–800 mm high. *Corm* subglobose, 40–55 mm diam.; tunics coarsely netted. *Stem* simple. *Leaves* 3 or 4, basal, dry and withered at flowering, ± as long as spike, linear, 4–10 mm wide, midrib and margins lightly thickened; bract-like cauline leaves several, sheathing, dry at flowering. *Spike* laxly up to 10-flowered; bracts herbaceous and green, becoming dry and brownish apically, attenuate, 15–24 mm long, inner ± ⅔ to as long, deeply forked ± halfway. *Flowers* zygomorphic, red; perianth tube with lower part 14–20 mm long, exserted 5–7 mm from bracts, upper part horizontal, subcylindric, ± 25 mm long, ± 6 mm diam. at mouth; tepals oblanceolate, 25–30 × 8–12 mm, all widely spreading or dorsal hooded. *Filaments* unilateral, arcuate, 30–35 mm long, well exserted from tube; anthers 9–12 mm long, violet. *Style* dividing near middle of anthers, branches 6–7 mm long. *Capsules* narrowly obovoid, (18–)25–30 × 10–15 mm. *Seeds* 8–10 × 4–5 mm, with broad distal wing. *Flowering time*: March to July.

Distribution and ecology: a local endemic of the West Coast of Western Cape, South Africa, restricted to coastal granite outcrops between Saldanha and Langebaan; wedged in rock crevices.

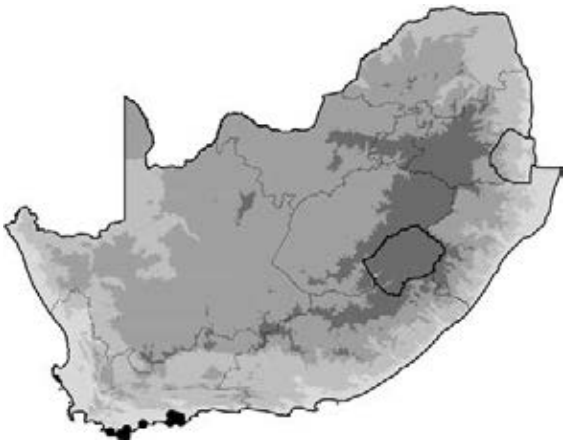
Diagnosis: distinguished from similar species with long-tubed, red flowers by the flowering time, autumn and winter, at which time the foliage is dry and withered, and by the deeply forked inner bracts, divided up to half their length. The leaves are unusually narrow, up to 10 mm wide but usually less.

51. **Watsonia vanderspuyiae** *L.Bolus* in Annals of the Bolus Herbarium 4: 45 (1926). Type: South Africa, [Western Cape], Piketberg Mtn., *Van der Spuy s.n.* (BOL [17838], lecto., designated by Goldblatt: 134 (1989); BOL, isolecto.).

Plants robust, 1 200–2 000 mm high. *Corm* depressed-globose, 60–100 mm diam.; tunics coarsely netted. *Stem* with 2 to 4 stiffly erect branches. *Leaves* 3 or 4, lower 2 or 3 basal, upper leaf partly sheathing stem, one ⅓–½ as long as spike, lanceolate, (33–)55–85 mm wide, midrib poorly defined, margins heavily thickened and hyaline; bract-like cauline leaves 2 or more, inflated, progressively smaller. *Spike* up to 30-flowered; bracts dry, brown and submembranous, becoming lacerate, 25–45 mm long, inner ± ⅔ as long, apically forked for 1–2 mm. *Flowers* zygomorphic, bright red; perianth tube with lower part ± 25 mm long, emerging from bracts, upper part horizontal, subcylindric, ± 25 mm long, ± 6 mm diam. at mouth; tepals narrowly lanceolate to lanceolate, 25–35 × 7–13 mm, uppermost hooded, others spreading or variously recurved. *Filaments* unilateral, arcuate, 30–35 mm



Distribution of ***Watsonia vanderspuyiae***.



Distribution of ***Watsonia fergusoniae***.

long, well exserted from tube; anthers 13–15 mm long, violet. *Style* dividing near apices of anthers, branches ± 6 mm long. *Capsules* oblong to ellipsoid, (24–)30–50 × ± 10 mm. *Seeds* 12–15 × ± 4 mm, with broad distal wing. *Flowering time*: September to November.

Distribution and ecology: endemic to the West Coast of South Africa, extending from the Bokkeveld Escarpment in Northern Cape south through the Matsikamma Mtns and Cederberg to Piketberg, the Cold Bokkeveld and Groot Winterhoek in Western Cape; in crevices in sandstone outcrops, flowering well after fire.

Diagnosis: a particularly robust species readily recognised by its broad leaves, (33–)55–85 mm wide with the midrib poorly defined but the margins heavily thickened, somewhat inflated bract-like cauline leaves, dry, lacerate floral bracts 25–45 mm long and large, long-tubed red flowers, the tube alone up to 50 mm long.

52. **Watsonia fergusoniae** *L.Bolus* in South African Gardening and Country Life 20: 14 (1930a). Type: South Africa, [Western Cape], limestone hills 8 miles from Still Bay, *Ferguson s.n.* (BOL [*BOL19031*], lecto., designated by Goldblatt: 137 (1989); BOL, isolecto.).

Plants (220–)400–1 100 mm high. *Corm* depressed-globose, 25–35 mm diam.; tunics finely netted. *Stem* simple. *Leaves* 2 to 4, ± basal, upper leaf partly sheathing stem, usually reaching to base of spike, linear, 3–7(–14) mm wide, midrib poorly defined and margins not thickened; bract-like cauline leaves 2 or more, sheathing. *Spike* 7- to 18-flowered; bracts green, dry and brown apically, (14–)20–26(–30) mm long, overlapping, ± as long or slightly longer, entire or barely notched apically. *Flowers* zygomorphic, scarlet-red; perianth tube with lower part 17–25 mm long, emerging 3–6 mm from bracts, upper part ascending to horizontal, subcylindric, 20–25(–30) mm long, (4–)6 mm diam. at mouth; tepals obovate, 20–25 × 9–12 mm, spreading widely or slightly cupped. *Filaments* unilateral and arcuate, 25–35 mm long, well exserted from tube; anthers 7–8(–10) mm long, yellow. *Style* dividing between base and middle of anthers, branches 5–7 mm long. *Capsules* narrowly cylindric, 20–25 × 4–6 mm. *Seeds* narrow, 6–9 × ± 2 mm, with broad distal wing and smaller or obsolete proximal wing. *Flowering time*: October to November.

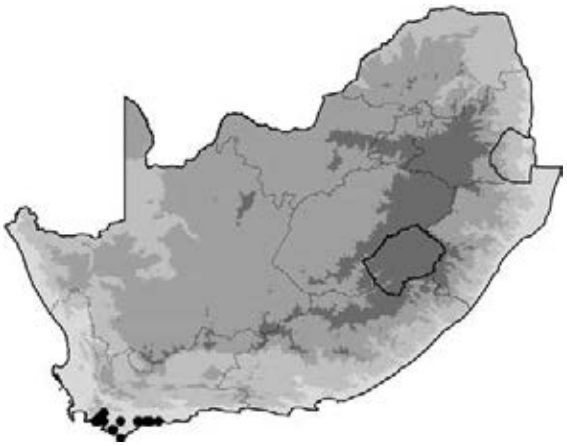
Distribution and ecology: endemic to the Agulhas Plain in Western Cape, South Africa, from the Agulhas Peninsula to Gouritz River Mouth; wedged in limestone outcrops, flowering well only after fire.

Diagnosis: a relatively small species seldom more than 500 mm tall, the leaves with unthickened midrib and margins, green bracts, and scarlet-red flowers with the upper part of the tube 20–25(–30) mm long and (4–) 6 mm diam. at mouth, with filaments 25–35 mm long, and unusual yellow anthers. *Watsonia stenosiphon* from sandstone habitats has the upper part of the tube 13–16 mm long and ± 4 mm diam., and shorter filaments 15–20 mm long, only shortly exserted from the tube.

53. **Watsonia stenosiphon** *L.Bolus* in Annals of the Bolus Herbarium 4: 46 (1926). Type: South Africa, [Western Cape], Caledon Division, without precise locality, ex Cape Town Wild Flower Show (BOL [15458], lecto., designated by Goldblatt: 138 (1989); BOL, K, isolecto.).

[*Watsonia pottbergensis* Eckl.: 36 (1827), invalid name without description; specimen at S.]

Plants 200–450 mm high. *Corm* depressed-globose, 15–20 mm diam.; tunics finely netted. *Stem* simple. *Leaves* 3 or 4, ± basal, uppermost leaf partly or entirely sheathing stem, ± half as long as spike, linear, 5–12 mm wide, midrib poorly defined and margins not or lightly thickened; bract-like cauline leaves 1 or 2, sheathing. *Spike* 8- to 14-flowered; bracts green, dry and brown above, 15–22 mm long, overlapping, ± as long as, shortly notched apically. *Flowers* zygomorphic, bright salmon-orange or rarely mauve, lower 3 tepals often with darker median line toward base; perianth tube with lower part 14–18 mm long, enclosed or emerging 2–5 mm from



Distribution of ***Watsonia stenosiphon***.

bracts, upper part ascending, subcylindric, 13–16 mm long, 4 mm diam. at mouth; tepals obovate, 17–20 × 9–19 mm, spreading widely or slightly cupped. *Filaments* unilateral and arcuate, 15–20 mm long, not or barely exserted from tube; anthers 6–7 mm long, violet or yellow. *Style* dividing between base and middle of anthers, branches 5–7 mm long. *Capsules* narrowly cylindric to prismatic, 15–18 × 2 mm. *Seeds* slender, 7–10 × ± 2 mm, 2-winged. *Flowering time*: mid-September to late October.

Distribution and ecology: endemic to the southwestern coast of Western Cape, South Africa, from Kleinmond to the Agulhas Peninsula and Cape Infanta in the east; on stony sandstone flats and lower slopes, flowering best after fire. The species is especially common between Hermanus and Onrus, but urbanisation here is rapidly encroaching on its habitat.

Diagnosis: a short species, up to 450 mm high, with distinctive, narrow perianth tube 25–34 mm long and ± 4 mm diam. at the mouth, with spreading tepals and filaments 15–20 mm long and barely exserted from the perianth tube. *Watsonia fergusoniae* from limestone habitats is taller, usually more than 400 m high, with larger flowers, the tube 35–50 mm long and mostly ± 6 mm diam. at the mouth, and longer filaments 25–35 mm long well exserted from the perianth tube.

UNCERTAIN SPECIES

Watsonia cylindrica Baker in Journal of Botany, British and foreign 14: 336 (1876). Type: unknown, said to be from Madagascar.

Watsonia fulgens (Andrews) Pers., Synopsis plantarum 1: 42 (1805). *Antholyza fulgens* Andrews, The Botanists' Repository 3: t. 192 (1801b). *Watsonia iridifolia* var. *fulgens* (Andrews) Ker Gawl.: 600 (1802a). *W. fulgida* Salisb.: 323 (1812), illegitimate superfluous name. Type: South Africa, without precise locality or collector, illustration in Andrews, The Botanists' Repository 3: t. 192. Identity uncertain, possibly *W. fourcadei* or *W. wilmaniae*.

Watsonia iridifolia (Jacq.) Ker Gawl. in Curtis's botanical magazine 17: sub t. 600 (1802). *Gladiolus iridifolius* Jacq.: 151 (1791). *Ixia iridifolia* (Jacq.) Link: 52 (1821), illegitimate homonym, not *I. iridifolia* D.Delaroche (1766). *W. meriana* var. *iridifolia* (Jacq.) Baker: 158 (1877). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 234 (1792 [1788–1795]). Identity uncertain, possibly a variant of *W. borbonica* or hybrid with that species.

Watsonia meriana var. *platypetala* Baker, Handbook of the Irideae: 175 (1892). Type: not designated and identity unknown. Said to differ from typical *Watsonia meriana* by its bright rose-red flowers with shorter, broader, somewhat overlapping tepals. Baker's circumscription of the species was very broad and included several taxa now accepted as distinct.

Watsonia stricta Spreng., Novi proventus hortorum academicorum halensis et berolinensis: 43 (1818). *Gladiolus sprengelianus* Schult. in Roemer & Schultes: 296 (1822), as a new name for *W. stricta* Spreng. [not *G. strictus* Jacq.]. Type: unknown. Said by Lewis & Obermeyer (1972) to be *W. strictiflora* Ker Gawl. (1811).

Watsonia vittata J.W.Mathews & L.Bolus in Bolus in Annals of the Bolus Herbarium 4: 25 (1925). Type: South Africa, without precise locality or collector, ex hort. Kirstenbosch [BOL (*BOL32351*), lecto., designated by Goldblatt: 141 (1989); BOL, isolecto.]. Identity uncertain.

Watsonia wordsworthiana J.W.Mathews & L.Bolus in Bolus in Annals of the Bolus Herbarium 4: 26 (1925). Type: South Africa, [Western Cape], Tulbagh, Romans River, ex hort. Kirstenbosch, *Tredgold s.n.* (BOL [*Nat. Bot. Gard. 652/13*], lecto., designated by Goldblatt: 141 (1989); BOL, PRE, isolecto.). Identity uncertain, possibly *W. meriana* or a hybrid.

EXCLUDED SPECIES

Watsonia lamarckii A.Dietr., Species plantarum 2: 570 (1832), illegitimate superfluous name for *Gladiolus spicatus* Lam., Tableau encylopédique et méthodique Botanique 1: 120 (1791). Type: P-Herb. Lamarck. This is a species of Lamiaceae, perhaps *Lavandula*.

REFERENCES

AITON, W. 1789. *Hortus Kewensis*, vol. 1. Nicol, London.

ANDREWS, H.C. 1799. *Antholyza spicata*. Spike-flowered Antholyza. *The Botanist's Repository* 1: t. 56. Bensely, London.

ANDREWS, H.C. 1801a. *Antholyza tubulosa*. Tubular Antholyza. *The Botanists's Repository* 3: t. 174. Bensely, London.

ANDREWS, H.C. 1801b. *Antholyza fulgens*. Refulgent-flowered Antholyza. *The Botanists's Repository* 3: t. 192. Bensely, London.

ANDREWS, H.C. 1803. *Gladiolus pyramidatus*. Pyramidal-spiked Gladiolus. *The Botanists's Repository* 5: t. 335. Bensely, London.

ARDERNE, H.M. 1893. *Watsonia alba*. *The Garden* 63: 229.

ASCHERSON, P.F.A. & GRAEBNER, K.O.R.P.P. 1907. *Synopsis der mitteleuropäischen Flora*, vol. 3.

BAKER, J.G. 1876. New Gladioleae. *Journal of Botany, British and foreign* 14: 333–339.

BAKER, J.G. 1877 ['1878']. Systema Iridacearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell and Co., London.

BAKER, J.G. 1896. Iridaceae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–71. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1901. Beiträge zur Kenntnis der Afrikanischen Flora. Iridaceae. *Bulletin de l'Herbier Boissier*, sér. 2, 1: 862–868.

BAKER, J.G. 1906. Decades Kewensis I. Iridaceae. *Bulletin of Miscellaneous Information Kew* 1906: 22–28.

BARKER, W.F., LEWIS, G.J., LEVYNS, M.R. & MOSS, C.E. 1948. Plantae novae africanae. *Journal of South African Botany* 14: 29–40.

BOLUS, L. 1918. In: Novitates africanae. *Annals of the Bolus Herbarium* 2: 153–162.

BOLUS, L. 1920. In: Novitates africanae. *Annals of the Bolus Herbarium* 3: 1–14.

BOLUS, L. 1921. In: Novitates Africanae. *Annals of the Bolus Herbarium* 3: 70–85.

BOLUS, L. 1922. In: Novitates africanae. *Annals of the Bolus Herbarium* 3: 123–146.

BOLUS, L. 1925. In: Novitates Africanae. *Annals of the Bolus Herbarium* 4: 1–30.

BOLUS, L. 1926. In: Novitates africanae. *Annals of the Bolus Herbarium* 4: 37–55.

BOLUS, L. 1927. In: Novitates africanae. *Annals of the Bolus Herbarium* 4: 69–119.

BOLUS, L. 1929a. In: Plants — New and noteworthy. *South African Gardening and Country Life* 19: 27.

BOLUS, L. 1929b. In: Novitates africanae. *Journal of Botany, British and foreign* 67: 132–139.

BOLUS, L. 1930a. Plants — New and noteworthy. *South African Gardening and Country Life* 20: 14.

BOLUS, L. 1930b. Plants — New and noteworthy. *South African Gardening and Country Life* 20: 63.

BOLUS, L. 1931. Novitates africanae: New Iridaceae. *Journal of Botany, British and foreign* 69: 258–262.

BOLUS, L. 1932. New South African Iridaceae. *Bulletin of Miscellaneous Information Kew* 1932: 326–330.

BOLUS, L. 1933. In: Novitates africanae. *Journal of Botany, British and foreign* 71: 122–125.

BOLUS, L. 1935. In: Plants — New and noteworthy. *South African Gardening and Country Life* 25: 56, 57.

BOLUS, H. & KENSIT, L. 1909. Contributions to the African Flora. *Transactions of the Royal Society of South Africa* 1: 147–163.

BROWN, N.E. 1889. New or noteworthy plants. *The Gardeners' Chronicle*, ser. 3, 6: 350, 351.

BROWN, N.E. 1891. Kew notes. *The Gardeners' Chronicle*, ser. 3, 10: 393, 394.

BROWN, N.E. 1931. Notes upon South African plants XXIX. *Bulletin of Miscellaneous Information Kew* 1931: 191–197.

BURMAN, N.L. 1768. *Flora indica: cui accedit series zoophytorum indicorum, nec non Prodromus florae capensis*. Cornelius Haak, Leiden.

COOKE, D.A. 1998. Bulbil watsonia is a variety of *Watsonia meriana* (L.) Miller (Iridaceae). *Journal of the Adelaide Botanic Garden* 18: 5–7.

DELAROCHE, D. 1766. Descriptiones plantarum aliquot novarum. Verbeek, Leiden.

DIETRICH, A.G. 1832. *Species plantarum 2*: 1–747. Nauck, Berlin.

DURAND, T. & SCHINZ, H. 1894 ['1895']. *Conspectus florae africae*, vol. 5. Jardin botanique de l'Etat, Bruxelles etc.

ECKLON, C.F. 1827. *Topographisches Verzeichnis der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.

FOSTER, R.C. 1936. Notes on nomenclature in Iridaceae. *Contrbutions from the Gray Herbarium of Harvard University* 114: 37–50.

GMELIN J.F. 1791. *Caroli à Linné, Systema naturae*, tome 2(1). Beer, Leipzig.

GOLDBLATT, P. 1971. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460.

GOLDBLATT, P. 1987. Notes on the variation and taxonomy of *Watsonia borbonica* (*W. pyramidata, W. ardernei*) (Iridaceae) in the southwestern Cape, South Africa. *Annals of the Missouri Botanical Garden* 74: 570–572.

GOLDBLATT, P. 1989. The genus *Watsonia*. *Annals of Kirstenbosch Botanic Gardens* 19. National Botanic Gardens, Kirstenbosch.

GOLDBLATT, P. 1991. Nomenclatural notes on African Iridaceae. *South African Journal of Botany* 57: 226.

GOLDBLATT, P. & MANNING, J.C. 2016. *Watsonia palustris* (Iridaceae), a new species from KwaZulu-Natal, South Africa. *South African Journal of Botany* 106: 149–152.

JACQUIN, N.J. 1791 ['1790']. *Collectanea*, vol. 4. C.F. Wappler, Vienna.

JACQUIN, N.J. 1788–1795 ['1786–1793']. *Icones plantarum rariorum*, vol 2. C.F. Wappler, Vienna.

JACQUIN, N.J. 1797. *Plantarum rariorum horti caesari schoenbrunnensis*, vol 1. C.F. Wappler, Vienna.

KER GAWLER, J.B. 1801a. *Watsonia aletroides*. Aletris-like Watsonia. *Curtis's Botanical Magazine* 15: t. 533.

KER GAWLER, J.B. 1801b. *Watsonia roseo-alba*. Long-tubed Watsonia. *Curtis's Botanical Magazine* 15: t. 537.

KER GAWLER, J.B. 1802a. *Watsonia iridifolia* var. *fulgens*. Scarlet Flag-leaved Watsonia. *Curtis's Botancial Magazine* 17: t. 600.

KER GAWLER, J.B. 1802b. *Watsonia brevifolia*. Short-leaved Watsonia. *Curtis's Botancial Magazine* 17: t. 601.

KER GAWLER, J.B. 1802c. *Watsonia marginata*. Long-spiked Watsonia. *Curtis's Botanical Magazine* 17: t. 608.

KER GAWLER, J.B. 1803. *Watsonia humilis*. Lake-coloured Watsonia. *Curtis's Botanical Magazine* 17: t. 631.

KER GAWLER, J.B. 1804 ['1805']. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.

KER GAWLER, J.B. 1809a. *Watsonia roseo-alba* var. β. Variegated Long-tubed Watsonia. *Curtis's Botanical Magazine* 30: t. 1193.

KER GAWLER, J.B. 1809b. *Watsonia meriana* var. γ. Largest Merian's Watsonia, or Scarlet Tuberose. *Curtis's Botanical Magazine* 30: t. 1194.



Plate 8: A, ***Watsonia aletroides***, Riversdale, WC; B, ***W. amatolae***, Amatola Mnts, EC; C, ***W. coccinea***, Cape Peninsula, WC; D & E, ***W. borbonica*** subsp. ***borbonica***, Cape Peninsula, WC; F & G, ***W. confusa***, Maclear, EC.

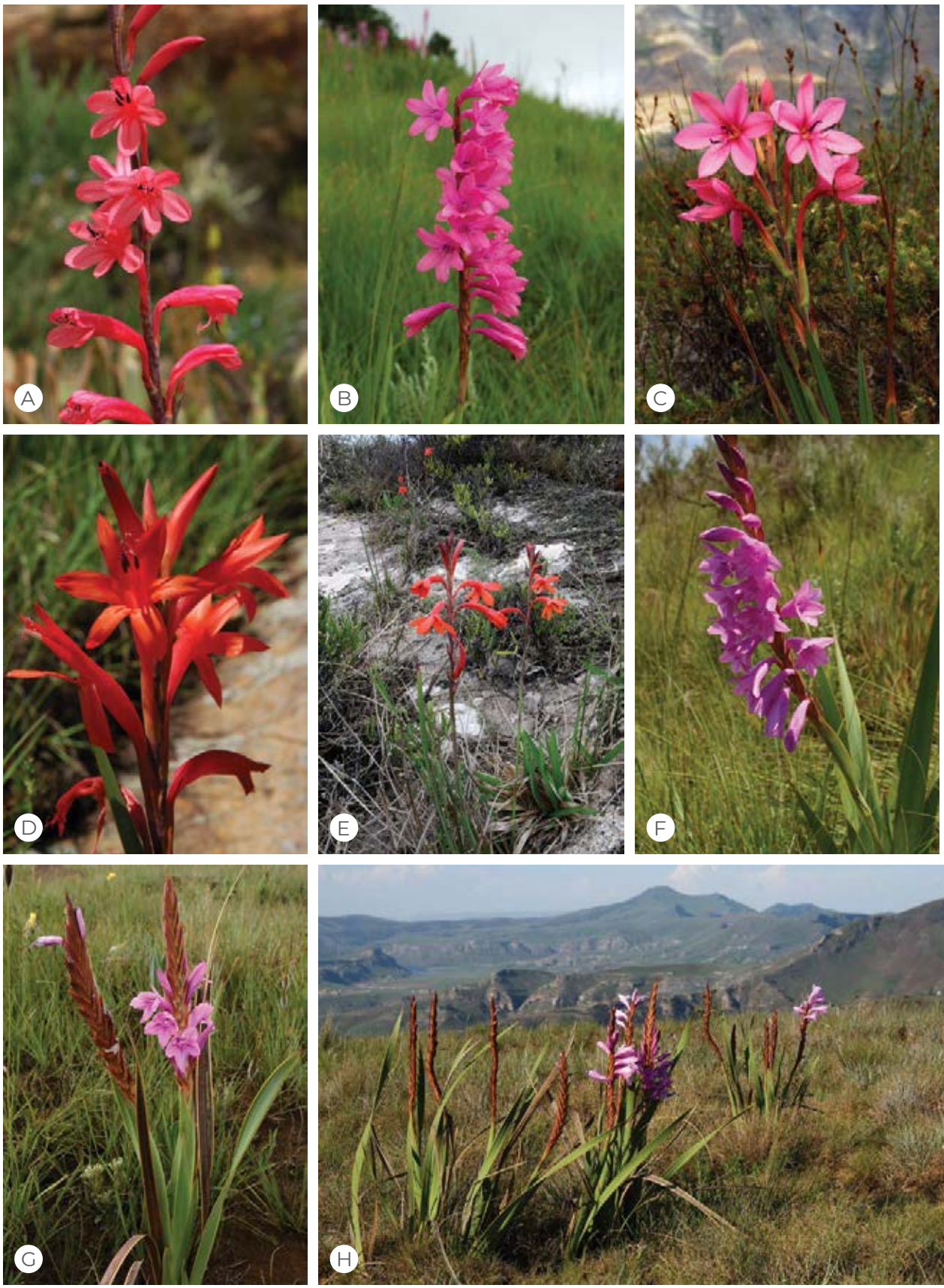


Plate 9: A, ***Watsonia comptonii***, Swartberg Pass, WC; B, ***W. densiflora***, Nottingham Road, KZN; C, ***W. dubia***, Hermon, WC; D, ***W. gladioloides***, Maclear, EC; E, ***W. hysterantha***, Langebaan, WC; F, ***W. pulchra***, Lydenburg, MP; G & H, ***W. lepida***, Witsieshoek, FS.













Plate 10: A, ***Watsonia meriana*** var. ***meriana***, Cape Peninsula, WC; B, ***W. meriana*** var. ***meriana***, Simonstown, WC; C & D, ***W. pillansii***, Sani Pass, KZN; E, ***W. schlechteri***, Wellington, WC; F, ***W. schlechteri***, Grabouw, WC.

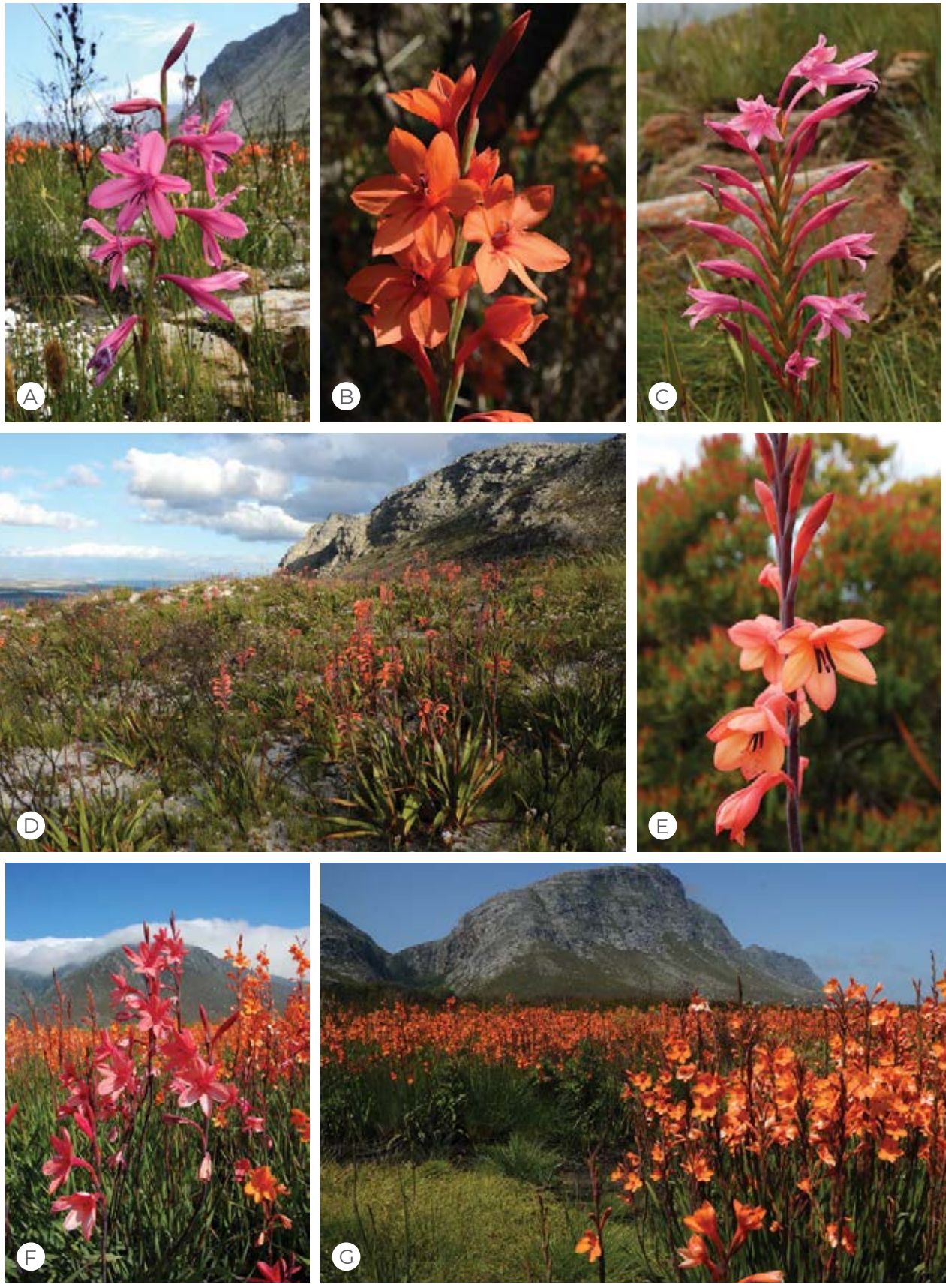


Plate 11: A, ***Watsonia rogersii***, Kogelberg, WC; B, ***W. stenosiphon***, Hermanus, WC; C, ***W. wilmsii*** Lydenburg, MP; D, ***W. tabularis***, Silvermine, Cape Peninsula, WC; E, ***W. tabularis***, Table Mt, WC; F, ***W. zeyheri*** ,Villiersdorp, WC; G, ***W. zeyheri***, Betty's Bay, WC.

KER GAWLER, J.B. 1809c. *Watsonia humilis* var. β. Larger Lake-coloured Watsonia. *Curtis's Botanical Magazine* 30: t. 1195.
KER GAWLER, J.B. 1811. *Watsonia strictiflora*. *Curtis's Botanical Magazine* 34: t. 1406.
KER GAWLER, J.B. 1813. *Watsonia marginata* var. *minor*. *Curtis's Botanical Magazine* 37: t. 1530.
KLATT, F.W. 1864. Revisio Iridearum. *Linnaea* 32: 689–784.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
LAMARCK, J.B.A.P.M. de. 1786–1788. *Encyclopédie méthodique. Botanique*, vol. 2. Panckoucke, Paris.
LAMARCK, J.B.A.P.M. de. 1791–1792. *Tableau encyclopédique et méthodique Botanique*, vol. 1. Pancoucke, Paris.
LEWIS, G.J. 1938. *Watsonia alpina* G.J.Lewis. *Flowering Plants of South Africa* 18: t. 689.
LEWIS, G.J. & OBERMEYER, A.A. 1972. A revision of the South African species of *Gladiolus*. *Journal of South African Botany* Suppl. 10: 1–316.
LINK, J.H.F. 1821. *Enumeratio plantarum horti berolinensis altera*, part 1. Reimer, Berlin.
LINNAEUS, C. 1759. *Systema naturae*, edn. 10, vol. 2. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 ('1781'). *Supplementarum plantarum*. Orphanotropheus, Braunschweig.
MANNING, J.C., GOLDBLATT, P. & WINTER, P.J.D. 1999. Two new species of *Gladiolus* (Iridaceae: Ixioideae) from South Africa and notes on long-proboscid fly pollination in the genus. *Bothalia* 29: 217–223.
MILLER, P. 1760. *Figures of plants described in the Gardener's Dictionary*. London.
MILLER, P. 1768. *The Gardener's Dictionary*, edn. 8. London.
OBERMEYER, A.A. 1962. Notes and new records of African plants: Iridaceae. *Bothalia* 8: 115, 116.
PERSOON, C.H. 1805. *Synopsis plantarum*, vol. 1. Cramer, Paris.
PHILLIPS, E.P. 1917. Contributions to the Flora of South Africa. *Annals of the South African Museum* 9: 337–353.
POIRET, J.L.M. 1826. In F. Cuvier (ed), *Dictionnaire des sciences naturelles dans lequel on traite méthodiquement des differents étres de la nature*, vol. 39.
POTGIETER, C.J. & JOHNSON, I.M. 2018. *Watsonia vicschuettei* (Iridaceae, Watsonieae), a replacement name for the illegitimate *Watsonia palustris*. *Phytotaxa* 364: 209, 210.
POURRET, P.A. 1788. Description de deux genres de la famille des Liliacées, désignés sous le nom de *Lomenia* et de *Lapeirousia*. *Histoire et Mémoires de l'Académie Royale des Sciences, Toulouse* 3: 73–82.
REDOUTÉ, P.J. 1812. *Les Liliacées*, vol. 7. Didot Jeune, Paris.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium secundum*, vol. 1. J.G. Cotta, Stuttgart.
ROEMER, J.J. & SCHULTES, J.A. 1822. *Mantissa in volumen primum systematis vegetabilium secundum*. J.G. Cotta, Stuttgart.
SALISBURY, R.A. 1796. *Prodromus strirpium in horto ad Chapel Allerton vigentium*. London.
SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.
SANDER, T.W. 1897. New Plants for 1897.
SCHINZ, H. 1900. Beiträge zur Kenntnis der Afrikanischen Flora XII. Iridaceae. *Mémoires de l'Herbier Boissier* 20: 13, 14.
SCHLECHTER, R. 1897. Decades plantarum novarum Austro-africanum. *Journal of Botany, British and foreign* 35: 218–222.
SCHRANK, F. de P von. 1822. *Commentarius in Irideas capenses. Denkschriften Königlich-Baierischen Botanischen Gesellschaft in Regensburg* 2: 165–224.
SPRENGEL, K. 1818. *Novi proventus hortorum academicorum halensis et berolinensis*. Gebauer & Son, Halle.
STEUDEL, E.G. 1840a. *Nomenclator botanicus*, edn. 2, vol. 1. J.G. Cotta, Stuttgart & Tübingen.
STEUDEL, E.G. 1840b. *Nomenclator botanicus*, edn. 2, vol. 2(8). J.G. Cotta, Stuttgart & Tübingen.
THUNBERG, C.P. 1784. *Dissertatio de Gladioli*. Edman, Uppsala.
THUNBERG, C.P. 1800. *Prodromus plantarum capensium*, part. 2: 85–191. Edman, Uppsala.
TREW, C.J. 1754. *Plantae selectae*, vol. 11. Nuremburg.
TUBERGEN, C.G. van. 1894. Home correspondence. *Watsonia obrienii*. *The Gardeners Chronicle*, ser. 3, 16: 701.
VAHL, M. 1805. *Enumeratio plantarum*, vol. 2. Moller & fil. Copenhagen.

7. Pillansia

Pillansia *L.Bolus* in Annals of the Bolus Herbarium 1: 20 (1914). Type: *P. templemannii* (Baker) L.Bolus

[*Wredowia* Eckl.: 16 (1827), invalid name without description]

Revisionary account: Obermeyer: t. 1381 (1962).

Honouring the South African botanist, N.S. Pillans (1884–1964), who collected the species and drew the plant to the attention of L. Bolus.

Evergreen geophyte. *Corm* depressed-globose, axillary in origin, past season's corms not resorbed; tunics coarsely fibrous. *Cataphylls* 2 or 3, leathery and brownish. *Stem* aerial, erect, repeatedly branched above, 2-angled or narrowly winged below, inflorescence axis often sparsely warty. *Leaves* several, unifacial, leathery and closely sclerotic, without evident main vein, lowermost leaf longest, linear, twisted, sometimes trailing, with 3 or 4 progressively smaller ± sheathing cauline leaves, dry and brown; margins simple, without vascular bundle, epidermis unspecialised. *Inflorescence* panicle-like, much-branched, with a solitary, sessile flower terminal on each axis; bracts leathery, green with reddish brown margins, glutinous inside, inner ± as long as outer and similar in texture, clasping ovary, multinerved and acute. *Flowers* actinomorphic, long-lived, cup-shaped, orange, unscented, not closing at night, with traces of nectar from septal nectaries; perianth tube short, funnel-shaped; tepals subequal, spreading, obovate. *Stamens* symmetrically arranged; filaments inserted just below mouth of perianth tube; anthers suberect or apically incurved, yellow. *Ovary* covered in mucilage from bracts; style filiform, 3-branched distally, branches slender, bifid or divided apically for ¼–⅓ their length, longitudinally folded. *Capsules* subglobose, woody. *Seeds* 1–3 per locule, large, angular with chalazal crest, smooth and shiny, testal cells finely reticulate-foveate. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number x* = 20.

Species 1: coastal mountains of the Caledon District in Western Cape, South Africa, mostly on wetter slopes, flowering after fire.

Readily recognised by the multi-branched, panicle-like inflorescence of bright orange, radially symmetric flowers and the fibrous, strap-like leaves without a main vein. The mucilaginous secretion from the inner epidermis of the paired floral bracts is unique. Although collected in 1827 by C.F. Ecklon who called it *Wredowia* but without formal description, the species was only described by J.G. Baker, who placed it in the genus *Tritonia* due to its radially symmetric, orange flowers. The multibranched inflorescence, leathery floral bracts and divided style branches are anomalous in that genus and it was accordingly removed to the monotypic genus *Pillansia* by L. Bolus (1914), who considered it to be closely allied to *Watsonia*.

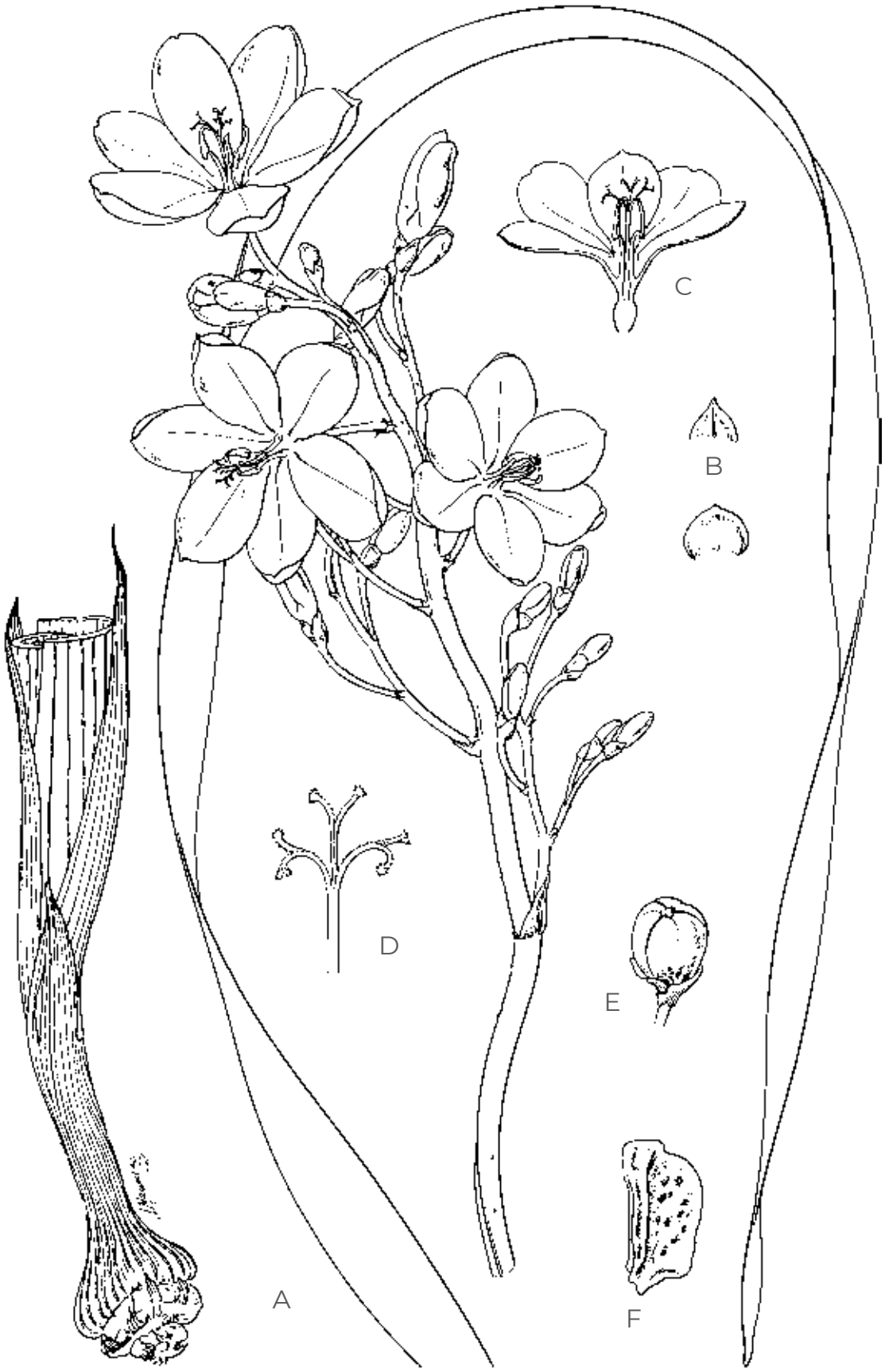
The main vein of the leaves is poorly developed and the species is also highly unusual in Crocoideae in having both a marginal bundle and columnar marginal epidermal cells in the leaf blade, only one or other of which typically occur in other genera of the subfamily. The basic chromosome number, *x* = 20, is polyploid. *Pillansia templemannii* has been regarded as an ancient relict polyploid surviving in local equable sites in the southwestern Cape coastal mountains, and was considered to be close to the ancestral type of Crocoideae and was assigned to its own tribe Pillansieae by Goldblatt (1990). Recent molecular analyses place it within tribe Watsonieae, as sister to *Watsonia*, confirming Bolus's (1914) early hypothesis. The axillary corm development accords with other genera in the tribe and the unusual leaves, inflorescence and flowers are best viewed as specialisations, not primitive in the subfamily, as has sometimes been suggested.

1. **Pillansia templemannii** *(Baker) L.Bolus* in Annals of the Bolus Herbarium 1: 20 (1914). *Tritonia templemannii* Baker: 193 (1892). Type: South Africa, [Western Cape], [Caledon] Zwartberg [Swartberg], *Templemann s.n.* (K, holo.).

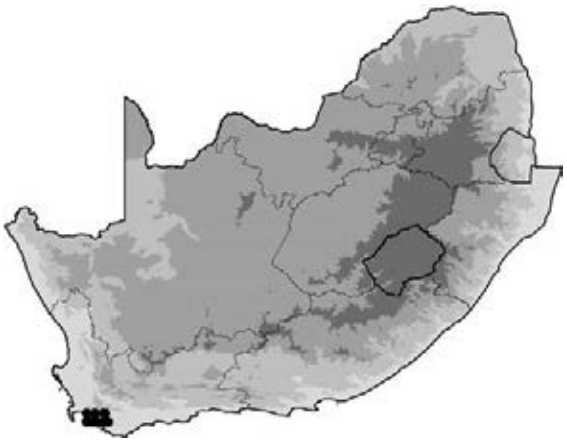
   [*Wredowia pulchra* Eckl.: 16 (1827), invalid name without description.]

   [*Aristea wredowia* Steud.: 130 (1840), invalid name without description.]

Plants 600–800(–1 200) mm high. *Corm* relatively small, 15–25 mm diam., persistent; tunics of coarse, wiry fibres. *Stem* stout, angled or narrowly winged below, many-branched, branches ascending, smooth or warty; stem bracts small, ovate to lanceolate, dry, brown and papery. *Leaves* 4 or 5, lowermost longest, linear or strap-like, 45–120 × 6–10 mm, suberect or trailing, twisted, leathery and sclerotic, closely veined with main vein obscure, remaining leaves cauline, progressively smaller, upper 2 or 3 entirely sheathing, dry and dark reddish brown. *Inflorescence* multibranched, terminal branches ascending, 1-flowered, smooth or warty; bracts broadly to transversely ovate, 5–8 mm long, acute or apiculate, leathery and green below or entirely dark brown with narrow, membranous margins, inner ± as long as outer and similar in texture, multinerved and clasping ovary, both mucilaginous on inner surfaces. *Flowers* suberect or slightly nodding, cup-shaped, bright orange, unscented, firm-textured; perianth tube funnel-shaped, 5–7 mm long; tepals suberect below then spreading, obovate, subequal or inner slightly broader, 20–30 ×



Pillansia templemannii: A, corm, leaf and inflorescence; B, outer bract (bottom) and inner bract (top); C, half-flower; D, detail of style branches; E, capsule; F, seed.



Distribution of ***Pillansia templemannii***.

7–15(–20), obtuse, weakly cupped. *Filaments* erect or curved outward above, 8–10 mm long; anthers 7–8 mm long, yellow. *Style* dividing opposite anthers, branches 5–8 mm long, forked at tips or divided up to ⅓. *Capsules* subglobose to obovoid, woody, 12–20 × 10–12 mm. *Seeds* ± 8 mm long, reddish brown. *Flowering time*: October to November.

Distribution and ecology: a local endemic of the south-western coastal mountains of Western Cape, South Africa, from Kogelberg to the Klein River Mtns; on cooler south-facing sandstone slopes and sandy flats, mostly 300–700 m elevation but also at lower altitudes near the coast, flowering only after fire.

Diagnosis: the evergreen habit with solitary, fibrous, strap-like basal leaf and panicle-like inflorescence of thick-textured, radially symmetric, orange flowers are highly distinctive. The floral bracts are small and leathery, glutinous on their inner surface, and the style branches are divided up to one third their length. Preliminary observations suggest that the bright orange flowers are pollinated mainly by pollen-collecting bees but also by hopliine beetles.

REFERENCES

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell and Co., London.

BOLUS, L. 1914. In: Novitates Africanae. *Annals of the Bolus Herbarium* 1: 20, 21.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.

GOLDBLATT, P. 1990. Phylogeny and classification of Iridaceae. *Annals of the Missouri Botanical Garden* 77: 607–627.

OBERMEYER, A.A. 1962. *Pillansia templemannii*. *Flowering Plants of South Africa* 35: t. 1381.

STEUDEL, E.G. 1840. *Nomenclator botanicus*, edn. 2, vol. 1. J.G. Cotta, Stuttgart & Tübingen.



Plate 12: A & B, ***Pillansia templemannii***, Kogelberg, WC .

8. Thereianthus

Thereianthus *G.J.Lewis* in Journal of South Africa Botany 7: 33 (1941). Lectotype: *T. spicatus* (L.) G.J.Lewis, designated by Goldblatt & Manning: 130 (2008).

Beilia Eckl. ex Kuntze: 305 (1898) [*Beilia* Eckl.: 43 (1827), invalid name without description], illegitimate superfluous name for *Paulomagnusia* Kuntze (1891) [= *Micranthus* (Pers.) Eckl., conserved name]. Type: *B. spicata* (L.) Eckl. ex Kuntze = *Thereianthus spicatus* (L.) G.J.Lewis

Watsonia [unranked] *Beilia* Eckl. ex Baker 16: 158 (1877). Type: *W. punctata* (Andrews) Ker Gawl. = *Thereianthus bracteolatus* (Lam.) G.J.Lewis

Watsonia subg. *Beilia* Eckl. ex Baker: 177 (1892). Lectotype: *W. punctata* (Andrews) Ker Gawl. = *Thereianthus bracteolatus* (Lam.) G.J.Lewis, designated by J.C.Manning & Goldblatt: 246 (2011).

Revisionary accounts: Lewis: 33–43 (1941); Manning & Goldblatt: 241–269 (2011).

From the Greek, *thereios*, summer, *anthos*, flower.

Deciduous geophytes. *Corm* globose, axillary in origin, tunics of coarsely netted fibres. *Cataphylls* 2, dry and papery, reddish brown. *Leaves* 3 or 4(to 6), all cauline and superposed, usually ± dry at flowering, lowermost longest, blade falcate or linear, plane and either with definite main vein or with several equally prominent veins, or ± terete, glabrous or rarely scabridulous, upper leaves progressively shorter, uppermost sometimes entirely sheathing; margin simple, without submarginal vein, epidermis unspecialised. *Stem* usually unbranched, rarely with short branch from upper leaf axil. *Inflorescence* a spike, loosely spirally twisted at anthesis; bracts firm-textured, short, often overlapping, green below with apices dry and brown or entirely dry and papery, smooth or prominently veined, inner strongly 2-veined and apically forked (entire in *T. juncifolius*), mostly membranous (leathery in *T. juncifolius*). *Flowers* zygomorphic or rarely actinomorphic, long-lived, closing at night, usually blue to purple, rarely white or pink to magenta, unmarked or lower 3 tepals with darker markings or all tepals with white markings, usually unscented, with nectar from septal nectaries; perianth tube short to long, funnel-shaped or cylindric; tepals subequal, ± spreading. *Stamens* unilateral and arcuate or declinate, or central and symmetrically arranged; filaments inserted shortly below top of perianth tube; anthers usually purple. *Ovary* subglobose; style filiform, 3-branched distally, branches slender, deeply divided, recurved. *Capsules* woody, ovoid to spindle- or flask-shaped, tardily dehiscent. *Seeds* angular-elongate with chalazal crest or narrowly ovoid-fusiform with thread-like or filiform chalazal extension, smooth or wrinkled, matte. *Pollen grains* monosulcate-operculate, operculum 1- or 2-banded, exine perforate- or reticulate-scabrate (Table 1). *Basic chromosome number x* = 10.

Species 11: South Africa, Western Cape, winter-rainfall region, mostly in nutrient-poor, stony sandstone soils; most species are pyrophytes to some degree.

A small Western Cape genus closely allied to *Micranthus*, *Thereianthus* shares with that genus superposed leaves, ± dry bracts with membranous margins, and small to moderate-sized, often blue flowers (also white, pink or magenta). The foliage in both *Micranthus* and *Thereianthus* is strictly cauline, with the lowermost leaf subbasal. The corm tunics are thus formed solely from the cataphylls, without any contribution from the bases of the lower leaves. Chromosome number, $2n$ = 20, and a karyotype of one long and nine short chromosome pairs in *Micranthus* and *Thereianthus* is likely ancestral for the tribe.

The moderately short spikes of spirally inserted flowers, bracts with narrow membranous margins, and monosulcate pollen grains distinguish *Thereianthus* from *Micranthus*, which has elongate, two-ranked spikes, bracts with broad membranous margins, and zonasulculate pollen grains (Goldblatt & Manning, 2008). The simple leaf margin, without marginal bundle or specialised epidermis, is an additional anatomical specialisation for *Thereianthus* (Manning & Goldblatt, 2011).

TABLE 1.—Pollen operculum type and exine sculpturing in *Thereianthus*. Square brackets [] indicate closely associated operculum bands; curved brackets () indicate a less common operculum character state (from Goldblatt et al. 1991 and Manning & Goldblatt 2011).

Species	Operculum	Exine sculpturing
Sect. *Brevibracteae*		
T. racemosus	(1)2-banded	Reticulate
T. intermedius	2-banded	Reticulate
T. montanus	(1)[2]-banded	Reticulate
T. minutus	[2]-banded	Perforate
T. juncifolius	2-banded	Perforate
Sect. *Thereianthus*		
T. bulbifer	1-banded	Perforate
T. bracteolatus	1-banded	Perforate
T. spicatus	1-banded	Perforate
T. ixioides	1-banded	Perforate
T. elandsmontanus	1-banded	Perforate
T. longicollis	1-banded	Perforate



Thereianthus racemosus: A, flowering plant; B, flower front view (top) and side view (bottom); C, stamens and detail of style branches side view (top) and front view (bottom); D, capsule; E, seed.

Key to species

1a Bracts short, 3–8 mm long, uniformly leathery or soft-textured without prominent veins (sect. *Brevibracteae*):
2a Leaf blades filiform-terete; spike lax, bracts distant (lower internodes 3–5 × longer than bracts); inner bracts as long as or slightly longer than outer and similar in texture, both leathery and green with dry, papery apices; tepals ovate-obovate; stamens central ..... 5. *T. juncifolius*
2b Leaf blades linear to falcate, plane; spike dense, bracts ± overlapping (lower internodes < twice as long as bracts); inner bracts shorter than outer and membranous-papery except along veins; tepals lanceolate; stamens unilateral-arcuate:
3a Perianth tube very short, 1.0–1.5 mm long, included in bracts ..... 1. *T. racemosus*
3b Perianth tube longer, 10–30 mm long, exserted from bracts:
4a Bracts 3–5 mm long; perianth tube 10–13 mm long; capsules ovoid, 4–5 mm long; plants from Cold Bokkeveld and Hex River mtns ..... 2. *T. intermedius*
4b Bracts (5–)6–8 mm long; perianth tube 20–30 mm long; plants from Grootwinterhoek to Riviersonderend mtns and Kogelberg:
5a Leaves ± falcate, lowermost mostly 3–7 mm wide and usually much shorter than stem, with pseudomidrib but without evident secondary veins, the pseudomidrib raised when dry but secondary veins never raised; perianth magenta or deep pink; anthers pale yellow; filaments 3–4 mm long; capsules flask-shaped, 6–8 mm long ..... 4. *T. minutus*
5b Leaves linear, lowermost 2.5–2.8 mm wide and mostly longer than stem, with main and secondary veins raised when dry; perianth and anthers purple; filaments 6–8 mm long; capsules unknown ..... 3. *T. montanus*
1b Bracts longer, (7–)8–15 mm long, with prominently raised, closely set veins (sect. *Thereianthus*):
6a Leaves leathery without strongly raised veins; perianth tube curved and flowers thus ± nodding; filaments declinate, 6–10 mm long (ser. *Bracteolatus*):
7a Stem developing cluster of large cormels in axil of lowest leaf; leaves linear with evident veins; perianth tube 7–9 mm long; tepals pale to midblue with white markings at base, veins not mottled, lateral longitudinal veins with numerous branches in distal half; filaments 6–8 mm long ..... 6. *T. bulbifer*
7b Stem without cormels; leaves terete or elliptic in section, without evident veins; perianth tube (7–)8–10(–15) mm long; tepals purple to violet with prominent, darkly mottled veins, lateral longitudinal veins mostly without branches in distal half; filaments 8–10 mm long ..... 7. *T. bracteolatus*
6b Leaves striate or corrugate with strongly raised veins; perianth tube straight or slightly curved distally and flowers thus suberect; filaments central or arcuate, 3–5 mm long (ser. *Thereianthus*):
8a Perianth tube 7–12(–15) mm long, filiform, tightly clasping style for most of length and then abruptly dilated at mouth; filaments central, symmetrical and completely exposed, blocking mouth of perianth tube ..... 9. *T. ixioides*
8b Perianth tube (12–)15–40 mm long, narrowly funnel-shaped or ± cylindric, not tightly clasping style; filaments arcuate, included within upper part of tube and not blocking mouth:
9a Perianth tube 25–40 mm long, > twice as long as tepals ..... 11. *T. longicollis*
9b Perianth tube 12–25 mm long, < twice as long as tepals:
10a Flowers usually blue, rarely white or pink, lower three tepals with white markings near base outlined distally with dark blue chevron; tepals lanceolate, 3–5 mm wide ..... 8. *T. spicatus*
10b Flowers pale flesh-pink with purple tube, lower three tepals marked with purple in basal half; tepals linear, 1.5–3.0 mm wide ..... 10. *T. elandsmontanus*

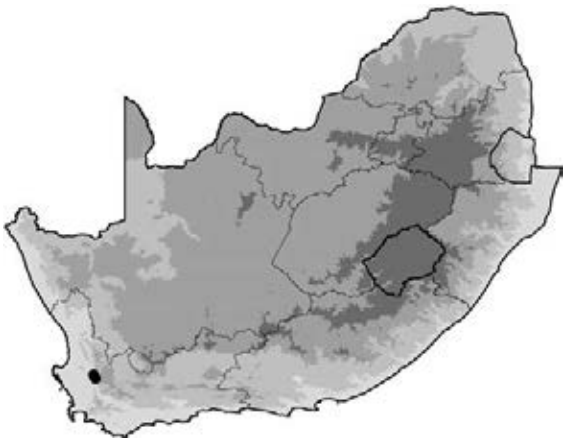
Sect. 1. **Brevibracteae** *Goldblatt & J.C.Manning* in Bothalia 41: 246 (2011). Type species: *Thereianthus racemosus* (Klatt) G.J.Lewis

Leaves filiform and terete, or linear to falcate and plane, with or without prominent main vein but never strongly ribbed; bracts short, 3–8 mm long, uniformly leathery or moderately soft-textured, without prominent veins. *Pollen* operculum ± 2-banded, exine perforate or reticulate. *Seeds* (where known) ellipsoid-fusiform with filiform or thread-like chalazal extension, reddish brown; testa sculpturing longitudinally rugose or obscurely scalariform.

Species 5: southwestern Western Cape, South Africa.

1. **Thereianthus racemosus** *(Klatt) G.J.Lewis* in Journal of South African Botany 7: 36 (1941). *Watsonia racemosa* Klatt 15: 354 (1882). Type: South Africa, [Western Cape], 'in montibus ad Vier en Twintig Rivieren', Dec. without year, *Zeyher 1609* (B, holo.; BOL, GRA, K (2 sheets), PRE, SAM (3 sheets), iso.).

Plants 130–250 mm high. *Corm* ± 10 mm diam.; tunics of moderately fine-textured to coarsely netted fibres. *Stem* erect or flexed slightly outward above sheath of second leaf, rarely with short branch from upper leaf axil. *Leaves* (3)4(5), lowermost reaching base of spike or not, linear or falcate, 60–130(–190) × 1–3(–4) mm, thick-textured and plane with main vein not thickened or raised when fresh and usually without evident secondary veins, rarely with 1 secondary vein visible on each side, uppermost leaf entirely sheathing, well separated from spike. *Spike* erect, moderately densely 5- to 25-flowered; bracts shortly overlapping, outer



Distribution of ***Thereianthus racemosus***.

3–5 mm long, up to 1 internode long, acute, green below or entirely brown and leathery with narrow membranous margins and papery tip, without evident veining, inner ± as long as or slightly longer, ± membranous with narrow brown zone along veins. *Flowers* suberect, pale blue, lower 3 tepals white at base with purple median chevron in lower ¼, strongly honey-scented, perianth subactinomorphic; tube narrowly funnel-shaped, 1.0–1.5 mm long, included in bract; tepals elliptical-oblanceolate, subequal, spreading and slightly cupped, 7–9 × 3–4 mm. *Stamens* unilateral but laterals slightly spreading; filaments arcuate, 3–4 mm long, exserted 1.5–2.5 mm from tube; anthers 4–5 mm long, dark blue; pollen pale blue. *Style* arching over stamens, dividing between base and middle of anthers, branches 2.0–2.5 mm long, divided for ± ½ their length. *Capsules* ovoid, 4–5 × 2.5–3.0 mm. *Seeds* ovoid, ± 1 mm long, with ± straight, thread-like chalazal extension ± 0.5 mm long, reddish brown. *Flowering time*: December.

Distribution and ecology: restricted to the Voorberg (Twenty Four Rivers Mtns) above Porterville in Western Cape, South Africa, especially the Grootwinterhoek Wilderness Area; on seasonally moist or marshy, sandy flats in restioid communities, flowering only after fire.

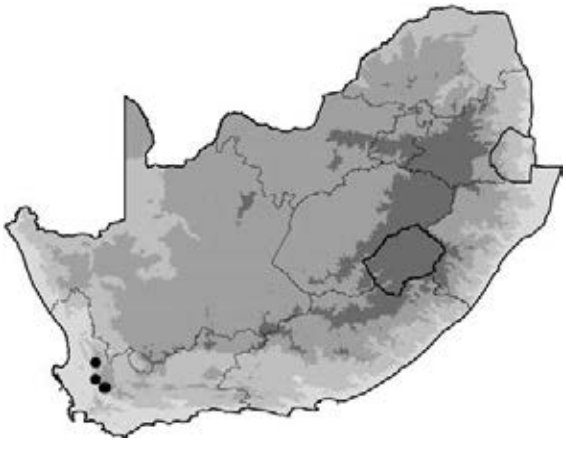
Diagnosis: unique in the genus in its very short perianth tube, 1.0–1.5 mm long and entirely included in the floral bracts, the outer bracts only 3–5 mm long. The small, pale blue flowers are strongly honey-scented.

2. **Thereianthus intermedius** *J.C.Manning & Goldblatt* in Bothalia 41: 247 (2011). *T. lapeyrousioides* var. *elatior* G.J.Lewis in Journal of South African Botany 7: 38 (1941). Type: South Africa, [Western Cape], 'Ceres Hills', Jan. 1892, *L. Guthrie 2208* (BOL, holo.).

Plants 200–350 mm high. *Corm* ± 10 mm diam.; tunics of fine-textured, netted fibres accumulating with age. *Stem* erect, flexed slightly outward above sheath of second leaf. *Leaves* (3)4, lowermost reaching base of spike or not, linear, 70–150 × 2–3 mm, thick-textured with main vein ± evident but not thickened or raised when fresh, plus a pair of secondary veins, uppermost leaf entirely sheathing or with short blade up to 20 mm long, well separated from spike. *Spike* moderately densely 12- to 40-flowered; bracts not or scarcely overlapping, outer 3–5 mm long, up to 1 internode long, obtuse, brown and leathery with narrow membranous margins, without evident veining, inner ± as long or slightly longer, ± membranous with narrow brown zone along veins. *Flowers* suberect, violet (rarely pale blue), lower 3 tepals whitish at base with purple or dark blue median chevron in lower ¼; perianth subactinomorphic; tube straight or slightly arching in upper ± 3 mm, 10–13 mm long, cylindric, widening slightly in upper ± 3 mm; tepals narrowly oblanceolate, subequal, spreading and slightly cupped, 10–11 × 3.0–3.5 mm. *Stamens* unilateral; filaments erect, ± 7 mm long, exserted ± 4 mm from tube; anthers purple, 4–5 mm long; pollen violet. *Style* arching over stamens, dividing below base of anthers, branches ± 2.5 mm long, divided for ± ½ their length. *Capsules* ovoid, 4–5 × 3–4 mm. *Seeds* ovoid, ± 1.5 × 1.0 mm, with thread-like chalazal extension up to 3 mm long abruptly reflexed from near middle, reddish brown, testa striate-rugulose. *Flowering time*: December.

Distribution and ecology: Cold Bokkeveld Mtns to western Hex River Mtns above Ceres in Western Cape, South Africa [the record from Piketberg cited in Manning & Goldblatt (2011) is *T. spicatus*]; on seasonally waterlogged or marshy, sandy flats dominated by restioids, between ± 500 and 1 000 m elevation, flowering only after fire.

Diagnosis: recognised among the species in sect. *Brevibracteae* by the very short bracts 3–5 mm long and moderately elongate perianth tube 10–13 mm long. The small, ovoid capsules are 4–5 mm long and the seeds have thread-like chalazal extensions up to 3 mm long, abruptly reflexed near the middle.



Distribution of ***Thereianthus intermedius***.

3. **Thereianthus montanus** *J.C.Manning & Goldblatt* in Bothalia 34: 103 (2004). Type: South Africa, Western Cape, Riviersonderend, Pilaarkop, ridge WNW of peak, 31 Jan. 2004, *E.G.H. Oliver 12197* (NBG, holo.; MO, iso.).

Plants 200–350 mm high. *Corm* 7–10 mm diam.; tunics of fine-textured, netted fibres accumulating with age. *Stem* erect, flexed outward above sheath of second leaf. *Leaves* 3 or 4, lowermost reaching or exceeding spike, linear, 150–300 × 2.5–2.8 mm, thick-textured with main vein evident but not thickened or raised when fresh, plus 1 or 2 evident secondary veins on each side, uppermost leaf well separated from spike, short and entirely sheathing. *Spike* erect, compact, densely 7- to 10-flowered; bracts overlapping, outer 6–8 mm long, obtuse to truncate, green and leathery below, dry and brown in upper ½, ± 2 internodes long, inner ± 1.5 mm shorter than outer, brown and papery with narrow darker zone along veins. *Flowers* suberect, purple, lower three or all tepals each with spear-shaped, purple median streak near base, throat and lower part of tube white; perianth subactinomorphic, salver-shaped; tube straight or slightly arching in upper ± 5 mm, 22–27 × 1.2–1.5 mm, cylindric and widening slightly in upper ± 5 mm; tepals spreading and slightly cupped, narrowly elliptical to lanceolate, subequal, 9–15 × 3.5–5.0 mm. *Stamens* unilateral; filaments erect, 6–8 mm long, exserted 3–4 mm from tube; anthers 4–5 mm long, purple; pollen violet. *Style* arching over stamens, dividing between base and middle of anthers, branches ± 2.5 mm long, divided for ± ½ their length. *Capsules and seeds* unknown. *Flowering time*: late January to February.

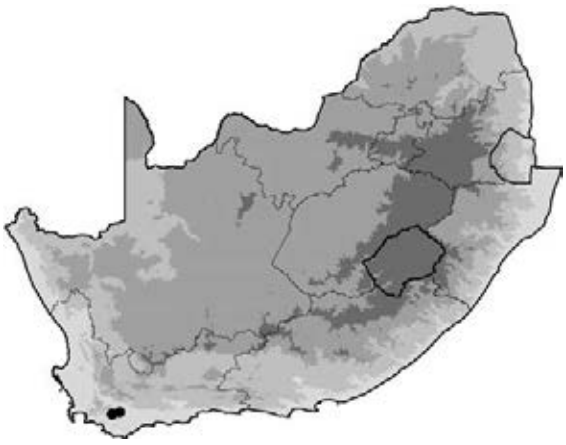
Distribution and ecology: endemic to the Riviersonderend Mtns in Western Cape, South Africa; on steep, south-facing slopes in moist, loamy soil in short, grassy fynbos at ± 1 500 m elevation.

Diagnosis: resembling *Thereianthus minutus* in the moderately long bracts 6–8 mm long and perianth tube 22–27 mm long but differing in the narrower, linear leaves less than 3 mm wide, the lower mostly longer than the stem, and in the purple perianth with concolorous anthers on relatively longer filaments 6–8 mm long.

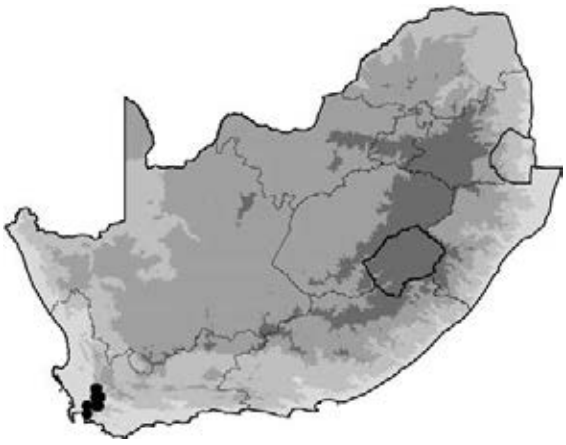
4. **Thereianthus minutus** *(Klatt) G.J.Lewis* in Journal of South African Botany 7: 43 (1941). *Watsonia minuta* Klatt: 353 (1882). Type: South Africa, [Western Cape], Tulbagh Waterfall, *Ecklon & Zeyher Irid. 189* (B, lecto., designated by Goldblatt 19: 143 (1989); MO, S, SAM, isolecto.).

Watsonia lapeyrousioides Baker: 178 (1892). *Thereianthus lapeyrousioides* (Baker) G.J.Lewis 7: 38 (1941). Type: South Africa, [Western Cape], 'clivis montium inter Villiersdorp & French Hoek [Franschhoek]', Nov. 1879, *Bolus 5251* (BOL, lecto., designated by Manning & Goldblatt: 250 (2011); K, isolecto.).

Plants 100–200(–300) mm high. *Corm* 7–10 mm diam.; tunics of fine-textured, netted fibres, sometimes accumulating with age. *Stem* usually inclined but flexed outward above sheath of second leaf and then erect. *Leaves* 3 or 4(–6), lowermost mostly much shorter than spike, usually falcate but rarely linear-arcuate, (30–)40–100(–350) × (1.5–)3.0–7.0 mm, thick-textured with main vein evident but not raised when fresh (becoming raised when dry), plus 1 or 2 evident secondary veins on each side, uppermost leaf well separated from spike, short and entirely sheathing. *Spike* erect, compact, moderately densely (3–)5- to 10(–20)-flowered; bracts shortly overlapping, outer (5–)6–8 mm long, obtuse to truncate, green and leathery below, dry and brown in upper ½, ± 1.5 internodes long, inner ± 1.0–1.5 mm shorter than outer, brown and papery with narrow darker zone along veins. *Flowers* suberect, dark pink to magenta, lower 3 tepals usually with darker median mark near base, throat white; perianth subactinomorphic, salver-shaped; tube straight, 20–30 × 1.2–1.5 mm, widening gradually and evenly from base; tepals spreading and slightly cupped, elliptical to oblanceolate, subequal, 7–10 × 2–4 mm. *Stamens* unilateral; filaments erect, 3–4 mm long, exserted ± 2 mm from top of tube;



Distribution of ***Thereianthus montanus***.



Distribution of ***Thereianthus minutus***.

anthers 3–4 mm long, pale yellow; pollen cream-coloured. *Style* arching over stamens, dividing just below or just above base of anthers, branches ± 4 mm long, divided for ± ½ their length. *Capsules* flask-shaped, 6–8 mm long. *Seeds* fusiform, 1.5–2.0 mm long, with chalazal extension to 4 mm long, thus ± twice as long as seed body, sharply bent back ± midway and hooked or crook-like, sometimes twisting around adjacent seeds, reddish brown, longitudinally rugulose. *Flowering time*: (late October)December to January.

Distribution and ecology: mountains in the extreme southwestern part of Western Cape, South Africa, from above Porterville southward to the Kogelberg and western Riviersonderend Mtns; in moist habitats such as rock ledges, damp cliffs and streamsides, growing in flushes, peaty seepages and mossy turf.

Diagnosis: readily recognised in the wild by the ± falcate leaves, the lowermost mostly 3–7 mm wide and usually much shorter than stem, with a more-or-less distinctive pseudomidrib, and magenta or deep pink flowers with pale yellow anthers on filaments 3–4 mm long. The flask-shaped capsules, 6–8 mm long, are highly diagnostic, and the fusiform seeds have a hooked, thread-like chalazal extension ± twice as long as the seed body.

5. **Thereianthus juncifolius** *(Baker) G.J.Lewis* in Journal of South African Botany 7: 37 (1941). *Morphixia juncifolia* Baker: 238 (1876a). *Watsonia juncifolia* (Baker) Baker: 178 (1892). *Freesia juncifolia* (Baker) Klatt in Th.Durand & H.Schinz: 188 (1894). *Lapeirousia juncifolia* (Baker) N.E.Br.: 194 (1931). Type: South Africa, [Western Cape], without precise locality or date, [Piquetberg Div. fide Baker (1896)], *Zeyher 1619* (K [*K320516 ex herb. Wallich*], lecto., designated by Manning & Goldblatt: 252 (2011); BOL, K (3 sheets), S, SAM (2 sheets), isolecto.).

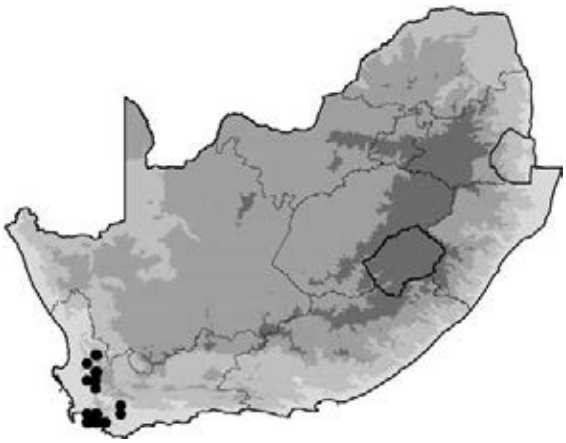
   Anomatheca calamifolia Klatt: 355 (1882), illegitimate superfluous name for *Morphixia juncifolia* Baker (1876b). Type: South Africa, [Western Cape], Twenty Four Rivers, *Zeyher* [as *Drège*] *1619* (S, 'Herb. Klatt', holo.; BOL, K (3 sheets), S, SAM (2 sheets), iso.).

   Ixia zeyheri Baker: 166 (1892), illegitimate superfluous name for *Morphixia juncifolia* Baker (1876a) [based on the same type]. Type: South Africa, [Western Cape], without precise locality or date, *Zeyher 1619* (K [*K320516 ex herb. Wallich*], lecto., designated by Manning & Goldblatt: 252 (2011); BOL, K (3 sheets), S, SAM (2 sheets), isolecto.).

Slender plants 120–200(–300) mm high. *Corm* 5–10 mm diam.; tunics of fine-textured, netted fibres, accumulating with age. *Stem* flexed outward above sheath of second leaf and then erect, rarely with short branch from axil of uppermost scale-leaf. *Leaves* (3)4, lowermost mostly reaching to spike or exceeding it, filiform-terete, 150–500 × 0.5–1.5 mm, thick-textured, striate with slightly raised veins when dry, uppermost 1 or 2 leaves scale-like and entirely sheathing, inserted ± midway between foliage leaves and spike. *Spike* erect, elongate, laxly (2)3- to 10-flowered, lower internodes 3–5(–7) × longer than bracts but progressively shorter and uppermost internodes ± as long as bracts; bracts not overlapping, outer 3–5 mm long, acute to truncate, soft-textured and green with papery brown tips, inner slightly longer than outer and similar in texture, acute or truncate. *Flowers* suberect, purple to lilac with white throat; perianth actinomorphic, salver-shaped; tube straight, 11–18 mm long, widening gradually and evenly from base, 1.0–1.5 mm diam. at mouth; tepals spreading and slightly cupped, ovate or obovate, subequal, 10–15 × 3.5–6.0 mm. *Stamens* central; filaments erect, 4–6 mm long, exserted 3–4 mm from tube; anthers 3–4 mm long, lilac or pale yellow; pollen lilac or cream-coloured. *Style* central, dividing between base and middle of anthers, branches ± 3 mm long, divided for > ½ their length, spreading or recurved. *Capsules* flask-shaped, 9–15 mm long. *Seeds* fusiform, 6–7 mm long, with chalazal thread ± 13 mm long, thus ± twice as long as seed body, sharply bent back ± midway and hooked or crook-like, sometimes twisting around adjacent seeds, reddish brown, longitudinally rugulose. *Flowering time*: December to February(March).

Distribution and ecology: mainly montane in southwestern Western Cape, South Africa, from the southern Cederberg through the Olifants River Mtns to the Skurweberg north of Ceres, with a disjunction to the Hottentots Holland, Kogelberg and Klein River mtns in the south, and also recorded on the lower southern slopes of the Riviersonderend Mtns, thus apparently absent from the mountains between Ceres and Stellenbosch; restricted to seeps, streamsides, drainage lines and marshy ground, mostly between 500 and 1 000 m elevation but to near sea level along the coastal ranges.

Diagnosis: readily recognised by the filiform-terete leaves and lax spike with distant bracts, the lower



Distribution of ***Thereianthus juncifolius***.

internodes 3–5 times longer than the bracts. Uniquely in the genus, the inner bracts are as long as or slightly longer than the outer and similar in texture, both leathery and green with dry, papery apices – in other species the inner bracts are smaller than the outer and ± membranous.

Sect. 2. **Thereianthus**

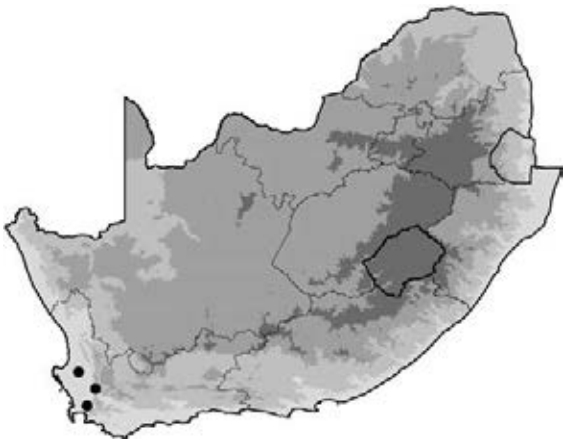
Leaves linear or falcate, plane and either leathery without raised veins or strongly ribbed or corrugate with prominently raised veins, or ellipsoid in section; bracts (7–)8–15 mm long, closely and prominently veined with raised veins (sclerenchymatous phloem caps prominent). *Pollen* operculum 1-banded, exine perforate. *Seeds* (where known) ellipsoid-ovoid and angled, without chalazal extension, brown to blackish.

Species 6: southwestern Western Cape, South Africa.

Ser. **Bracteolatus** *J.C.Manning & Goldblatt* in Bothalia 41: 254 (2011). Type species: *Thereianthus bracteolatus* (Lam.) G.J.Lewis

6. **Thereianthus bulbifer** *Goldblatt & J.C.Manning* in Bothalia 41: 254 (2011) [as *T. bulbiferus*]. Type: South Africa, Western Cape, Bo-Hermon, Elandsberg Nature Reserve, alluvial flats near river, after fire, 97 Nov. 2010, *J.C.Manning 3312* (NBG, holo.; MO, iso.).

Plants 140–200 mm high. *Corm* 10–15 mm diam.; tunics of coarsely netted fibres, sometimes forming claws below, accumulating with age. *Stem* erect, flexuous or flexed outward only above sheath of second leaf, rarely with short branch from upper leaf axil, developing a conspicuous cluster of 5–7 cormels in axil of lowest leaf. *Leaves* 4, lowermost reaching base of spike or not, ± dry at flowering, linear-falcate, often sinuous-twisted, 70–120 × (1.5–)2.0–3.0 mm, leathery, with 3 ± equally distinct veins or with main vein slightly more distinct, not thickened or raised when fresh but prominent when dry, uppermost leaf well separated from spike, usually with short blade 20–50 mm long, rarely almost entirely sheathing. *Spike* erect, densely 7- to 15-flowered; bracts overlapping for ± ½ their length, outer 7–9(–10) mm long and up to two internodes long, obtuse or truncate, either green below or entirely brown and leathery, conspicuously and closely veined, with narrow membranous margins, inner bract ½–¾ as long as outer, ± membranous with narrow brown zones along veins. *Flowers* patent, pale to midblue, lower 3 tepals with white median mark near base; perianth actinomorphic; tube slightly curved, 7–9 mm long, funnel-shaped, exserted 2–5 mm from bracts; tepals oblanceolate, subequal or inner slightly broader, spreading and slightly cupped, (10–)13–20 × 3–6 mm. *Stamens* ± declinate; filaments 6–8 mm long, exserted ± 5–6 mm from tube; anthers all facing upward or median (lower) facing downward or outward, 4 mm long, purple; pollen lilac. *Style* ± deflexed to lie beneath stamens, dividing at middle of anthers, branches 3–5 mm long, divided to near base. *Capsules* ovoid, 6 × 3 mm long, slightly shorter to slightly longer than bract. *Seeds* subglobose-angled, 1.5–2.0 mm long, chalaza ± excavated, yellowish brown, obscurely scalariform-rugulose. *Flowering time*: November, rarely to early December.



Distribution of ***Thereianthus bulbifer***.

Distribution and ecology: a local endemic of the Piketberg and the flats between Porterville and Joostenburg in Western Cape, South Africa, notably along the western foot of the Elandskloof Mtns near Hermon; on seasonally moist or wet alluvial flats in fynbos and renosterveld.

Diagnosis: unique in the genus in developing a cluster of large cormels in the axil of the lowest leaf, *Thereianthus bulbifer* is further characterised by linear leaves and pale to midblue flowers, marked with white at the base of the lower tepals, with a relatively short, curved perianth tube 7–9 mm long and declinate stamens.

7. **Thereianthus bracteolatus** *(Lam.) G.J.Lewis* in Journal of South African Botany 7: 42 (1941). *Gladiolus bracteolatus* Lam.: 725 (1788). Type: South Africa, without precise locality, said to have been collected by *Sonnerat s.n.* (P-Herb. Lamarck, holo.).

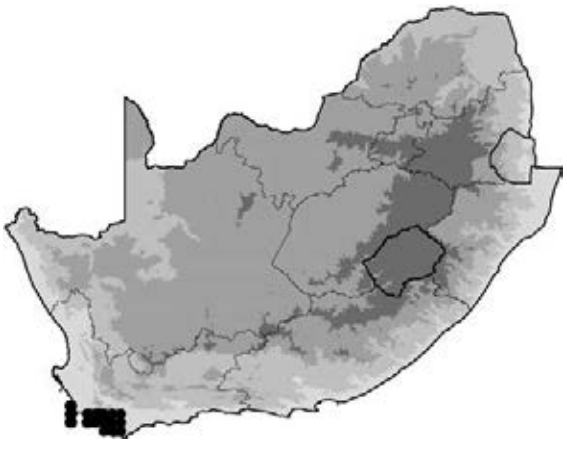
Ixia punctata Andrews: t. 177 (1801). *Watsonia punctata* (Andrews) Ker Gawl.: 229 (1804). *Gladiolus punctatus* (Andrews) Roem. & Schult.: 425 (1817). Type: South Africa, 'Cape of Good Hope', said to have been collected and sent by G. Hibbert, illustration in Andrews' *The Botanist's Repository* 3: t. 177 (1801).

Gladiolus subulatus Vahl: 97 (1805), illegitimate superfluous name for *G. bracteolatus* Lam. (1788).

Watsonia subulata Klatt, as a replacement name for *G. subulatus* Vahl. Type: South Africa, without precise locality or date, *Bulow s.n. C1000844* (C, holo.).

Gladiolus triticeus Thunb.: 194 (1807). *Watsonia triticea* (Thunb.) Spreng.: 150 (1824). *Beilia triticea* (Thunb.) Eckl.: 43 (1827). *Micranthus triticeus* (Thunb.) Heynh.: 405 (1847). *W. punctata* var. *triticea* (Thunb.) Baker: 177 (1892). *B. spicata* var. *triticea* (Thunb.) Kuntze: 305 (1898). Type: South Africa, without precise locality, *Thunberg s.n. UPS-THUNB1084* (UPS-THUNB, holo.).

Plants (80–)150–200(–300) mm high. *Corm* 10–15 mm diam., developing several large cormels at base; tunics of coarsely netted fibres, thickened and forming woody claws below, accumulating with age. *Stem* flexuose or flexed outward only above sheath of second leaf. *Leaves* 4(5), lowermost reaching base of spike or not, ± dry at flowering, linear, elliptic in section or terete, 70–170 × 0.5–1.5(–2.0) mm, leathery, with 3 ± equally veins or with main vein slightly more prominent, not thickened or raised when fresh but prominent when dry, uppermost leaf well separated from spike, entirely sheathing or with short blade 20–50 mm long. *Spike* erect, densely 7–15(–30)-flowered; bracts overlapping for ± ½ length, 8–10(–12) mm long and ± two internodes long, outer entirely brown and leathery, obtuse or truncate (rarely apiculate), conspicuously and closely veined, with narrow membranous margins, inner ½–¾ as long as outer, ± membranous with narrow brown zones along veins. *Flowers* ± patent, purple to violet with dark blotches and streaks on longitudinal veins and especially midline; perianth actinomorphic; tube slightly curved, (7–)8–10(–15) mm long, funnel-shaped, usually exserted 2–6(–10) mm beyond bracts, rarely just included; tepals oblanceolate, subequal or inner slightly broader, spreading and slightly cupped, (10–)11–17 × 3–6 mm. *Stamens* ± declinate, sometimes weakly so and then ± central; filaments 8–10 mm long, exserted ± 6–8 mm from tube, usually flexed sharply upward apically; anthers all facing upward, usually white (rarely purple), 4–6 mm long; pollen white (brown when anthers purple). *Style* ± deflexed to lie beneath stamens, dividing opposite middle of anthers, branches 3–5 mm long, divided to near base. *Capsules* ovoid, ± 6 mm long. *Seeds* subglobose- or ellipsoid-angled, ± 2 mm long, chalaza truncate, brown, testa colliculate. *Flowering time*: late November to early January.



Distribution of ***Thereianthus bracteolatus***.

Distribution and ecology: endemic to Western Cape, South Africa, from Stellenbosch and the Cape Peninsula along the coastal ranges of the Hottentots Holland, Kogelberg and Klein River/Babilonstoring mtns to Bredasdorp in the east, with isolated records from near Caledon (Drayton Siding) and the lower slopes of the Riviersonderend Mtns above Greyton; locally common on sandy flats and lower slopes below 1 000 m elevation.

Diagnosis: a distinctive species with the leaves terete or elliptic in section and without evident veins, and deep purple to violet, sideways-facing flowers with a curved perianth tube 7–15 mm long and tepals with prominent, darkly mottled veins. The filaments are declinate and relatively long, 8–10 mm long. The anthers are usually white, but some populations have purple anthers with brown pollen. It is the only species of *Thereianthus* on the Cape Peninsula.

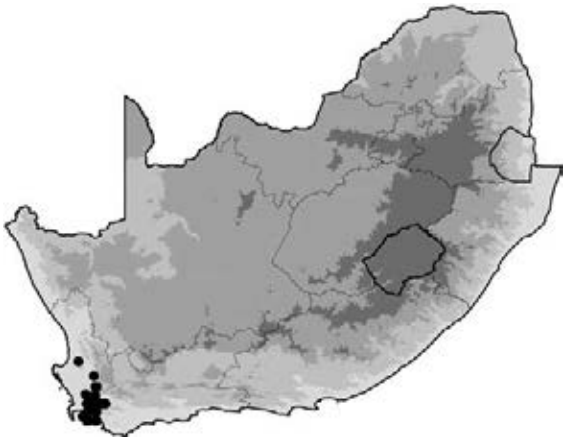
Ser. **Thereianthus**

Leaves ribbed or corrugate, with thickened and raised veins. *Flowers* suberect with ± straight tube; perianth actinomorphic or more usually zygomorphic. *Stamens* arcuate, rarely central.

8. **Thereianthus spicatus** *(L.) G.J.Lewis* in Journal of South African Botany 7: 39 (1941). *Gladiolus spicatus* L.: 37 (1753). *Ixia spicata* (L.) Willd.: 200 (1797), illegitimate homonym, not *I. spicata* Burm.f. (1768). *G. alopecuroides* Pers.: 46 (1805), illegitimate superfluous name for *G. spicatus* L. and an illegitimate homonym, not *G. spicatus* L. (1756). *Micranthus spicatus* (L.) Heynh.: 405 (1847). *Paulomagnusia spicata* (L.) Kuntze: 702 (1891). *Beilia spicata* (L.) Eckl. ex Kuntze: 305 (1898) [*B. spicata* (L.) Eckl., not validly published]. Type: from South Africa without any details ex Herb. van Royen (?L, not found). Neotype, designated by Manning & Goldblatt: 259 (2011): South Africa, [Western Cape], Jonkershoek Valley, contour path below Berg River Collar, 29 Dec. 1989, *Goldblatt & Manning 9028* (NBG, neo.; K, MO, PRE, iso.).

Thereianthus spicatus var. *linearifolius* G.J.Lewis: 40 (1941). Type: South Africa, [Western Cape], mountains near Franschhoek, *Salter 2973* (BOL, holo.).

Gladiolus rubens Vahl: 98 (1805). *Watsonia rubens* (Vahl) Ker Gawl.: sub t. 1072 (1807). Type: South Africa, not cited, probably at C.



Distribution of ***Thereianthus spicatus***.

Plants (150–)200–500(–600) mm high. *Corm* 10–20 mm diam.; tunics of coarsely netted fibres, thickened and claw-like at base, accumulating with age. *Stem* erect or flexed outward above sheath of second leaf, rarely with short branch from axil of uppermost leaf. *Leaves* 4(5), lowermost mostly reaching or exceeding spike, ± dry at flowering, linear, (100–)200–250 × 1–2(–4) mm, closely 3–5(–7)-ribbed, smooth or minutely scabrid on ribs and margins, uppermost leaf only rarely reaching base of spike, entirely sheathing or with short blade 20–60 mm long. *Spike* closely (3–)6- to 20(–30)-flowered; bracts overlapping for ½–⅔ length, (7–)8–13(–15) mm long and two or three internodes long, outer acute, either green below or entirely brown and leathery, conspicuously and closely veined, with narrow membranous margins, inner slightly shorter, ± membranous with narrow brown zones along veins. *Flowers* suberect, mostly pale to midblue, rarely white or pink, lower three tepals each with white marking near base outlined distally with purple chevron; perianth subactinomorphic or weakly zygomorphic; tube ± straight or slightly curved outward in distal 3 mm, (12–)15–18(–25) mm long, 1.0–1.5 mm diam. at mouth, ± dilated gradually and evenly from base to tip, exserted 6–15 mm beyond bracts, 0.8–1.8 × as long as tepals; tepals elliptical-oblanceolate, inner 3 slightly smaller, spreading and slightly cupped, 10–18 × 3–5 mm. *Stamens* arcuate; filaments 3–4 mm long, exserted 2 mm from tube; anthers 4–5 mm long, purple; pollen purple. *Style* arching above anthers, dividing at ± middle of anthers, branches 4–5 mm long, divided to near base. *Capsules* narrowly ovoid, 6–7 × 3 mm. *Seeds* ellipsoid-angled, ± 2 mm long, black or brown, testa striate-colliculate. *Flowering time*: (November)December to January(early February).

Distribution and ecology: common along the coastal mountains and foothills in the southwestern Western Cape, South Africa, from Piketberg and Porterville south to the Palmiet River Mouth and onto the lower slopes of the Riviersonderend Mtns, but absent from the Cape Peninsula; mostly on sandstone slopes but also shale bands and on granite, from near sea level to over 1 000 m elevation.

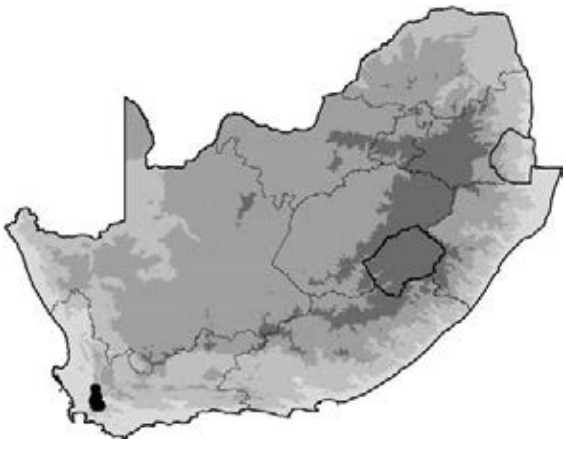
Diagnosis: distinguished from the other species with strongly ribbed leaves by the moderately long perianth tube, (12–)15–18(–25) mm long, usually curved outward slightly near the tip and dilating gradually and evenly from base to apex, elliptic-oblanceolate tepals, 10–18 × 3–5 mm, and filaments 3–4 mm long. Although usually glabrous, the leaves in some plants are scabridulous along the ribs and margins.

9. **Thereianthus ixioides** *G.J.Lewis* in Journal of South African Botany 7: 41 (1941). Type: South Africa, [Western Cape], Bain's Kloof at summit, 8 Dec. 1934, *T.M. Salter 5117* (BOL, holo.).

[*Watsonia filifolia* E.Mey. in Drège: 82 (1843), invalid name without description.]

[*Watsonia punctata* var. *filifolia* E.Mey. ex Baker: 16: 159 (1877), invalid name without description.]

Plants 250–500 mm high. *Corm* 12–20 mm diam.; tunics of coarsely netted fibres, thickened and claw-like at base, accumulating with age. *Stem* erect or flexed outward above second sheath. *Leaves* 4(5), lowermost reaching or exceeding spike, green or dry at flowering, linear, 200–400 × 1.0–2.0 mm, closely 3-ribbed, uppermost leaf entirely sheathing. *Spike* erect, compact, densely 6- to 12-flowered; bracts overlapping for ½–⅔ length, 8–13 mm long and two or three internodes long, outer acute or obtuse, either green below or entirely brown and leathery, conspicuously and closely veined, with narrow membranous margins, inner slightly shorter, ± membranous with narrow brown zones along veins. *Flowers* suberect, white to pale mauve (rarely midblue), unmarked or lower three tepals each with purple marking near base (rarely ± all tepals marked); perianth actinomorphic; tube straight, 7–12(–15) mm long, 0.5–1.0 mm diam. at mouth, filiform and tightly clasping style throughout, abruptly expanded in distal 1 mm, exserted 1–9 mm beyond bracts, 0.5–1.0 × as long as tepals; tepals elliptical-oblanceolate, spreading and slightly cupped or flat, 12–15 × 4–6 mm. *Stamens* central, erect or diverging apically with anthers spreading; filaments 3–4 mm long, swollen slightly at base



Distribution of ***Thereianthus ixioides***.

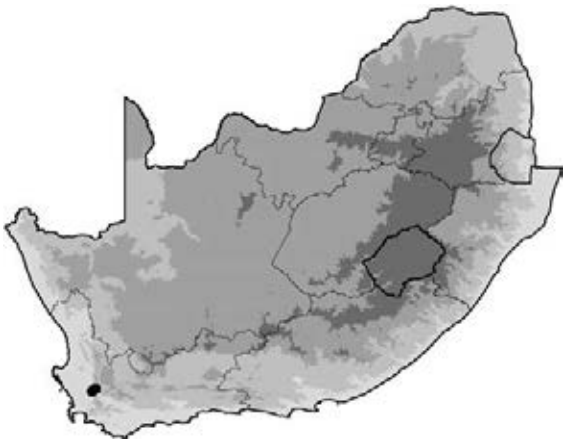
and occluding mouth of perianth tube; anthers 5–7 mm long, lilac or pale yellow; pollen cream-coloured. *Style* central, dividing between base and middle of anther, branches ± 3–4 mm long, divided to near base. *Capsules* ovoid, 7–10 × 3–5 mm. *Seeds* ellipsoid-angled, 2–3 mm long, yellowish brown testa striate-colliculate. *Flowering time*: late November to December(early January).

Distribution and ecology: a narrow endemic of the mountains between Wellington and Franschhoek in Western Cape, South Africa, where it is best known from Bain's Kloof and Du Toit's Kloof passes and the Wemmershoek Mtns; on cooler, south-facing sandstone slopes at mid-altitudes, mainly around 1 000 m elevation, often in seasonally damp places, along drainage lines or water courses.

Diagnosis: recognised by its compact, subcapitate spike of actinomorphic, white or pale lilac (rarely midblue) flowers with filiform, straight perianth tube, 7–12(–15) mm long and up to 0.5 mm diam., tightly clasping the style for most of its length and abruptly dilated only in the distal 1 mm, with the filaments thus completely exserted. The stamens are symmetrically arranged, with ± horizontally spreading anthers, and the filaments occlude the mouth of the perianth tube.

10. **Thereianthus elandsmontanus** *Goldblatt & J.C.Manning* in Bothalia 41: 263 (2011). Type: South Africa, Western Cape, Bo-Hermon, Elandsberg Nature Reserve, Slangkop, low sandstone ridge, two years after fire, (–AC), 7 Nov. 2010, *J.C.Manning 3313* (NBG, holo.; MO, iso.).

Plants 140–240 mm high. *Corm* 10–15 mm diam.; tunics of coarse, matted fibres, accumulating with age. *Stem* erect. *Leaves* 4, lowermost exceeding spike, ± dry at flowering, linear, 200–250 × 2–3 mm, closely 3- or 4-ribbed, uppermost leaf with short blade 20–30 mm long. *Spike* erect, densely 7- to 15-flowered; bracts overlapping for ½–⅔ length, 8–10(–13) mm long and two or three internodes long, outer acute, either green below or entirely brown and leathery, conspicuously and closely veined, with narrow membranous margins, inner slightly shorter, ± membranous with narrow brown zones along veins. *Flowers* suberect, cream-coloured to pale flesh-pink, flushed purple on tube, lower three tepals with median linear maroon streak extending halfway along blade; perianth weakly zygomorphic; tube slightly curved outward in distal 3 mm, (17–)20–23 mm long, ± 1.5 mm diam. at mouth, ± cylindric but widening slightly distally, exserted 13–15 mm beyond bracts; tepals linear-oblanceolate, inner three slightly smaller, spreading and slightly cupped, 12–15 × 1.5–3.0 mm. *Stamens* arcuate; filaments 4–5 mm long, exserted 2–3 mm from tube; anthers 4 mm long, blackish purple; pollen purple. *Style* arching above anthers, dividing between base and middle of anthers, branches, ± 3 mm long, divided to near base. *Capsules* narrowly ovoid, 5–7 × 3 mm. *Seeds* ellipsoid-angled, ± 2 mm long, yellowish brown, testa striate-colliculate. *Flowering time*: November.



Distribution of ***Thereianthus elandsmontanus***.

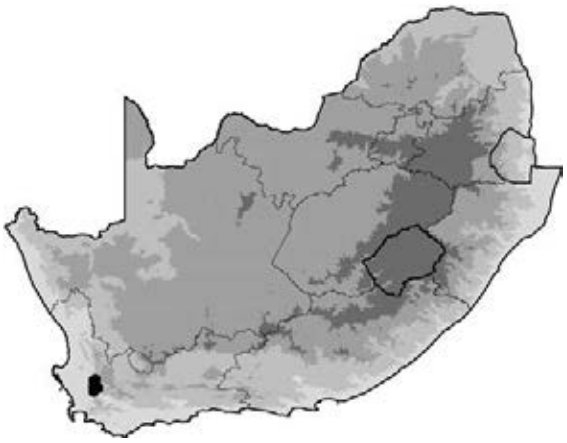
Distribution and ecology: restricted to Slangkop Ridge on Elandsberg Nature Reserve near Hermon in Western Cape, South Africa; on sandstone in grassy fynbos.

Diagnosis: distinguished by its cream-coloured to pale flesh-pink flowers with moderately long tube, 17–23 mm long and 1.5–1.8 × as long as the tepals, which are unusually narrow, almost linear, and just 2–3 mm wide. Unfortunately the flowers do not retain their colour in the herbarium, drying bluish lilac. It is most likely to be confused with *Thereianthus spicatus*, which has a tube of similar length, but this species has blue (rarely white or pink flowers) with broader, lanceolate tepals, 3–5 mm wide.

11. **Thereianthus longicollis** *(Schltr.) G.J.Lewis* in Journal of South Africa Botany 7: 39 (1941). *Watsonia longicollis* Schltr.: 106 (1899). Type: South Africa, [Western Cape], Tulbagh Waterfall, ± 1 200 ft [365 m], 10 Nov. 1896, *R. Schlechter 9055* (B, holo.; BOL, GRA, MO, PRE (4 sheets), iso.).

Watsonia punctata var. *longicollis* Baker: 177 (1892). Type: South Africa, [Western Cape], Worcester [District], *Zeyher s.n. K400455* (K, holo.).

Plants 150–350 mm high. *Corm* 10–15 mm diam.; tunics of coarsely netted fibres, thickened and claw-like at base, accumulating with age. *Stem* erect. *Leaves* 4, lowermost reaching or exceeding spike, ± dry at flowering, linear, 200–250 × 1–2 mm, closely 3-ribbed, uppermost leaf with short blade 20–60 mm long. *Spike* densely 7- to 15(–20)-flowered; bracts overlapping for ½–⅔ length, 8–12(–17) mm long and 2 or 3 internodes long, outer acute, either green below or entirely brown and leathery, conspicuously and closely veined, with narrow membranous margins, inner slightly shorter, ± membranous with narrow brown zones along veins. *Flowers* suberect, white or pale pink to purple-pink with purple tube, lower three tepals each with purple chevron or diamond-shaped markings near base;



Distribution of ***Thereianthus longicollis***.

perianth weakly zygomorphic; tube slightly curved outward in distal 3 mm, 25–40 mm long, ± 2 mm diam. at mouth, ± cylindric but dilated slightly distally, exserted 20–30 mm beyond bracts, 2.0–2.5 × longer than tepals; tepals oblong-oblanceolate, inner 3 slightly smaller, spreading and slightly cupped, 12–17 × 2.5–5.5 mm. *Stamens* arcuate; filaments 6 mm long, exserted 3 mm from tube; anthers 4–6 mm long, purple; pollen purple. *Style* arching above anthers, dividing at ± middle of anthers, branches ± 4–5 mm long, divided to near base. *Capsules* narrowly ovoid, 6–7 × 2.5–3.0 mm. *Seeds* ellipsoid-angled, ± 2.5 mm long, yellowish brown, testa striate-colliculate. *Flowering time*: mostly mid-November to late December.

Distribution and ecology: a narrow endemic of the mountains between Porterville and Wolseley in Western Cape, South Africa, including the southern end of the Grootwinterhoek Mtns, Saronsberg and the Elandskloof Mtns; in sandy gravel or loamy ground on rocky sandstone slopes open proteoid or restioid fynbos.

Diagnosis: separated from all other species in the genus by its unusually long perianth tube, 25–40 mm long and 2.0–2.5 times longer than the tepals. The flowers vary in colour from pale pink or almost white to purple-pink, with darker tube and purple, chevron-shaped markings on the lower tepals. The species may be confused with longer-tubed forms of *T. spicatus*, but the perianth tube in that species is shorter, mostly less than 20 mm long (rarely up to 25 mm) and always less than twice as long as the tepals, and also narrower, at most 1.5 mm diam. at the mouth.

UNCERTAIN SPECIES

Beilia spicata var. *brevifolia* Kuntze: 305 (1898). Type: South Africa, [Western Cape], 'Mowbray bei Capstadt', collector and date unknown (specimen not located). The brief description of this taxon '*foliis brevibus 1–2 cm latis acuminatus*' and its collection at Mowbray, Cape Town, make it certain that it is not *Thereianthus spicatus*, which has narrower leaves and is absent from the Cape Peninsula. The only possibility in *Thereianthus* is thus *T. bracteolatus*, but the broad leaves are inconsistent with this species as well and suggest that it might be a species of *Watsonia*.

REFERENCES

ANDREWS, H. 1801. *Ixia punctata*. *The Botanist's Repository* 3: t. 177.

BAKER, J.G. 1876a. New species of Ixieae. *Journal of Botany, British and foreign* 14: 236–239.

BAKER, J.G. 1876b. New Gladioleae. *Journal of Botany, British and foreign* 14: 333–339.

BAKER, J.G. 1877 ['1878']. Systema iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell and Co., London.

BAKER, J.G. 1896. Iridaceae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.

BROWN, N.E. 1931. XXIX. Notes upon South African plants. *Bulletin of Miscellaneous Information Kew* 1931: 191–197.

BURMAN, N.L. 1768. *Prodromus florae capensis*. Cornelius Haak, Leiden.

DRÈGE, J.F. 1843. Zwei pflanzengeographische Dokumente. *Flora* 1843. Leipzig.

DURAND, T. & SCHINZ, H. 1894 ['1895']. *Conspectus florae africae*, vol. 5. Jardin botanique de l'Etat, Bruxelles etc.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.

GOLDBLATT, P. 1989. The genus *Watsonia*. *Annals of Kirstenbosch Botanic Garden* 19: 1–148.

GOLDBLATT, P. & MANNING, J.C. 2008. *The Iris family: natural history and classification*. Timber Press, Oregon.

HEYNHOLD, G. 1847 ['1846']. *Alphabetische und synonymische Aufzählung der Gewächse*. Dresden & Leipzig.

KER GAWLER, J.B. 1804. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.

KER GAWLER, J.B. 1807. *Watsonia rosea*. Pyramidal watsonia. *Curtis's Botanical Magazine* 27: sub t. 1072.

KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.

KUNTZE, O. 1891. *Revisio Generum Plantarum*, vol. 2. Felix, Leipzig.

KUNTZE, O. 1898. *Revisio Generum Plantarum*, vol. 3(3). Felix, Leipzig.

LAMARCK, J.B.A.P.M. de. 1786–1788. *Encyclopédie méthodique. Botanique*, vol. 2. Panckoucke, Paris.

LEWIS, G.J. 1941. Iridaceae. New genera and species and miscellaneous notes. *Journal of South African Botany* 7: 19–59.

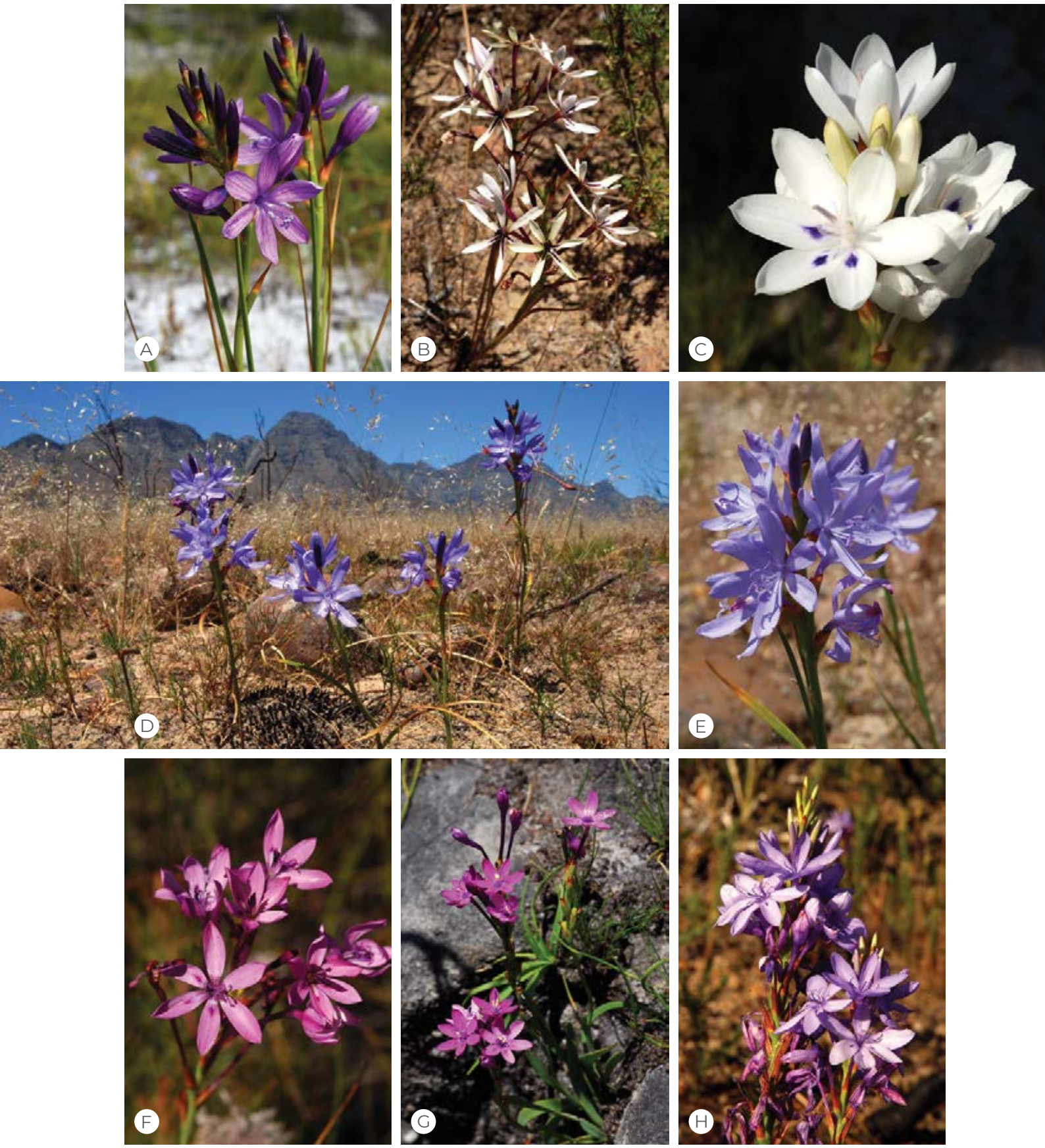


Plate 13: A, ***Thereianthus bracteolatus***, Cape Peninsula, WC; B, ***T. elandsmontanus***, Hermon, WC; C, ***T. ixioides***, Wellington, WC; D & E, ***T. bulbifer***, Hermon, WC; F, ***T. longicollis***, Tulbagh, WC; G, ***T. minutus***, Wellington, WC; H, ***T. spicatus***, Paarl, WC.

LINNAEUS, C. 1753. *Species plantarum*. Salvius, Stockholm.
LINNAEUS, C. 1756. *Centuria plantarum* II. Höjer, Uppsala.
MANNING, J.C. & GOLDBLATT, P. 2004. A new species of *Thereianthus* (Iridaceae: Crocoideae) from Western Cape, South Africa, nomenclatural notes and a key to the genus. *Bothalia* 34: 103–106.
MANNING, J.C. & GOLDBLATT, P. 2011. A taxonomic revision of the genus *Thereianthus* G.J.Lewis (Iridaceae: Crocoideae). *Bothalia* 41: 241–269.
PERSOON, C.H. 1805. *Synopsis plantarum*, vol. 1. Cramer, Paris.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium secundum*, vol. 1. J.G. Cotta, Stuttgart.
SCHLECHTER, R. 1899['1900']. Plantae schlechterianae novae vel minus cognitae describuntur II. *Botanische Jahrbücher für Systematik* 27: 86–220.
SPRENGEL, K. 1824. *Systema vegetabilium*, vol. 1. Dietrich, Göttingen.
THUNBERG, C.P. 1807. *Flora capensis* 1: 1–144. Edman, Uppsala.
VAHL, M. 1805. *Enumeratio plantarum*, vol. 2. Copenhagen.
WILLDENOW, C.L. 1797. *Species plantarum*, edn. 4. Berlin.

9. Micranthus

Micranthus *(Pers.) Eckl.*, Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon: 43 (1827), name conserved, not *Micranthus* J.C.Wendl. (1798) [Acanthaceae]. *Gladiolus* subg. *Micranthus* Pers.: 46 (1805). *Hebea* subg./unranked *Micranthus* (Pers.) R.Hedw.: 24 (1806). Type (conserved): *G. alopecuroides* L. = *M. alopecuroides* (L.) Eckl.

Paulomagnusia Kuntze: 702 (1891). Type: *P. alopecuroides* (L.) Kuntze, lecto., designated by Goldblatt & Manning: 133 (2008) = *Micranthus alopecuroides* (L.) Eckl.

Revisionary account: Goldblatt et al.: 127–144 (2013).

Named for the unusually small flowers, from the Greek *micro* (small) and *anthos* (flower).

Deciduous geophytes. *Corm* axillary in origin, subglobose, rooting from below; tunics coarsely fibrous. *Leaves* few, the lower 2 or 3 cataphylls, lowermost foliage leaf longest, inserted on stem above corm, blades either plane with a definite main vein and falcate or lanceolate with margins moderately to heavily thickened, or ± tubular and hollow, or terete and ± solid with heavily thickened central vein and margins separated by narrow longitudinal grooves, margins with subepidermal sclerenchyma associated with a marginal vein, *Stem* straight or ± flexuose, simple or few- to several-branched. *Inflorescence* a congested, 2-ranked spike, usually weakly rotated; bracts short, overlapping, with leathery or dry central portion and broad membranous margins, inner forked apically and shorter than to ± as long as outer. *Flowers* zygomorphic, lasting several days, blue to violet, mauve, white or flushed lilac, scentless or pleasantly scented, with nectar from septal nectaries; perianth tube short, curving outward, ± cylindric below, flaring in upper half; tepals ± equal, dorsal slightly larger and arching over stamens, lower tepals extended ± horizontally. *Filaments* unilateral, arcuate, slender, free; anthers oblong, held under the dorsal tepal, splitting longitudinally. *Ovary* ovoid, sessile; style branches slender, usually deeply divided and recurved, or barely notched at apex. *Capsules* woody, small, narrowly ovoid-ellipsoid or urn-shaped with ovules in lower fourth. *Seeds* 2 to 4(5) per locule, 3(4)-sided below, elongate, widest at micropylar end with micropylar crest and micropyle above base, tapering and pointed at chalazal end, surface slightly wrinkled. *Pollen grains* zonasulculate, exine reticulate. *Basic chromosome number x* = 10.

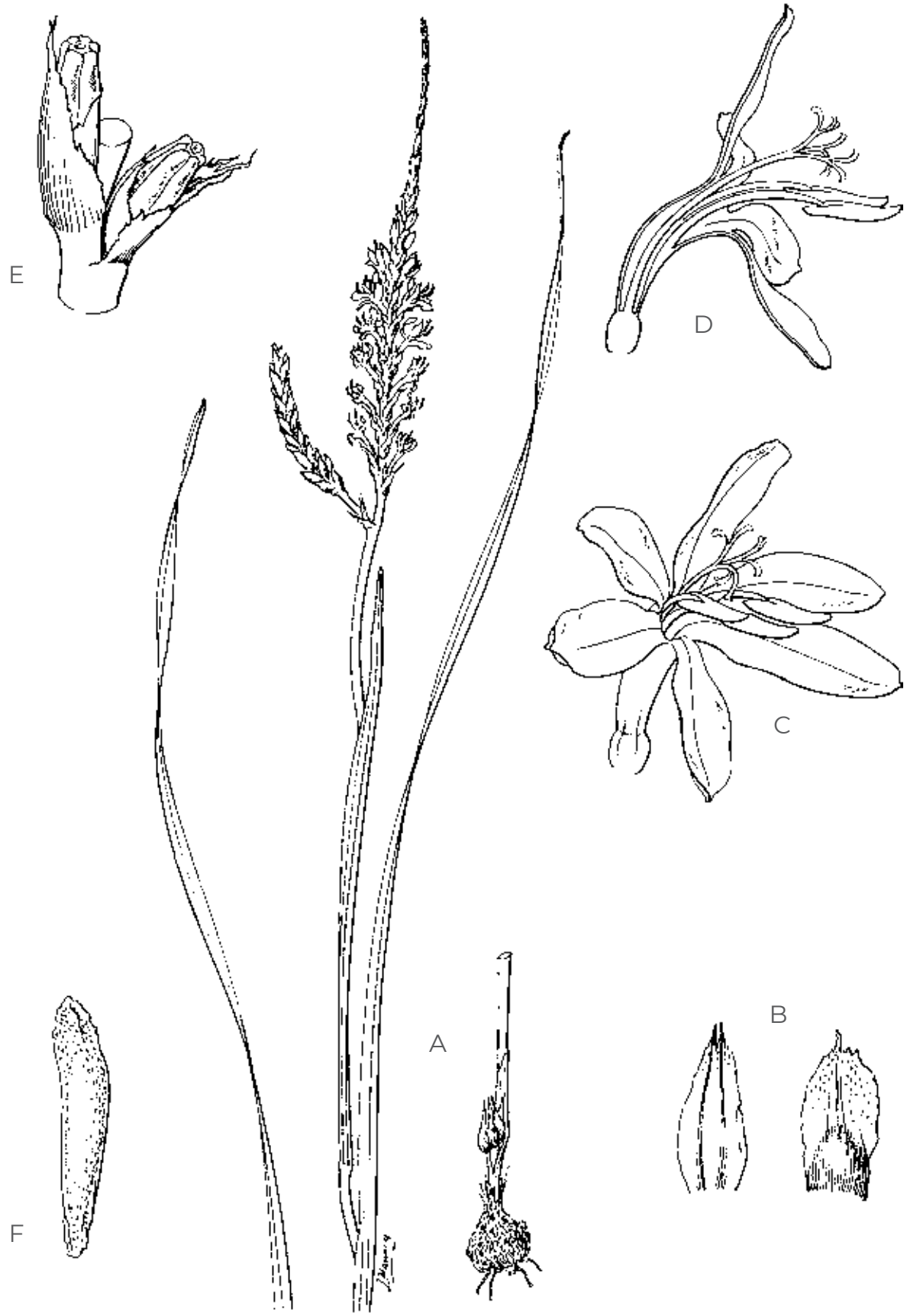
Species 7: Core Cape Floristic Region, South Africa.

This small genus restricted to the southern African winter-rainfall region stands out in its tiny flowers that have tepals seldom longer than 8 mm, a perianth tube typically about as long and spikes of numerous flowers crowded on 2-ranked spikes. *Micranthus thereianthoides* stands out in having an elongate perianth tube up to 25 mm long. The flowers are usually pale to deep blue, rarely white or lilac and always zygomorphic, with a hood-like dorsal tepal and unilateral, arcuate stamens. Corms of *Micranthus* are axillary in development and this together with the deeply divided style branches (not in *M. simplex*) place the genus in tribe Watsonieae. Molecular phylogenetic studies retrieve the genus closest to *Thereianthus* with which it was historically associated. *Micranthus* shares with *Thereianthus* an unusual feature, foliage leaves inserted at the base of the stem and only the cataphylls contribute to the formation of the corm tunics. Pollen grains of *Micranthus* are zonasulculate, thus strikingly different to the typical monosulcate-operculate condition of Crocoideae, where the operculum is usually 2-banded (sometimes 1-banded as in some species of *Thereianthus*). Variation in *Micranthus* species is mainly in the leaves, which range from plane and sword-shaped, to linear with prominent veins, cross-shaped in section or terete and hollow or inflated.

Key to species

Note: plants with the lower part of the spike bearing smaller, paler floral bracts subtending one or more small cormlets may be *Micranthus plantagineus* or *M. tubulosus* or may be hybrids involving these two species or with *M. alopecuroides* and are not accommodated in the key.

1a Leaf blades either plane with evident central vein or one or two prominently thickened veins, or terete and 4-grooved with thickened margins, not hollow; style variously dividing between mouth of perianth tube to opposite middle of anthers:
2a Lowermost leaves plane and linear to lanceolate or falcate, (2–)4–12 mm wide; style branches divided ± halfway ..... 1. *M. alopecuroides*
2b Lowermost leaves either plane and linear or terete and cross-shaped in section, up to 2 mm wide; style branches divided up to halfway or undivided:



Micranthus alopecuroides: A, flowering plant; B, outer bract (right) and inner bract (left); C, flower; D, half-flower; E, capsules; F, seed.

3b Flowers white, outer tepals tipped palest lilac, fading slightly darker lilac; style branches undivided or barely notched at apex . . . . . 2. *M. simplex*
3b Flowers pale blue, blue-mauve or deep blue or white; style branches divided up to halfway:
4a Style dividing at mouth of perianth tube opposite middle of filaments; style branches ± 2.5 mm long, divided less than ⅓; leaves at least 1.5 mm wide. . . . . 6. *M. cruciatus*
4b Style dividing between base and middle of anthers; style branches usually ± 1.0 mm (up to 1.5 mm) long, divided up to halfway; leaves < 1 mm wide . . . . . 5. *M. filifolius*
1b Leaf blades tubular and hollow, round or ± compressed in section; style dividing opposite base to middle of anthers (rarely just below anther bases):
5a Perianth tube elongate and ± twice as long as bracts, 22–25 mm long; bracts 8–15 mm long. . . . . 3. *M. thereianthoides*
5b Perianth tube shorter than bracts, < 10 mm long; bracts 5–7 mm long:
6a Flowering stem ± flexed at each aerial node; stem with prominent, coarsely fibrous collar around base . . . . . *M. plantagineus* × *M. tubulosus*
6b Flowering stem straight, stiffly erect; stem with or without collar of fibres around base:
7a Blade of lowermost leaf terete or oval in section, ± straight, green at flowering and smooth when fresh (with evident thickened veins when dry); stem without collar of fibres around base; capsules narrowly ovoid to ± urn-shaped. . . . . 7. *M. plantagineus*
7b Blade of lowermost leaf tubular and inflated, falcate with prominent apical mucro, often dry at flowering, without prominent veins when alive or dry; stem with collar of fibres around base; capsules narrowly ovoid . . . . . 4. *M. tubulosus*

1. **Micranthus alopecuroides** *(L.) Eckl.*, Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon: 43 (1827); Goldblatt et al.: 132 (2013). *Gladiolus alopecuroides* L.: 5 (1756). *Ixia alopecuroides* (L.) L.f.: 92 (1782). *I. plantaginea* Aiton: 59 (1789), illegitimate superfluous name for *G. alopecuroides* L. *Paulomagnusia alopecuroides* (L.) Kuntze: 702 (1891). Type: South Africa, [Western Cape], Somerset West, 19 Nov. 1944, *Barker 3384* (NBG, neo., designated by Goldblatt & Manning: 132 (2013); PRE iso.).

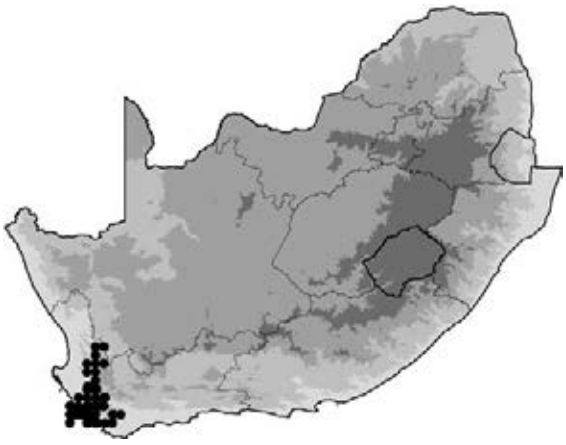
[*Watsonia compacta* G.Lodd.: t. 1577 (1830), invalid name without description.]

[*Micranthus plantagineus* sensu auct., non Eckl. (1827).]

Plants mostly 200–450 mm high, base usually sheathed with collar of short fibres. *Corm* mostly 10–12 mm diam., tunics of dark brown, relatively coarse, reticulate fibres, drawn into short bristles above. *Stem* usually simple or 1- or 2(3)-branched, when unbranched often with one or more scales below base of spike; usually bearing 1 or more cormlets in axil of lowermost foliage leaf. *Leaves* 2 to 4(5), lowermost 1 or 2 plane, broadly to narrowly falcate (occasionally ± lanceolate) or linear, (2–)5–10(–15) mm wide, with moderately prominent main vein; margins slightly or occasionally heavily thickened, hyaline when dry; upper 1 or 2(3) leaves largely sheathing. *Spike* mostly 40- to 80-flowered, often much congested, with internodes 1.5–3.0 mm long; bracts 5–7 mm long, outer with broad to narrow brown centre and translucent membranous margins, inner ± as long as outer, notched apically, translucent with 2 dark veins slightly broader toward base; lower or all nodes sometimes vegetative and then bracts paler in colour and subtending one (or more) cormlets in each axil. *Flowers* usually dark blue, sometimes pale blue, often lower ⅓–¼ of tepals paler blue or white, distally edged with a thin darker blue line, unscented; perianth tube ± 5 mm long; tepals subequal, elliptic, 7–8 × ± 3 mm, with short narrow, claw-like base. *Filaments* ± 5 mm long, diverging in upper half; anthers oblong, 3–4 mm long, pale mauve; pollen white to pale blue. *Style* ± 7 mm long, usually dividing between upper ⅓ of filaments and lower ⅓ of anthers; branches ± 1.2–1.6 mm long, divided for ± half their length. *Capsules* oblong to narrowly ovoid, ± 5 mm long but ± 4 mm long when dry. *Seeds* 3.5–4.0 mm long, 3 or 4 per locule. *Flowering time*: October in the north, November to December in the south.

Distribution and ecology: centred in southwestern Western Cape, South Africa, extending from the Cape Peninsula north into the Olifants River Valley and east locally to Hermanus and Swellendam; typically on well-drained clay or loamy, seasonally wet slopes and flats but also recorded on sandy ground and thin clay or sandy gravel, on rocky pavement.

Diagnosis: *Micranthus alopecuroides* is distinctive in its plane, sometimes very broad lanceolate to linear or falcate, basal leaves sometimes up to 12 mm wide or exceptionally up to 15 mm. Exceptions are numerous and there are populations with ± linear leaves 3–5 mm



Distribution of ***Micranthus alopecuroides***.

wide and only up to 25 mm long. The flowers are typically dark blue but also pale blue, with a perianth tube ± 5 mm long. The spikes of 40 or more flowers are often unusually congested with the internodes ± 1.5 mm long. Populations from the Olifants River Valley and flowering in October, at least three weeks earlier than elsewhere, stand out in their relatively lax spikes with internodes 2.5–3.0 mm long (vs. ± 1.5–2.0 mm elsewhere) and relatively short, straight leaves, 5–8 mm wide with particularly prominent mucronate tips.

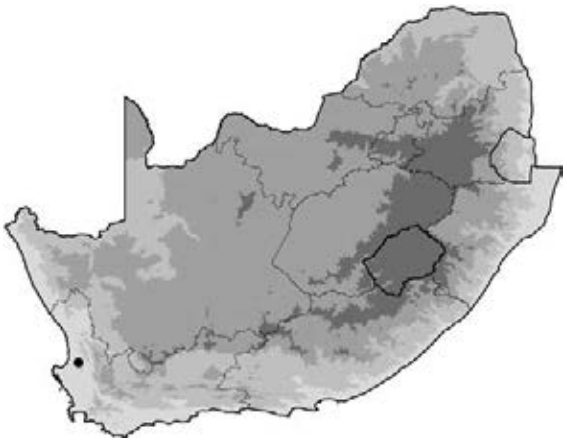
Hybrids from sandy flats south of Malmesbury have abnormally elongated spikes up to 120 mm long, more than ¾ of their length bearing small, pale bracts each enclosing not a flower but a small cormlet. The leaves, either tubular or plane with a central vein, correspond to *Micranthus tubulosus* or *M. alopecuroides* respectively. These plants likely constitute hybrids or a hybrid swarm with *M. alopecuroides* as one parent and *M. tubulosus* or possibly *M. plantagineus* as the other. Similar plants from other sites, notably Rondebosch Common and Vogelgat, Hermanus, show the same striking features. Populations at Elandsberg near Bo-Hermon, with plane, narrowly lanceolate leaves have the inflorescence sterile throughout and bearing a cormlet in all bract axils as do many individuals of the species from Rondebosch Common, Cape Town. The status of these plants is uncertain but they most likely have a hybrid origin.

Micranthus alopecuroides was long known as *M. plantagineus*, but examination of the type shows that the latter is in fact the species previously known as *M. junceus*.

2. **Micranthus simplex** *Goldblatt & J.C.Manning* in Bothalia 43: 133 (2013). Type: South Africa, Western Cape, Piketberg, southwestern slopes of Zebrakop, shallow soil on sandstone pavement, 4 Jan. 1995, *Goldblatt & Manning 10172* (NBG, holo.; K, MO, PRE, iso.)

Plants (100–)140–200 mm high, base sheathed by short collar of brittle fibres. *Corm* tunics of dark brown, reticulate fibres. *Stem* usually simple, rarely 1-branched. *Leaves* (2)3, plane, linear or falcate, ± 1 mm wide, usually with 1 or 2 prominent veins, margins thickened, hyaline when dry. *Spike* 16- to 40-flowered; bracts purple-brown with broad translucent, brown-flecked membranous margins, ± 5 mm long, inner bracts ± as long as outer, membranous with 2 dark keels, notched at apex. *Flowers* white fading to lilac, outer tepals tipped pale lilac, with subapical brown ridge on reverse; perianth tube ± 3 mm long; tepals oblong, ± 4 × 1.2 mm. *Filaments* ± 2.5 mm long; anthers oblong, ± 2.5 mm long. *Style* ± 7 mm long, dividing opposite middle of anthers; branches ± 1 mm long, barely notched at apex. *Capsules* oblong, slightly warty in distal half, ± 4 mm long. *Seeds* ± 3 mm long. *Flowering time*: December to at least mid-January.

Distribution and ecology: known only from the slopes of Zebrakop, the highest peak in the Piketberg, Western Cape, South Africa; in shallow soils in moss or in rock crevices on wet sandstone rocks, a habitat that remains moist as late as January when the plants flower.

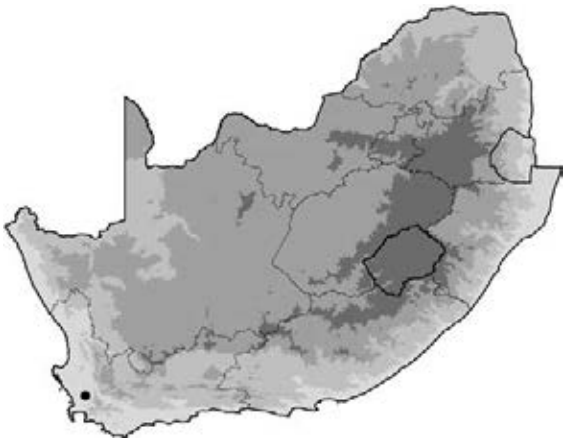


Distribution of ***Micranthus simplex***.

Diagnosis: unusually short for the genus, stems of *Micranthus simplex* rarely exceed 180 mm and the white flowers with lilac-tipped outer tepals are distinctive, other species having flowers in shades of deep to pale blue or blue-mauve, or occasionally white. The inflorescence is relatively lax, the bracts of the lower flowers of the spike not overlapping those above them, but the upper bracts are as closely set as in other species. It is one of two species of *Micranthus* with consistently plane leaves; the other, *M. alopecuroides*, is a taller plant with congested spikes of 40 to 80 flowers and broader leaves mostly 5–12 mm wide. The flowers of *M. simplex* are the smallest in the genus, the perianth tube just 3 mm long and the short anthers ± 2.5 mm long. The short, undivided style branches, ± 1 mm long, are likewise unusual for *Micranthus*, other species of which have style branches divided for at least one third their length.

3. **Micranthus thereianthoides** *Goldblatt & J.C.Manning* in Bothalia 43: 134 (2013). Type: South Africa, Western Cape, Paardeberg, Vondeling, rock cracks and sands along stream, 9 Jan. 2013, *Nicolson 995* (NBG, holo.; K, MO, iso.).

Plants 300–800(–1 200) mm high, base weakly sheathed by fine fibres. *Corm* 10–15 mm diam., tunics of fine to moderately coarse, dark brown, reticulate fibres. *Stem* simple or rarely branched, with solitary cormlet in axil of second leaf and sometimes also third leaf. *Leaves* (4)5 or 6, green or drying at flowering, lowermost 2 or 3 longest, blades 100–300(–800) mm long, 2.5–5.0(–15.0) mm diam., tubular and hollow, sometimes inflated, acute-mucronate, upper leaves progressively shorter and narrower, uppermost bract-like and entirely sheathing. *Spike* 10- to 40(–70)-flowered, bracts brown with broad translucent membranous margins, 8–11(–15) mm long, as long as 1.5–2.0 spike internodes, inner bracts slightly shorter than outer, forked apically, membranous with 2 dark keels broadened toward base. *Flowers* suberect,



Distribution of ***Micranthus thereianthoides***.

dark violet or purple, unscented; perianth tube ± cylindric, 22–25 mm long; tepals oblong, 5–6 × 1.5–2.5 mm, reverse of outer tepals with prominent subapical ridge. *Filaments* 6–8 mm long, exserted ± 3 mm; anthers oblong, 3.5–4.0 mm long. *Style* 24–27 mm long, dividing between middle and slightly beyond anthers, branches ± 1.5(–2.0) mm long, divided for ± half their length. *Capsules* ovoid, smooth, 5–6 mm long, with ± 4 seeds per locule. *Seeds* ± 3.5 mm long. *Flowering time*: January.

Distribution and ecology: a narrow endemic of the Paardeberg near Malmesbury in Western Cape, South Africa; at mid- to upper elevations along the banks of seasonal streams, the corms usually wedged among granite rocks, sometimes in humic loam.

Diagnosis: *Micranthus thereianthoides* closely resembles *M. plantagineus* and *M. tubulosus* in its cylindric leaves but is unique in the genus in the relatively large floral bracts, 8–11 mm long, and most strikingly in its dark violet flowers with elongate, cylindric perianth tube 22–25 mm long, thus ± twice as long as the bracts. The species appears never to develop cormlets in the floral bract axils. The species was discovered in January 2012 by local plant enthusiasts Greg Nicholson and Dewan Roets during a botanical survey of the Paardeberg. The long-tubed, violet flowers are evidently adapted to pollination by long-proboscid flies. The incomplete fruit set in wild plants suggests that *M. thereianthoides* is an obligate outcrosser.

4. **Micranthus tubulosus** *(Burm.f.) N.E.Br.* in Bulletin of Miscellaneous Information Kew 1929: 133 (1929); Goldblatt et al.: 134 (2013). *Gladiolus tubulosus* Burm.f.: 2 (1768). *Ixia cepacea* Basseporte ex DC. in Redouté: t. 96 (1804), as new name in *Ixia,* not *I. tubulosa* Burm. f. (1768) (= *Babiana tubulosa* (Burm.f.) Ker Gawl.). Type: South Africa, without precise locality or collector (G: Herb. Burman, holo.).

   Gladiolus fistulosus Jacq.: 8 (1797). *Ixia fistulosa* (Jacq.) Sims: t. 523 (1801), illegitimate homonym, not *I. fistulosa* Andrews (1799) [= *Hesperantha radiata* (L.f.) Ker Gawl.]. *Micranthus fistulosus* (Jacq.) Eckl. ex Baker: 179 (1892), illegitimate superfluous name for *G. tubulosus* Burm.f. Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 16 (1797), left hand plant, lecto., designated by Goldblatt & Manning: 134 (2013).

   Watsonia spicata Sol. ex Ker Gawl.: sub t. 553 (1803), illegitimate superfluous name for *Gladiolus spicatus* L. (1753), *G. tubulosus* Burm.f. (1768) & *G. fistulosus* Jacq. (1797). [The citation *Watsonia spicata* (L.) Ker Gawl.: 229 (1804) is an error]. Type: South Africa, without precise locality, illustration in Ker Gawler: t. 523 '*Ixia fistulosa*' (1801).

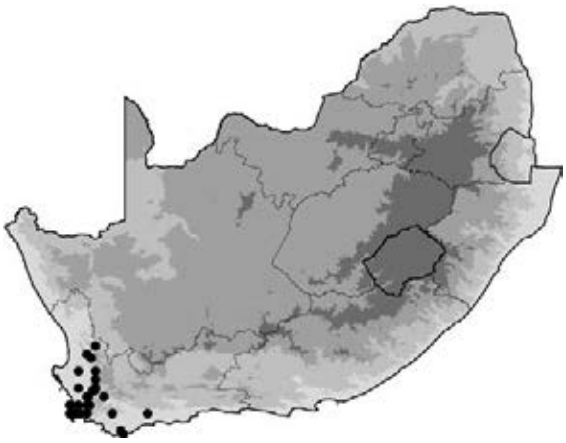
   [*Ixia teretifolia* Herb. Banks ex Sims: t. 523 (1801), invalid name only in synonymy.]

   [*Micranthus fistulosus* Eckl.: 44 (1827), invalid name without description. Probably intended as a combination but basionym not cited.]

Plants (70–)150–350(–600) mm high, base sheathed by collar of short, stiff, bristly fibres. *Corm* 14–18 mm diam., tunics of coarse, dark brown, reticulate fibres. *Stem* simple or branched, occasionally with cormlets in axil of lowermost leaf and of uppermost cataphyll. *Leaves* (2)3 to 5, usually dry at flowering, lowermost 1 or 2 longest, blades 50–200 mm long (up to 300 mm in sterile plants), 4–7 mm diam., inflated, tubular and hollow, apex obtuse-mucronate, upper leaves progressively shorter and narrower. *Spike* 16- to 40-flowered; bracts mid- to dark brown, 5–6 mm long, outer with broad translucent membranous margins, inner bracts ± as long as outer, forked apically, membranous with 2 dark keels broadened toward base; lower nodes sometimes vegetative with one or more cormlets and bracts then pale. *Flowers* pale or dark blue or white, sweetly scented; perianth tube 5–6 mm long; tepals oblong, 5–6(–10) × 1.2–2.5 mm, reverse of outer tepals with prominent subapical ridge. *Filaments* 6–8 mm long; anthers oblong, 3.5–4.0 mm long. *Style* 7–8 mm long, dividing opposite or slightly below base of anthers, branches ± 1.5(–2.0) mm long, divided for ± half their length. *Capsules* ovoid, smooth, 4–5 mm long, with 3 or 4 seeds per locule. *Seeds* ± 3 mm long. *Flowering time*: November to December.

Distribution and ecology: restricted to the western half of Western Cape, South Africa, extending from the Cape Peninsula as far as the northern Cederberg at Heuningvlei and east to Suurbraak and the Agulhas Peninsula; on flats and lower slopes, usually on clay and granite-derived soils but also on sandstone.

Diagnosis: the inflated, tubular, falcate leaves are diagnostic for *Micranthus tubulosus*, the spikes and flowers of which differ hardly at all from those of *M. alopecuroides*. A particularly distinctive feature of the leaves is the prominent brown mucro at the obtuse to ± truncate apices. The leaves are often ± dry at flowering time. Marloth (1915: plate 41) has a particularly apt illustration of



Distribution of ***Micranthus tubulosus***.

the species. As in *M. plantagineus*, one or more cormlets may be produced in the lower axils of the spike. The condition is more frequent, although not consistent, in *M. plantagineus*. Despite its apparently preferred habitat on relatively dry slopes, *M. tubulosus* can occasionally be found on moist sandy flats, sometimes co-occurring with *M. alopecuroides* and *M. plantagineus*. Hybrids between these two species at shared sites blur their usually clear foliar differences. A curious feature of *Micranthus tubulosus* is that populations may consist of a mixture of some plants with entirely fertile spikes and others with the lower part of the spike sterile.

Hybrids: the following interspecific hybrids are known involving *Micranthus tubulosus*: *M. tubulosus* × *M. alopecuroides* and *M. tubulosus* × *M. plantagineus*. Those with *M. plantagineus* can form large populations locally, probably backcrossing with one other parental species.

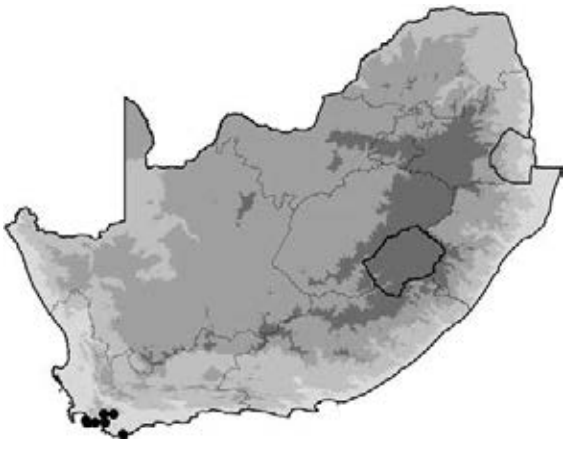
5. **Micranthus filifolius** *Goldblatt & J.C.Manning* in Bothalia 43: 137 (2013). Type: South Africa, Western Cape, Akkedisberg Pass, sandy hillside, 18 Nov. 2011, *Goldblatt & Porter 13370* (NBG, holo.; MO, PRE, iso.).

Plants 180–300 mm high, base sheathed with sparse to well-developed collar of fibres. *Corm* 12–16 mm diam., tunics of relatively soft, fine or thicker fibres. *Stem* unbranched or rarely with single short branch, without cormlets in leaf axils. *Leaves* 4–6, green or beginning to dry from tips at flowering time, lowermost longest, reaching to middle of spike to shortly exceeding it, blade either ± terete and ± 1 mm diam. or ± plane and ± 2 mm wide, with heavily thickened central vein and margins, separated when dry by narrow longitudinal grooves, upper leaves shorter, with sheaths overlapping, uppermost 1 or 2 leaves sheathing for most of their length, with short free tips. *Spike* mostly 18- to 50-flowered, closely congested, lower bracts always subtending flowers; bracts mid- to dark brown, ± 5 mm long, outer with broad translucent membranous margins, inner slightly shorter than outer, with 2 dark keels broadened toward base, notched apically. *Flowers* pale mauve or midblue, unscented; perianth tube ± 5 mm long; tepals oblong, ± 5 × 2.2–2.8 mm. *Filaments* ± 5 mm long, exserted ± 2.5 mm; anthers oblong, ± 3 mm long. *Style* ± 7 mm long, dividing between base and middle of anthers; branches 1.0–1.6 mm long, divided for up to half their length, rarely only notched at apex. *Capsules* narrowly ovoid, smooth, 4–6 × ± 2 mm, with up to 4 seeds per locule. *Seeds* 3–5 mm long. *Flowering time*: mid-November to late February.

Distribution and ecology: centred in the Caledon District of Western Cape, South Africa, extending from Steenbras and Cape Hangklip east to Elim, including the lower slopes of Caledon Swartberg; mostly on clay or loamy soils, particularly abundant after fire.

Diagnosis: with its narrow leaves, the lowermost of which is linear or terete, *Micranthus filifolius* is most like *M. plantagineus* in general appearance. It differs, however, from that species in several respects, particularly in the solid, rather than hollow, leaf blades of the lowermost and sometimes the upper leaves. The leaves closely overlap one another and sheath the stem up to the base of the spike. Plants typically have four or five leaves but sometimes even six leaves, the upper one or two largely to entirely sheathing. Unlike *M. plantagineus*, plants do not produce cormlets in the leaf axils and the corm tunics are usually soft-textured with the base enclosed by a collar of fibres, whereas *M. plantagineus* has coarser corm tunics, lacks a basal collar of fibres, and cormlet production is conspicuous in the lowermost and sometimes other leaf axils. The flowers, although typical of *Micranthus*, are somewhat smaller than in *M. plantagineus,* having a perianth tube mostly 4–5 mm long and tepals ± 4 mm long, and are more often pale mauve (drying white), although the western populations are dark blue (drying blue), the flower colour in most populations of *M. plantagineus.* Typical *M. plantagineus* has been recorded close to most localities of *M. filifolius*, flowering in November and December.

Plants bloom unusually late in the season, with mostly after mid-January, and sometimes in mid- to late



Distribution of ***Micranthus filifolius***.

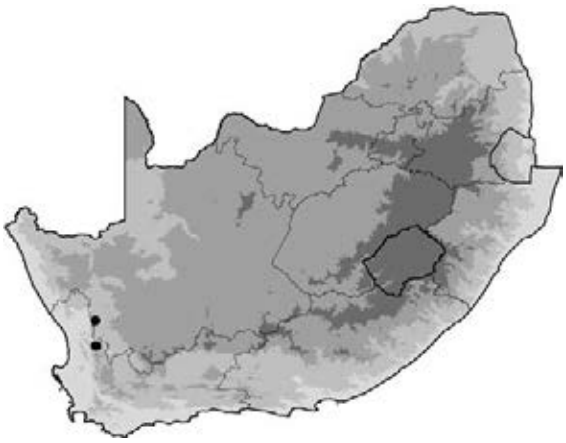
February. Inland populations, as from Drayton Siding, east of Caledon, and Akkedisberg Pass, flower from mid-November to early January and are in fruit before any coastal populations come into flower, the early flowering possibly due to warmer and drier conditions well inland of the coast. The coarser corm tunic fibres and collar of fibres around the base of the stems in these populations are perhaps adaptations to the drier habitat. Plants sometimes co-occur with or grow close to *M. plantagineus*, which is in fruit when *M. filifolius* begins to bloom, two or three weeks after the last flowers of *M. plantagineus* have faded, both at the coast and at inland sites. *Micranthus filifolius* also occasionally co-occurs with *M. tubulosus*.

6. **Micranthus cruciatus** *Goldblatt & J.C.Manning* in Bothalia 43: 139 (2013). Type: South Africa, Western Cape, Pakhuis Mtns, trail to Heuningvlei, local in wet seep on rocky sandstone slope, 19 Dec. 1995, *Goldblatt 10438* (NBG, holo.; MO, iso.).

Plants 300–450 mm high. *Corm* globose, 8–10 mm diam., tunics of brown, soft membranous layers not accumulating. *Stem* simple or 1-branched, usually with 1 or 2 small cormlets in lowermost leaf axil. *Leaves* (3)4 or 5, lower 3 linear to subterete, ± 1.5 mm wide, margins and midrib heavily thickened with narrow longitudinal grooves between (often cross-shaped in section with 4 narrow longitudinal grooves), reaching to base or middle of spike, uppermost leaf sheathing stem almost to base of spike, with short free portion. *Spike* up to 70-flowered; bracts brown or straw-coloured with broad translucent membranous margins, ± 4 mm long, inner ± as long as outer, membranous with 2 dark keels, apically notched. *Flowers* pale blue-mauve (drying ± white) or deep blue; perianth tube ± 3 mm long; tepals oblong, ± 4 × 1.5 mm. *Filaments* ± 5 mm long; anthers oblong-linear, ± 3 mm long. *Style* ± 4 mm long, dividing ± at mouth of tube opposite middle of filaments, branches ± 2.5 mm long, divided for ± ⅓ their length. *Capsules* oblong, smooth, ± 2.5 mm long, evidently immature. *Seeds* unknown. *Flowering time*: mid-November to late December, possibly January.

Distribution and ecology: restricted to the northern Cape flora region of South Africa, extending from the Bokkeveld Mtns southwest of Nieuwoudtville in Northern Cape to the northern Cederberg near Pakhuis Pass in Western Cape; on rocky slopes, in seeps on thin sandy soil over sandstone pavement. The species is poorly documented.

Diagnosis: linear- to terete-leaved *Micranthus cruciatus* is immediately distinguished by its solid, narrow leaf blades, ± 1.5 mm wide, with heavily thickened veins and margins separated by narrow longitudinal grooves. Leaves are either linear or terete becoming cross-shaped in section distally with only the margins and central vein thickened. Plants broadly resemble *M. plantagineus* but are more slender than is usual in that species, which has hollow leaves 2–3 mm diam. and is



Distribution of ***Micranthus cruciatus***.

conspicuous in the production of cormlets in the lowermost and sometimes upper leaf axils. *Micranthus cruciatus* bears no more than one or two small cormlets, these in the axil of the lowermost leaf. The pale mauve-blue or sometimes dark blue flowers are notable in the short perianth tube, ± 3 mm long, in the style dividing at the mouth of the perianth tube and in the unusually long style branches up to 2.5 mm long, divided for up to one third their length. The narrow, heavily thickened leaf in *M. cruciatus* is similar to that in *M. filifolius*, but in other critical details the two are very different, the latter with coarsely fibrous corm tunics and a collar of fibres around the base of the stem.

Typical, hollow-leaved *M. plantagineus* with dark blue flowers also occurs in the Pakhuis and Bokkeveld mtns, as well as in the Cederberg but has not been recorded growing near *M. cruciatus*.

7. **Micranthus plantagineus** *Eckl.*, Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon: 43 (1827), as a new name for *Ixia plantaginea* Aiton: 59 (1789), illegitimate superfluous name for *Gladiolus alopecuroides* L.; Goldblatt et al.: 140 (2013). *Watsonia plantaginea* Ker Gawl.: t. 553 (1803), as a new name for *Ixia plantaginea* Aiton and illegitimate superfluous name for *G. alopecuroides* L. Type: South Africa, without precise locality, *Masson s.n. BM922008* (BM, holo.: narrow-leaved specimens mounted with the type (*Nelson 1777*) with broad, flat leaves are *M. alopecuroides*]).

Phalangium spicatum Houtt.: 115 (1780). Type: South Africa, without precise locality or collector, illustration in Houttuyn: t. 80 f. 2 (1780).

Micranthus plantagineus var. *junceus* Baker: 179 (1892). *M. junceus* (Baker) N.E.Br.: 138 (1929). Type: South Africa, [Western Cape], Groenekloof and vicinity, *Zeyher 1611* (K, lecto., designated by Goldblatt & Manning: 140 (2013), K000320508; PRE, isolecto.; other collections numbered

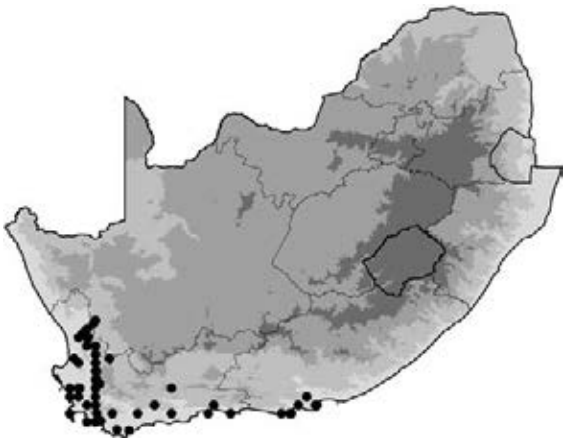
Zeyher 1611 in PRE and SAM are from Klipfontein or Tulbagh, thus not type material).

[*Phalangium spicatum* Burm.f.: 3 (1768), invalid name without description. The cited illustration, Plukenet: t. 310, f. 1 (1694), lacks text or figure analysis and probably represents *Ixia scillaris* L.; specimen in G: Herb. Burman is *Micranthus* and designated the 'type'. *Micranthus spicatus* (Burm.f.) N.E.Br.: 138 (1929), invalid name.]

Plants 200–400(–650) mm high, base without collar of fibres. *Corm* globose, 12–15 mm diam., tunics of dark brown, medium-textured, reticulate fibres drawn into fine points above. *Stem* simple or with up to 9 short branches, with cormlets in axil of lowermost leaf, sometimes of upper cataphyll, rarely other leaf axils. *Leaves* (2)3(4), green at flowering, lowermost leaf longest, blades terete or oval in section, hollow, 2.0–3.5 mm diam., smooth when fresh with translucent veins, when dry, veins appearing thickened with homologue of marginal vein pair more prominent, usually reaching to middle of spike to shortly exceeding spike, uppermost 1 or 2 leaves sheathing for most of length, with free part often slightly longer than sheath. *Spike* (16–)40- to 100-flowered, lower bracts sometimes subtending cormlets; bracts mid- to dark brown, ± 6 mm long but slightly smaller if subtending cormlets, outer with broad translucent margins, apices sharply acute and ultimately curved outward, inner bracts ± as long as outer, with 2 dark keels broadened toward base. *Flowers* usually dark blue, occasionally pale blue or white, evidently sometimes slightly sweetly scented, perianth tube 6–7 mm long; tepals oblong, with thickened subapical ridge on reverse, (4–)6–7 × ± 1.2 mm. *Stamen* filaments ± 5 mm long; anthers oblong, 3–4 mm long. *Style* ± 7 mm long, dividing between lower ⅓ and middle of anthers (rarely ± 1 mm below anthers), branches 1.0–1.8 mm long, divided for ⅓–½ their length. *Capsules* smooth, ± urn-shaped or narrowly ovoid, (3)4–5 × 2–3 mm, with (2)3 or 4 seeds per locule. *Seeds* ± 4 mm long. *Flowering time*: October to December (rarely in May).

Distribution and ecology: widespread in the Cape flora region of South Africa, extending from the Bokkeveld Mtns near Nieuwoudtville in Northern Cape south through Western Cape to the Cape Peninsula and east to Port Elizabeth in Eastern Cape but poorly represented in the Little Karoo and Swartberg; typically in seasonally wet habitats, often in marshy sites, along streams, or at least in places that are waterlogged in the winter months.

Diagnosis: identification of *Micranthus plantagineus* depends largely on leaf morphology: the two to four leaves are straight, firm-textured, erect, hollow and round to oval in section, ± 2–3 mm diam., and reach or shortly exceed the spike. When alive the leaves are smooth with the veins evident as paler, translucent lines. On drying, the veins appear hyaline and the veins at the adaxial and abaxial poles are somewhat more prominent. The stem is often branched, and as many as four (exceptionally



Distribution of ***Micranthus plantagineus***.

nine) short branches may be produced shortly below the base of the main spike, these seldom exceeding half the length of the main spike. The lower flowers of the spike are often replaced by cormlets [as many as five may be present in an axil]. The feature is not universal and plants may have normal flowers and capsules from base to apex of the spike. A second characteristic feature of *M. plantagineus* is the presence of one or more cormlets in the lowermost leaf axil (not invariably present in other species) and occasionally in the axils of the upper cataphyll and one or more of the upper leaves. Plants lack a collar of fibres around the base (in contrast to superficially similar *M. filifolius* and *M. tubulosus*).

There are two, somewhat poorly defined morphs of the species. One has narrow leaves, ± 2 mm diam. when alive, and slender capsules, ± 4.3 × 1.5 mm. Plants with mature capsules have (1)2 fusiform-angular seeds per capsule, ± 3.7–4.0 mm long. The second morph has broader leaves, 2–3 mm diam. when alive, and urn-shaped capsules ± 5 × 2–3 mm. Capsules have 4 seeds per locule, these flattened-angular, 3.0–3.5 mm long. A collection from a marshy site on Viljoen's Pass made in May 1935 conforms exactly to *Micranthus plantagineus*, the only apparent difference being the flowering time.

Interspecific hybrids are not uncommon in *Micranthus* and are likely to occur when two or more species co-occur. Most striking are those between *M. plantagineus* and *M. tubulosus*. The two species flower together at the foot of the Elandskloof Mtns in Elandsberg Nature Reserve and present a remarkable sight. The hybrids are locally very common growing with typical *M. tubulosus* and are always slightly shorter that the parent, 100–150 mm high, and like it have a well-developed collar of fairly coarse fibres around base. The other parent is less common but present in small clumps, recognised by its erect habit, straight leaves and pale blue flowers. The hybrid is evidently fertile and stands out in having a slightly flexuose stem and narrower leaves than either parent. Unlike *M. tubulosus*, which they otherwise most closely resemble, hybrid individuals bear small cormlets at aerial nodes and sometimes at the base of

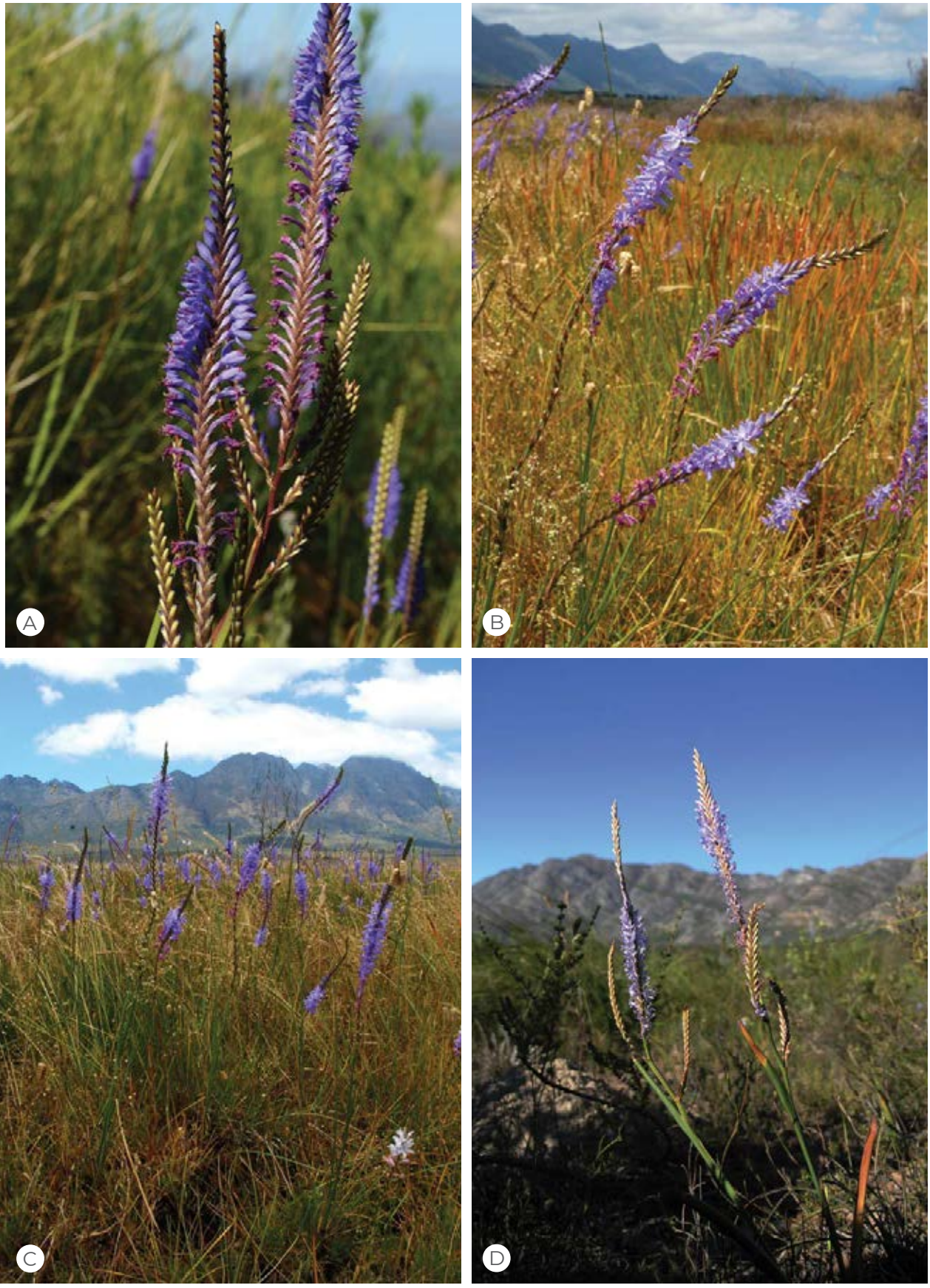


Plate 14: A, ***Micranthus plantagineus***, Cape Peninsula, WC; B & C, ***M. plantagineus***, Hermon, WC; D, ***M. tubulosus***, Hermon, WC.

the spike. Similar hybrid plants have also been recorded near Elim where *M. tubulosus* and *M. plantagineus* also grew side by side.

Less common are hybrids between *Micranthus tubulosus* and *M. alopecuroides*, but at Elandsberg Nature Reserve we noted both species growing close to one another with apparent hybrids between them. The putative hybrids have short, plane leaves, in outline like those of *M. tubulosus* but not round in section, although the leaves have an airspace between the two surfaces and lack the visible main veins of *M. alopecuroides*.

REFERENCES

AITON, W. 1789. *Hortus Kewensis*, vol. 1. George Nicol, London.

ANDREWS, H. 1799. *Ixia fistulosa*. *The Botanists Repository* 1(3): t. 59.

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell and Co., London.

BROWN, N.E. 1929. The Iridaceae of Burman's *Florae capensis prodromus*. *Bulletin of Miscellaneous Information Kew* 1929: 129–139.

BURMAN, N.L. 1768. *Prodromus florae capensis*. Cornelius Haak, Leiden.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.

GOLDBLATT, P. & MANNING, J.C. 2008. The *Iris* family: natural history and classification. Timber Press, Portland, OR.

GOLDBLATT, P., MANNING, J.C. & GEREAU, R.E. 2013. The Cape genus *Micranthus* (Pers.) Eckl. (Iridaceae: Crocoideae): nomenclature and taxonomy. *Bothalia* 43: 127–144.

HEDWIG, R.A. 1806. *Genera Plantarum*. Reclam, Leipzig.

HOUTTUYN, M. 1780. *Natuurlyke Historie*, edn. 2, vol. 12. F. Houttuyn, Amsterdam.

JACQUIN, N.J. 1797. *Plantarum rariorum horti caesarei schoenbrunnensis* 1. C.F. Wappler, Vienna.

KER GAWLER, J.B. 1801. *Ixia fistulosa*. Hollow-leaved Ixia. *Curtis's Botanical Magazine* 16: t. 523.

KER GAWLER, J.B. 1803. *Ixia plantaginea*. Small-flowered Watsonia. *Curtis's Botanical Magazine* 16: t. 553.

KER GAWLER, J.B. 1804 ['1805']. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.

KUNTZE, O. 1891. *Revisio Generum Plantarum*, vol. 2. Felix, Leipzig.

LINNAEUS, C. 1753. *Species plantarum*. Salvius, Stockholm.

LINNAEUS, C. 1756. *Centuria plantarum II*. Höjer, Uppsala.

LINNAEUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Braunschweig.

LODDIGES, G. 1830. *Watsonia compacta*. *The Botanical Cabinet* 16: t. 1577. C. Loddiges & Sons, London.

MARLOTH, R. 1915. *Flora of South Africa. 4. Monocotyledons*. Juta, Cape Town.

PERSOON, C.H. 1805. *Synopsis plantarum* 1. Cramer, Paris.

PLUKENET, L. 1694. *Phytogeographia*. Part 4. London.

REDOUTÉ, P.J. 1804. *Les Liliacées* 3. Didot Jeune, Paris.

SIMS, G. 1801. *Ixia fistulosa*. Hollow-leaved ixia. *Curtis's Botanical Magazine* 15: t. 523.

WENDLAND, J.C. 1798. *Botanische Beobachtungen*. Gebrüdern Hahn, Hannover.

10. **Codonorhiza**

Codonorhiza *Goldblatt & J.C.Manning* in Strelitzia 35: 88 (2015).
Type: *C. corymbosa* (L.) Goldblatt & J.C.Manning

Lapeirousia sect. *Fastigiatae* [as *Fastigiata*] Goldblatt: 15 (1972). *L.* subg. *Paniculatae* sect. *Fastigiatae* (Goldblatt) Goldblatt & J.C.Manning 77: 373 (1990). Type: *L. corymbosa* (L.) Ker Gawl. = *Codonorhiza corymbosa* (L.) Goldblatt & J.C.Manning

Revisionary account: Goldblatt & Manning: 88–103 (2015).

Named for the bell-shaped corm, *codon* (Greek for bell), *rhizon* (Greek for root).

Deciduous geophytes. *Corm* flat-based, broadly obconic (± triangular in profile), rooting from base and axillary in origin; tunics of dark brown to blackish, densely compacted fibres. *Foliage leaves* 2 or 3, lowermost inserted at ground level, longest, plane with ± prominent main vein, upper leaves progressively smaller. *Stem* aerial, compressed and angled to winged, simple or repeatedly branched. *Inflorescence* either a spike or a ± flat topped false panicle with sessile flowers; bracts two, opposed, green, firm-textured, usually obtuse to ± truncate, inner ± as long as outer, sometimes notched apically. *Flowers* radially symmetric or zygomorphic, long-lived, salver- or bowl-shaped, blue, purple, red, pink or white, usually with contrasting darker or lighter markings, sometimes sweetly scented; perianth tube ± cylindric or funnel-shaped, short or elongate; tepals subequal or unequal with outer whorl larger. *Stamens* symmetrically disposed or unilateral and arcuate; filaments slender, free; anthers oblong-linear, dehiscence longitudinal. *Ovary* globose; style filiform, branches usually forked for ± ½ their length, occasionally barely forked at tips. *Capsules* cartilaginous, globose to ± top-shaped and 3-lobed. *Seeds* ovoid(–orbicular), flattened at chalazal end, with reticulate to rugulose sculpturing; funicular collar prominent, surface cells ± flat (obscurely domed). *Pollen grains* monosulcate-perforate with 1-banded operculum. *Basic chromosome number x* = 10.

Species 7: restricted to Western Cape, South Africa.

Historically included in *Lapeirousia* because of the shared divided style branches and flat-based corms, *Codonorhiza* has been separated from that genus as a result of a molecular study, which shows the species comprising a clade sister to *Lapeirousia*, *Cyanixia, Savannosiphon* plus the tropical members of *Lapeirousia. Codonorhiza* holds together morphologically, sharing blackish corm tunics, often a flat-topped panicle-like inflorescence, and green, leathery floral bracts. The pollen grains are unusual in this alliance in having a 1-banded operculum rather than the ancestral 2-banded one. Despite its small size, *Codonorhiza* shows some floral diversity, flowers being adapted for bee, moth, hopliine beetle and possibly bee fly pollination. Flowers are blue in most species, but pale yellow (to white) in *C. fastigiata*, dull yellow or dark maroon in *L. micrantha* and mauve-pink in *L. falcata*, the only species with a spicate inflorescence.

Key to species

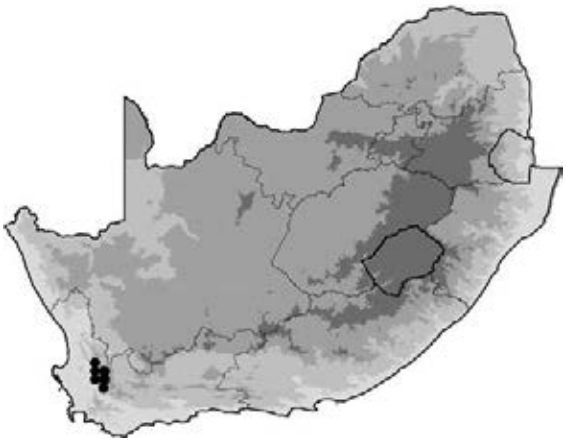
1a Inflorescence a spike; flowers white to pink, lower tepals with purple or red marks in basal half; perianth tube cylindric. . . . . 1. *C. falcata*
1b Inflorescence a flat-topped false panicle with ultimate branches bearing 1 to 5 sessile flowers; flowers predominantly blue, yellow or maroon to light brown; perianth tube cylindric or funnel-shaped:
2a Perianth tube (14–)18–20 mm long; tepals 7–8 mm long . . . . . 3. *C. pillansii*
2b Perianth tube 3–12 mm long:
3a Flowers dull yellow, creamy brown or maroon; perianth tube cylindric 8–10 mm long, ± twice as long as tepals . . . . . 2. *C. micrantha*
3b Flowers blue to violet or pale yellow; perianth tube funnel-shaped, shorter than tepals:
4a Flowers zygomorphic with unilateral stamens; perianth blue to violet, with white or dark blue-black contrasting markings:
5a Flowers medium to dark blue(–violet) with white, bracket-shaped band in basal ⅓ of lower tepals; anthers 3–4 mm long; pollen blue or grey; tepals 12–15 mm long. . . . . 5. *C. elandsmontana*
5b Flowers deep blue(–violet) with dark blue, red-purple or blackish mark (sometimes outlined in white) at base of lower tepals; anthers 3–5 mm long; pollen usually dark red-brown, blue or pale grey; tepals 14–20 mm long . . . . . 4. *C. azurea*
4b Flowers actinomorphic with stamens ascending; perianth blue (rarely white) or pale yellow:
6a Perianth light to dark blue with white, star-shaped mark in centre outlined in darker colour; tepals 6–10 mm long; filaments 5–6 mm long . . . . . 6. *C. corymbosa*
6b Perianth pale yellow, each tepal with small dark mark in lower midline; tepals 14–15 mm long; filaments ± 10 mm long . . . . . 7. *C. fastigiata*

1. **Codonorhiza falcata** *(L.f.) Goldblatt & J.C.Manning* in Strelitzia 35: 89 (2015). *Gladiolus falcatus* L.f.: 96 (1782). *Lapeirousia falcata* (L.f.) Ker Gawl.: 238 (1804); Goldblatt: 28 (1972). *Ovieda falcata* (L.f.) Spreng.: 147 (1824). *Peyrousia falcata* (L.f.) Sweet: 499 (1830a). *Meristostigma falcatum* (L.f.) A.Dietr.: 594 (1833). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1025, holo.).

Lapeirousia pappei Baker: 170 (1892). Type: South Africa, [Western Cape], Winterhoeksberg, Tulbagh, *Pappe s.n.* (K, holo.; BOL, iso.).

Plants short and compact to fairly slender, seldom exceeding 100 mm, simple or with up to 3 branches from near base, stem terete. *Corm* ± 8 mm diam., broadly obconic, tunics dark brown to black, rugose, split longitudinally at base and apex. *Leaves* usually 2, lowermost basal, longest, falcate, ± plane with main vein slightly raised, ± leathery, mostly 5–8 mm wide; upper leaf much shorter. *Inflorescence* a spike, with up to 12 flowers in 2 ranks; bracts green with red margins, outer ± 6 mm long, inner 4–5 mm long. *Flowers* zygomorphic, pale pink to nearly white, lower 3 tepals each with dark pink to mauve or red spot in lower midline, unscented; perianth tube ± cylindric, 12–17 mm long, slightly wider in upper 3–4 mm; tepals ovate-oblong 7–8 × ± 3 mm. *Filaments* unilateral, ± erect, ± 6 mm long, exserted ± 3 mm; anthers ± 1.2 mm long, white; pollen white. *Style* erect, dividing shortly below apex of filaments, branches ± 2.3 mm long, deeply divided, spreading between anthers. *Capsules* top-shaped and 3-angled, 4–5 mm long. *Seeds* ovoid-orbicular, flattened at chalazal end, brown, ± 0.6–0.9 × 0.5 mm, reticulate, funicular collar up to 0.3 mm long. *Chromosome number* 2*n* = 20. *Flowering time*: mainly September and October at lower elevations but as late as mid-December at high elevations.

Distribution and ecology: restricted to the mountains of interior Western Cape, South Africa, extending from Matroosberg and Lakenvlei, east of Ceres, through the Agterwitsenberg Vlakte and Cold Bokkeveld to Elandskloof, south of Citrusdal; on sandstone substrates and often in crevices in rock outcrops or in seeps on sandstone pavement, mostly at middle elevations between 800 and 1 200 m elevation but at 2 200 m on Matroosberg.



Distribution of ***Codonorhiza falcata***.

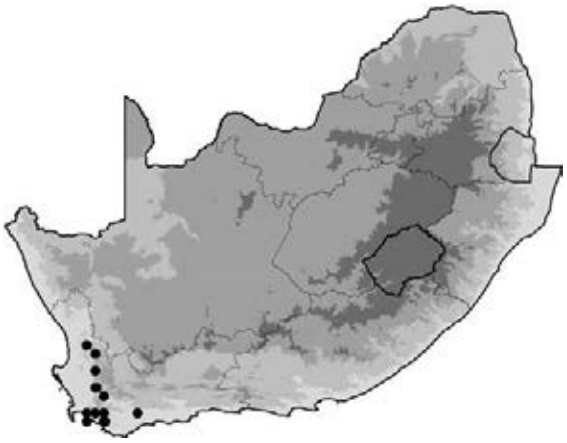
Diagnosis: taxonomically isolated in the genus, *Codonorhiza falcata* is distinguished by the spike-like inflorescence unlike the flat-topped false panicle in other species. The flowers are pale pink to ± white with dark pink to mauve or red markings on the lower tepals, colours unique in the genus. *Codonorhiza falcata* is one of only three species with a cylindric perianth tube, but the other two, *L. micrantha* and *L. pillansii* are immediately distinguished by their flat-topped inflorescences and flowers of different colours.

2. **Codonorhiza micrantha** *(E.Mey. ex Klatt) Goldblatt & J.C.Manning* in Strelitzia 35: 90 (2015). *Ovieda micrantha* E.Mey. ex Klatt: 781 (1864). *Lapeirousia micrantha* (E.Mey. ex Klatt) Baker: 156 (1877); Goldblatt: 27 (1972). Type: South Africa, [Western Cape], Worcester, waterfall, *Ecklon & Zeyher Irid 253* (K, lecto., designated by Goldblatt & Manning: 90 (2015); MO, isolecto.).

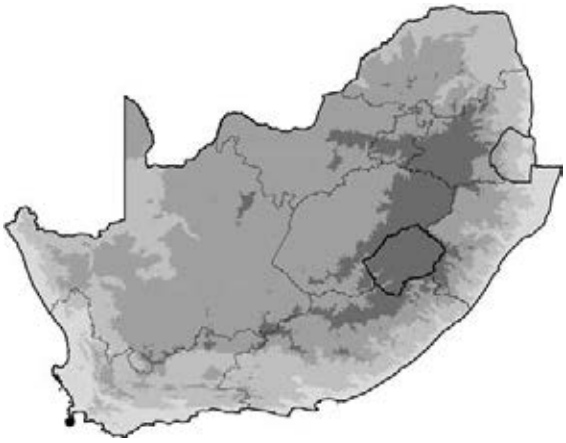
[*Lapeirousia manuleiflora* Eckl.: 31 (1827), invalid name without description.]

[*Meristostigma manuleiflorum* Eckl. ex Steud.: 130 (1841), invalid name without description.]

Plants mostly 120–250 mm high. *Corm* 10–12 mm diam., broadly obconic; tunics dark brown to blackish, basal rim ± crenate, splitting vertically from base. *Stem* flexuose, repeatedly branched, branches subtended by bracts (1–)2–5 mm long, these sometimes leaf-like below, compressed and 2- to 4-winged *Leaves* 2 or 3, lowermost basal, ± falcate, 80–300 × 8–16 mm, margins usually undulate or slightly crisped, main vein prominent, upper leaves inserted near middle of stem, smaller than basal, not or hardly sheathing at base. *Inflorescence* a congested, ± flat-topped false panicle, flowers crowded at branch tips, ultimate branchlets 1- to 3-flowered; bracts green, ± leathery, 2–3 mm long, margins red, inner ± as long as outer, obtuse or inner slightly emarginate. *Flowers* weakly zygomorphic with perianth radially symmetric and stamens and style unilateral, dull yellow to buff-coloured or brown to dull maroon, acrid-sweet or clove-scented; perianth tube ± cylindric, 8–10 mm long; tepals subequal, ± elliptic, obtuse, 3–5 × ± 1.5–2.0 mm. *Stamens* unilateral, ± erect; filaments ± 3.5 mm long, exserted ± 1.5 mm; anthers 1.5–2.0 mm long; pollen dull yellow to buff-coloured. *Style* dividing between base and upper ⅓ of anthers; style branches ± 1 mm long, usually divided for up to ½ their length or undivided. *Capsules* top-shaped, triangular, 5–6 mm long, with up to 6 seeds per locule. *Seeds* ± ovoid, dark brown, 1.3–1.6 mm long, funicular appendage up to 0.5 mm long, surface reticulate. *Chromosome number* 2*n* = 20. *Flowering time*: late September to December.



Distribution of ***Codonorhiza micrantha***.



Distribution of ***Codonorhiza pillansii***.

Distribution and ecology: extending from the Gifberg-Matsikamma Mtn. complex in the northwest to the Langeberg at Garcia's Pass in the southeast of Western Cape, South Africa; on sandy or stony ground, flowering only after fire.

Diagnosis: *Codonorhiza micrantha* stands out among the species with crowded, flat-topped inflorescences in its narrow, cylindric perianth tube, 8–10 mm long, and small, yellow to brown or maroon, strongly scented flowers. Pollination by settling moths is likely because of the dull flower colour and heavy, often clove-like floral odour that are matched in many other moth-pollinated species.

3. **Codonorhiza pillansii** *Goldblatt & J.C.Manning* in Strelitzia 35: 93 (2015). Type: South Africa, [Western Cape], Cape Peninsula, western edge of plateau west of Buffels Bay, 22 Nov. 1921, *Pillans 8928* (BOL, holo.; MO, iso.).

Plants 100–150 mm high, repeatedly branched, upper branches subtended by bracts up to 10 mm long, stem ± flexuose, compressed and 2-winged. *Corm* ± 10 mm diam., broadly obconic; tunics blackish, splitting vertically at base and apex. *Leaves* 2 or 3, lowermost basal and longest, usually falcate, 40–100 × 3–4 mm, acute, with prominent main vein, margins plane, slightly thickened, not or hardly sheathing at base; upper leaves similar, inserted in middle of stem, 25–30 mm long. *Inflorescence* a congested, flat-topped false panicle, flowers crowded at branch tips, ultimate branchlets mostly 2- or 3-flowered; bracts 5–7 mm long, green, leathery, inner ± as long as outer or slightly longer, obtuse or inner ± emarginate. *Flowers* zygomorphic, dark blue, evidently uniformly coloured, scent unknown; perianth tube ± cylindric, (14–)18–20 mm long, ± 1 mm diam. at base, ± 2 mm diam. at mouth; tepals 7–8 × ± 3 mm. *Filaments* unilateral, inserted ± 4 mm below mouth of tube, 7–8 mm long, exserted 3–4 mm; anthers ± 3 mm long; pollen colour unknown. *Style* dividing opposite middle and apex of anthers, ± 2.5 mm long, divided for ± ½ their length. *Capsules* top-shaped, 3-lobed, ± 5 mm long (mature capsules and seeds unknown). *Flowering time*: October and November.

Distribution and ecology: poorly understood and known from a single collection made in 1921 in the Cape Point Nature Reserve in Western Cape, South Africa; most likely in low fynbos on sandy, stony ground, probably flowering only after fire.

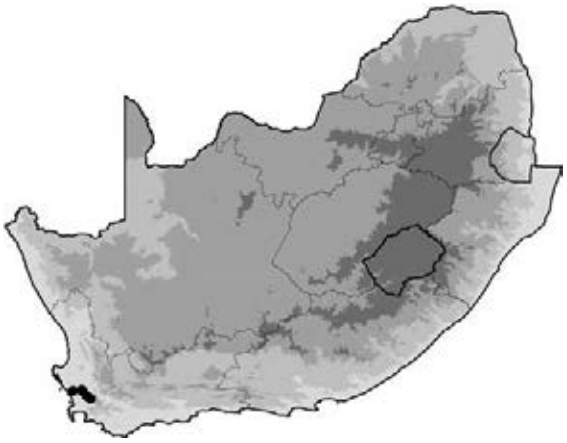
Diagnosis: *Codonorhiza pillansii* broadly resembles *C. corymbosa* in the falcate leaf and many-flowered, flat-topped inflorescence, but is immediately recognised by the flowers with a slender tube (14–)18–20 mm long. The filaments are unilateral and the tepals are subequal in size and evidently symmetrical in disposition. The tepals appear uniformly coloured, which accords with the comment 'flowers blue' on the type collection.

4. **Codonorhiza azurea** *(Eckl. ex Baker) Goldblatt & J.C.Manning* in Strelitzia 35: 93 (2015). *Lapeirousia corymbosa* var. *azurea* Eckl. ex Baker: 90 (1896). *L. azurea* (Eckl. ex Baker) Goldblatt in Goldblatt & Manning: 333 (1992). Type: South Africa, [Western Cape], between Paarl and Pont, *Drège 8509a* (K, lecto., designated by Goldblatt & Manning: 334 (1992); BM, G, MO, P, isolecto.).

[*Lapeirousia azurea* Eckl.: 31 (1827), invalid name without description.]

[*Meristostigma azureum* Eckl. ex Steud.: 131 (1841), invalid name without description.]

Plants 70–180(–260) mm high. *Corms* 12–16 mm in diam., tunics blackish, basal rim split vertically. *Stem* 5- to 7-branched, branches subtended by bracts (1–)2–5 mm long, those below appearing leaf-like, stem compressed and winged. *Leaves* 2, lowermost inserted at ground level, largest, falcate, 50–120(–240) × (6–)10–15 mm, margins undulate and crisped, obtuse to subapiculate, with prominent main vein and a pair of secondary veins (rarely one) on either side almost as prominent, second leaf inserted near middle of



Distribution of ***Codonorhiza azurea***.

stem, 20–70 mm long, oblong-lanceolate, margins ± straight, not or hardly sheathing at base. *Inflorescence* a congested, flat-topped false panicle, flowers crowded at branch tips, ultimate branchlets with 1 or 2 sessile flowers; bracts green, firm-textured, 9–11 mm long, outer folded in midline, margins often red, inner obtuse or slightly emarginate. *Flowers* zygomorphic, tilted backward, dark blue to violet, with triangular, dark blue-black or red-purple blotch at base of lower 3 and sometimes adjacent upper lateral tepals; perianth tube funnel-shaped, 10–12 mm long; tepals elliptic-ovate, obtuse, mostly 17–20 × 7–8 mm. *Filaments* unilateral, ascending or extended horizontally due to adaxial tilting of flower, 11–15 mm long, exserted for 8–10 mm; anthers 3–5 mm long; pollen dark blue or red-brown. *Style* dividing opposite upper ⅓ of anthers; branches 2.5–3.0 mm long, divided for ± ½ their length. *Capsules* ± top-shaped and 3-lobed, ± 6 mm long, with up to 8 seeds per locule. *Seeds* red-brown, ovoid, truncate at chalazal end, rugulo-reticulate, ± 1.0 × 1.0–1.3 mm, with funicular appendage 0.2–0.4 mm long. *Chromosome number* 2*n* = 20 ± 0–2b *Flowering time*: late September to late October.

Distribution and ecology: restricted to lowland sites in southwestern Western Cape, South Africa, between Paarl, Mamre and Riebeeck Kasteel north of Malmesbury; in granite-derived gravel soils rather than the shale-derived clay soils also common in the area, becoming increasingly rare.

The flowers with dark blue-black or red-purple markings are evidently adapted for pollination by hopliine beetles, but visits by large anthophorine bees have also been recorded.

Diagnosis: *Codonorhiza azurea* is distinguished by its large, zygomorphic, intensely dark blue flower bearing large black or dark red blotches on the adaxial tepals. The perianth tube is 8–12 mm long and the tepals (12–)16–20 mm long. The flower is tilted back toward the axis, especially in crowded inflorescences, when the posterior (adaxial) tepals, usually erect, are tilted out of position and come to lie horizontally, thus below the abaxial (lower) tepals, a type of floral presentation also occurring in *C. elandsmontana*.

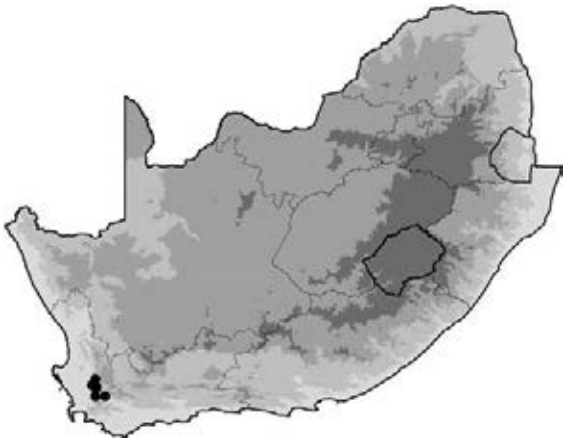
5. **Codonorhiza elandsmontana** *Goldblatt & J.C.Manning* in Strelitzia 35: 96 (2015). Type: South Africa, Western Cape, Bo-Hermon, foot of Elandskloof Mtns, Elandsberg Nature Reserve, stony ground, 11 Sept. 2010, *Goldblatt & Manning 13518* (NBG, holo.; MO, PRE, iso.).

Plants 150–210 mm high, several-branched, branches subtended by bracts (1–)2–5 mm long, or sometimes leaf-like below and longer; stem ± flexuose, compressed and 2-winged. *Corm* obconic, 10–15 mm diam., tunics blackish, splitting vertically from base and apex. *Leaves* 2(3), lower 1(2) basal, usually falcate (lanceolate), 100–250(–400) × 10–14 mm, subacute to acute, with prominent main vein and 1 or a pair of secondary veins on either side also raised; margins usually ± straight to slightly undulate, rarely slightly crisped; uppermost leaf inserted near middle of stem, 25–80 mm long, narrowly oblong, not or hardly sheathing at base. *Inflorescence* a congested, flat-topped false panicle, ultimate branchlets 1- or 2-flowered; bracts green, leathery, 4–7 mm long, usually red distally and slightly warty, outer obtuse to truncate, keeled, inner ± obtuse to slightly emarginate. *Flowers* zygomorphic, tilted backward with adaxial (dorsal and upper lateral) tepals often nearly horizontal, light to dark blue with white throat and basal ½ of abaxial tepals with white, bracket-shaped band, not scented; perianth tube funnel-shaped, 8–10 mm long; tepals elliptic, obtuse, 10–15 × 4–5 mm. *Stamens* ± unilateral, ± horizontal and facing upward; filaments 9–10 mm long, exserted 7–8 mm; anthers 3.0–3.5 mm long; pollen blue to blue-grey, or purple. *Style* unilateral, dividing opposite or shortly beyond anther apices, held below stamens; style branches 1.5–2.0 mm long, divided for ± ½ their length. *Capsules* top-shaped, 3-lobed, ± 5 mm long, with up to 6 seeds per locule. *Seeds* ovoid, reticulately sculptured, ± flattened to concave at chalazal end, dark brown, ± 0.8–1.0 × 1.0–1.2 mm; funicular collar up to 0.3 mm long. *Flowering time*: late September and October.

Distribution and ecology: locally common in the Tulbagh Valley, in Western Cape, South Africa, but extending eastward through the upper Breede River Valley to Botha and westward to Gouda and the lower slopes of the Elandskloof Mtns as far south as Bain's Kloof; in rocky ground, often in clay or clay loam.

The tabanid fly, *Philoliche angulata*, which has a proboscis ± 8 mm long, is an important and possibly only pollinator of the species.

Diagnosis: long confused with *Codonorhiza corymbosa* or sometimes with *C. azurea*, both of which it broadly resembles, especially in herbarium specimens, *C. elandsmontana* is recognised by the zygomorphic flowers with unilateral stamens and white, bracket-shaped markings only on the three abaxial tepals. Other floral details



Distribution of ***Codonorhiza elandsmontana***.

include a perianth tube, 8–10 mm long vs. 4–7(8) mm long and the larger tepals, 10–15 mm long (vs. 6–10 mm long in *C. corymbosa*). Flowers of *C. corymbosa* are radially symmetric with all six tepals bearing white, bracket-shaped markings. *Codonorhiza elandsmontana* may also be confused with *C. azurea* and *C. fastigiata*, which are similar in stature and have a broad basal leaf with undulate to crisped margins. The larger flowers of *C. azurea* are zygomorphic like those of *C. elandsmontana* but have a perianth tube 10–12 mm long and tepals mostly 17–20 × 7–8 mm and the three abaxial tepals have a dark blue-black or red markings in the lower half. Possible hybrids between *C. azurea* and *C. fastigiata* have been recorded at Piketberg Road (Gouda).

6. **Codonorhiza corymbosa** *(L.) Goldblatt & J.C.Manning* in Strelitzia 35: 98 (2015). *Ixia corymbosa* L.: 4 (1756). *Ovieda corymbosa* (L.) Spreng.: 140 (1824). *Lapeirousia corymbosa* (L.) Ker Gawl.: t. 595 (1802); Baker: 90 (1896) [incl. *C. azurea*]; Marloth: pl. 43 (1915); Goldblatt: 20 (1972, excl. subsp. *fastigiata* and subsp. *alta*). *Peyrousia corymbosa* (L.) Poir.: 365 (1826). *Meristostigma corymbosum* (L.) A.Dietr.: 594 (1833). Type: South Africa, [Western Cape], near Camps Bay, sandy rocky ground, *MacOwan s.n.* in *Herb. Norm. Austr. Afr. 268* (SAM, neo., designated by Goldblatt & Manning: 332 (1992); BM, BOL, G, iso.).

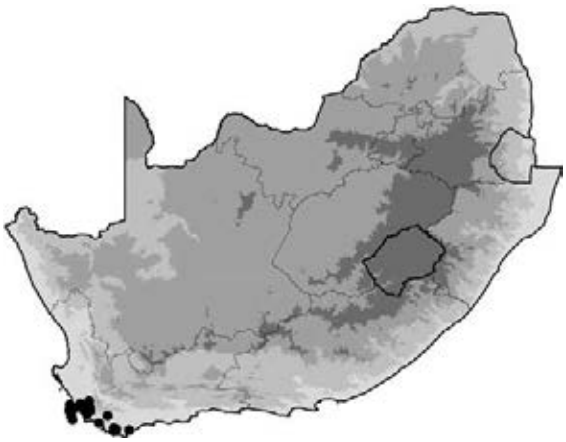
Ixia crispifolia Andrews: t. 35 (1798). Type: South Africa, without precise locality or collector, figure in Andrews: t. 35 (1798).

Lapeirousia corymbosa var. *grandiflora* Klatt: 204 (1885). Type: South Africa, [Western Cape], mountains near 'Houw Hoek' (Noord Hoek probably intended), Sept. 1883, *MacOwan 2284a* (K, SAM 20988, syn.).

Lapeirousia corymbosa var. *purpurea* Klatt: 204 (1885). Type: South Africa, [Western Cape], sandy depressions, Fish Hoek, Sept. 1883, *MacOwan 2284b* (SAM [as Noord Hoek], syn.).

Plants 60–150 mm high, 4- to 10-branched, branches subtended by bracts (1–)2–5 mm long, these sometimes leaf-like below and longer, stem ± flexuose, compressed and 2-winged. *Corm* obconic, 10–15 mm diam., tunics blackish, splitting vertically from base and apex. *Leaves* 2 or 3, lower 1(2) basal, usually falcate (or ± lanceolate), 100–130 × 4–8(–10) mm, subacute to acute, with prominent main vein and 1 or a pair of secondary veins on either side slightly less prominent, margins ± straight, slightly undulate, rarely slightly crisped, uppermost leaf inserted in middle ⅓ of stem, 25–80 mm long, narrowly oblong, not or hardly sheathing at base. *Inflorescence* a congested, flat-topped false panicle, ultimate branchlets bearing 1 or 2 sessile flowers; bracts green, leathery, 3.5–7.0 mm long, margins usually red, obtuse or inner slightly emarginate. *Flowers* actinomorphic, light to dark blue with white throat and lower half of tepals with white, bracket-shaped band (rarely ± white with pale blue markings), not scented; perianth tube funnel-shaped, 4–7(–8) mm long; tepals elliptic, obtuse, 6–10 × 2.3–3.5 mm. *Stamens* symmetrically arranged around style; filaments 5–6 mm long, exserted 3–4 mm; anthers 1.8–3.0 mm long, usually blue; pollen blue to grey, or ± white. *Style* dividing between base and upper ⅓ of anthers, often deflexed in older flowers; style branches 1.5–2.0 mm long, divided for ± ½ their length. *Capsules* top-shaped, 3-lobed, 4.5–6.5 mm long, with up to 6 seeds per locule. *Seeds* ovoid, reticulately sculptured, flattened to concave at chalazal end, dark brown, 0.7–1.0 mm long; funicular collar up to 0.5 mm long. *Flowering time*: late September and October, occasionally until mid-November.

Distribution and ecology: extending along the coastal plain of Western Cape, South Africa, from near Darling through the Cape Peninsula and Cape Flats to Bredasdorp and Elim; flowering relatively late in spring, on sandy, well-drained soils derived from Cape sandstone or weathered granite but occasionally also on clay loam. Once fairly common, it is becoming rare, especially on lowland sites, now mostly given over to farmland or urban development. It can still be found on lower mountain slopes and, especially after fires, may be common.



Distribution of ***Codonorhiza corymbosa***.

Diagnosis: the crowded, ± flat-topped inflorescence of radially symmetric flowers with a pale to fairly dark blue perianth and white bracket-shaped marks in the lower middle of the tepals distinguish *Codonorhiza corymbosa* from other *Codonorhiza* species. Although small, the upright flowers are particularly attractive with their white star-shaped central marking. *Codonorhiza corymbosa* is most easily confused with *C. elandsmontana* from the Worcester and Tulbagh Districts, but that species has unilateral stamens, and although the perianth shape and colouration is similar, the flowers are larger and only the lower (abaxial) tepals have white markings. The perianth tube of *C. elandsmontana* is 8–10 mm long and the tepals 10–15 mm long (vs. a tube 4–7(8) mm long and tepals 6–10 mm in *C. corymbosa*). Confusion is also possible with the deep blue-flowered *C. azurea*, especially when specimens are poorly preserved, but the flowers and bracts of *C. corymbosa* are always smaller than those of *C. azurea*, the tepals of which are 17–20 mm long. When alive the larger, dark blue, zygomorphic, abaxially tilted flowers of *C. azurea* with unilateral, horizontally extended stamens are unmistakable.

White-flowered plants occur occasionally in populations across the range of *Codonorhiza corymbosa*, but at Riverlands near Malmesbury the entire population has white flowers. In other respects the plants from Riverlands appear to conform closely with typical *C. corymbosa*. Plants tentatively included in *C. corymbosa* in the past from Cape Point Nature Reserve with slender perianth tube 18–20 mm long and tepals 7–8 × ± 3 mm are now regarded as a separate species, *C. pillansii*. The perianth tube length and shape are inconsistent with *C. corymbosa*, the funnel-shaped perianth tube of which is 4–7 mm long.

7. **Codonorhiza fastigiata** *(Lam.) Goldblatt & J.C.Manning* in Strelitzia 35: 101 (2015). *Lapeirousia fastigiata* (Lam.) Ker Gawl.: 238 (1804). *Ixia fastigiata* Lam.: 337 (1789). *L. corymbosa* subsp. *fastigiata* (Lam.) Goldblatt: 25 (1972). Type: South Africa, without precise locality or collector (P: Herb. Lamarck, holo.).

Ovieda purpureolutea Klatt: 781 (1864). *Lapeirousia purpureolutea* (Klatt) Baker: 515 (1877); 91 (1896). Type: South Africa, [Western Cape], Tulbagh, collector unknown, *Herb. Bergius s.n.* [SBT, lecto. designated by Goldblatt: 25 (1972)].

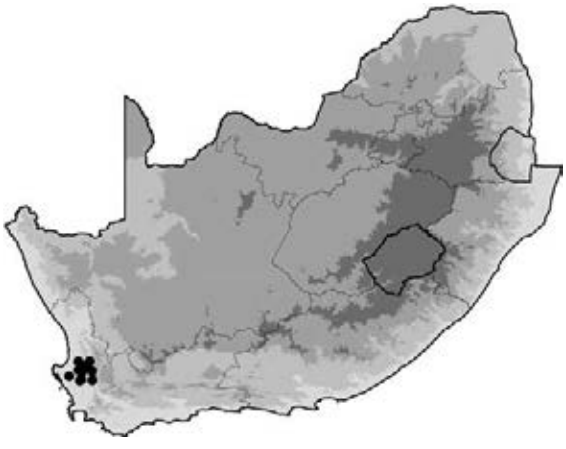
Lapeirousea corymbosa var. *rosea* Suess.: 88 (1951). Type: South Africa, [Western Cape], Saron, 29 Sept. 1946, *Rehm s.n.* (M, holo.).

Plants 100–200 mm high, several-branched, branches subtended by bracts (1–)2–3 mm long, lower sometimes ± leaf-like and longer, stem ± flexuose, compressed and narrowly winged, sheathed below by 2 membranous, pale or light brown cataphylls. *Corm* obconic, 10–16 mm diam., tunics blackish, splitting vertically from base and apex. *Leaves* 2, lowermost inserted at ground level, largest, falcate, 80–150(–250) × 11–18 mm, obtuse to subacute, with prominent main vein and pair of secondary veins on either side almost as prominent, margins usually undulate and crisped, rarely ± straight; upper leaf inserted near middle of stem, (12–)25–45 mm long, oblong-lanceolate, margins straight, not or hardly sheathing at base. *Inflorescence* a congested, ± flat-topped false panicle, ultimate branchlets bearring (1)2–5 sessile flowers; bracts green, often red on margins, 6–10 mm long, obtuse or inner emarginate. *Flowers* actinomorphic, pale yellow to nearly white with purple or brown median triangular mark in basal ⅓ of each tepal, sometimes flushed dull purple or brown outside, not scented; perianth tube funnel-shaped, 6.5–8.0 mm long; tepals elliptic, obtuse, 14–15 × 5–6 mm. *Stamens* symmetrically disposed, diverging; filaments ± 10 mm long; anthers 3–4 mm long, yellow; pollen white to pale yellow. *Style* dividing between base and middle of anthers; style branches 2.5–3.5 mm long, divided for ± ½ their length. *Capsules* top-shaped and 3-lobed, 5–6 mm long, with up to 6 seeds per locule. *Seeds* ovoid, reticulately sculptured, red-brown, darker on ridges, 0.8–0.9 mm long with funicular appendage up to 0.4 mm long. *Chromosome number* 2*n* = 20. *Flowering time*: late September to mid-October.

Distribution and ecology: once fairly common locally in Western Cape, South Africa, extending from Piekenierskloof Pass to Piketberg and Saron; most often on shale soils on hills and lower mountain slopes in renosterveld but sometimes on rocky, sandstone slopes; flowering is enhanced by clearing or burning.

Pollination of *C. fastigiata* has been little studied, but visits to the species by the large-bodied anthophorine and megachilid bees have been reported.

Diagnosis: pale yellow flowers and relatively large perianth with a tube 6–8 mm long and tepals 14–15 mm long are sufficient to distinguish *Codonorhiza fastigiata* from other species of the genus with flat-topped inflorescences, all of which have light to dark blue or violet flowers except *C. micrantha*, which has a buff-coloured to brown or maroon perianth but smaller flowers with a cylindric perianth tube. Both perianth and stamens



Distribution of ***Codonorhiza fastigiata***.

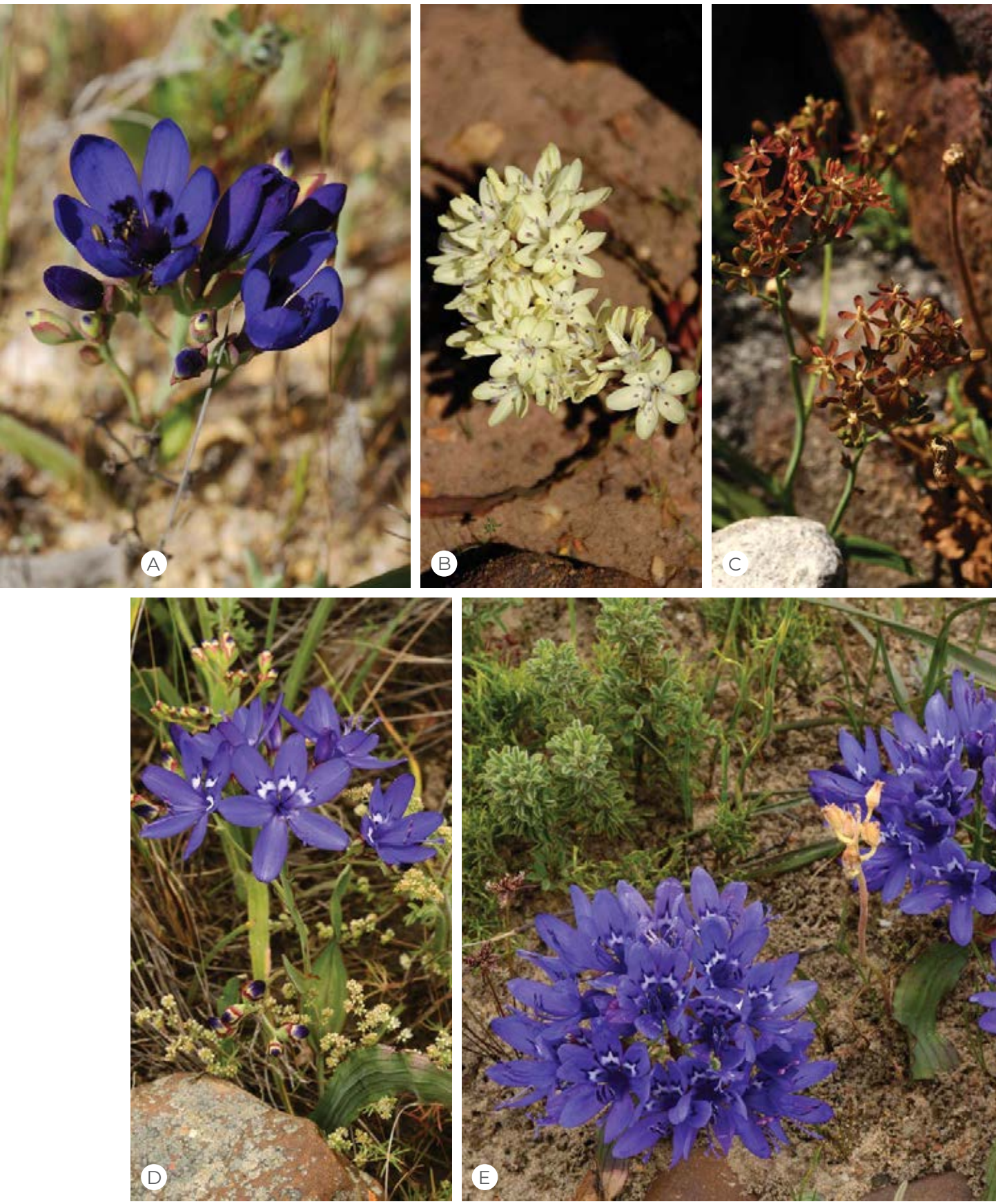


Plate 15: A, ***Codonorhiza azurea***, Malmesbury, WC; B, ***C. fastigiata***, Piketberg, WC; C, ***C. micrantha*** Bain's Kloof, WC; D & E, ***C. elandsmontana***, Hermon, WC.

of *C. fastigiata* are symmetrically arranged so that *C. azurea*, which has flowers of similar size and shape, can immediately be distinguished by its asymmetrically disposed stamens and perianth with markings only on the lower three tepals, as well as by its dark blue perianth.

Collections from Piketberg and Gouda that comprise plants with both yellow and blue flowers were thought to represent populations of plants intermediate between *Codonorhiza fastigiata* and *C. azurea* but likely represent hybrid individuals.

REFERENCES [See under 13. *Afrosolen*]

11. Schizorhiza

Schizorhiza *Goldblatt & J.C.Manning* in Strelitzia 35: 104 (2015).
Type: *S. neglecta* (Goldblatt) Goldblatt & J.C.Manning

Revisionary account: Goldblatt & Manning: 104–107 (2015).

For the coms that divide into several daughter corms at the end of the growing season, from the Greek *schizo* (split) and *rhizon* (root)

Deciduous geophytes. *Corm* ellipsoid with small flat base, rooting from base, axillary in origin, producing several new corms in place of parent corm at end of growing season; tunics of ± corky layers. *Foliage leaves* several, linear to sword-shaped, evidently plane but slightly pleated, with visible main vein; lowermost often longest and inserted on stem near ground level, upper leaves progressively smaller. *Stem* aerial, compressed and angled, branching repeatedly, producing cormlets in leaf axils above and below ground. *Inflorescence* much branched, forming a ± round-topped false panicle, with sessile flowers; bracts green, firm, inner ± as long as outer, acute or emarginate. *Flowers* zygomorphic, long-lived, often salver-shaped, lower (abaxial) tepals with contrasting darker markings; perianth tube ± cylindric; tepals subequal but dorsal slightly larger. *Stamens* unilateral; filaments slender, free; anthers oblong-linear, dehiscence longitudinal. *Ovary* globose, sessile; style filiform, branches forked for ± ½ their length. *Capsules* cartilaginous, ± top-shaped, 3-lobed above. *Seeds* ± globose, flattened at chalazal end, slightly wrinkled; surface cells ± flat. *Pollen grains* monosulcate-operculate, operculum 1-banded. *Basic chromosome number* $x = 6$; $2n = 12$ and 24.

Species 1, only *S. neglecta*: mountains of southwestern Western Cape, South Africa.

Schizorhiza was recognised as a result of a molecular study, which retrieved the single species as sister to *Lapeirousia*¸ *Cyanixia, Savannosiphon* plus *Afrosolen* (Goldblatt & Manning 2015). It thus falls between the basal clade, *Codonorhiza*, and the remainder of the *Lapeirousia* group. Morphologically it shares somewhat leathery floral bracts, a many-branched, more-or-less corymbose compound inflorescence, and pollen grains with 1-banded operculum. It stands apart in the nearly ellipsoid corm with a small flat base, splitting into several daughter corms and cork-like tunics at the end of the growing season. The basic chromosome number, $x = 6$ also departs from that in *Codonorhiza*, $x = 10$. The flowers, however, most closely resemble those of short-tubed members of the eastern and tropical African genus *Afrosolen*, notably *A. sandersonii*.

1. **Schizorhiza neglecta** *(Goldblatt) Goldblatt & J.C.Manning* in Strelitzia 35: 104 (2015). *Lapeirousia neglecta* Goldblatt in Goldblatt & Manning in South African Journal of Botany 58: 335 (1992). Type: South Africa, [Western Cape], Jonkershoek, slopes near Berg River Nek, Nov. 1989, *Esterhuysen 36923* (BOL, holo.; B, BR, E, G, K, M, MO, NBG, P, PRE, S, SRGH, US, WAG, iso.).

   Lapeirousia corymbosa subsp. *alta* Goldblatt: 24 (1972). Type: South Africa, [Western Cape], near Steenbras Dam, Dec. 1945, *Lewis 1595* (SAM, holo.; BOL, SAM, iso.).

Plants 280–450(–550) mm high, laxly 5- to 7-branched, branches subtended by bracts 3–5(–12) mm long, those subtending lower branches becoming ± leaf-like, stem ± straight, compressed, 2-winged below, often ± square above and 4-angled to narrowly 4-winged; bearing 2 or more cormlets in axils of lower leaves. *Corm* 12–14 mm diam., with several cormlets at base; tunics corky to somewhat papery, brown, not accumulating. *Leaves* 3 to 6, lower 2 to 4 inserted below ground level and largest, narrowly lanceolate, lowermost reaching to middle to shortly exceeding inflorescence, 7–15 mm wide, with prominent main and a pair of secondary veins (rarely two pairs) on either side ± as prominent; upper 1 to 3 leaves inserted in lower half of stem, progressively shorter above, not or hardly sheathing at base. *Inflorescence* a lax, rounded to ± flat-topped false panicle, flowers crowded distally, ultimate branchlets bearing 1 or 2(–4) sessile flowers; bracts green, margins often red, 4–7 mm long, inner usually slightly longer than outer, ± membranous above at anthesis, acute or inner slightly emarginate. *Flowers* zygomorphic, either white, then lower tepals usually with one or a pair of purple median spots (Jonkershoek), or blue with darker blue to violet spear-shaped markings in lower midline and often white-dotted in centre of dark colour (Bain's Kloof), with slight sweet scent; perianth tube ± cylindric, 7–10 (Jonkershoek), 12–14 (Bain's Kloof and Steenbras) mm long, flared from 1 mm diam. at base to 2 mm at mouth; tepals elliptic, obtuse, unequal, dorsal 10–13 × ± 4.5 mm, lower held closely together, 10–12 × ± 4 mm wide. *Stamens* unilateral and arcuate; filaments 5 or 6 (Jonkershoek), ± 9 (Bain's Kloof) mm long, exserted 3–5 mm; anthers 3.3–4.5 mm long; pollen ± white. *Style* arching adaxial to filaments, dividing opposite lower to middle ⅓ of anthers; style branches ± 2 mm long, divided for ± ⅓ their length. *Capsules* top-shaped and 3-lobed, 4–5 mm long, sometimes flushed red before drying; with 1 or 2(3) per locule. *Seeds* globose to ovoid, sometimes flattened by pressure, slightly wrinkled, ± 2.0–2.5 × 1.7–2.5 mm, with small funicular collar. *Chromosome numbers* $2n = 12, 24$. *Flowering time*: mid-November to late January.

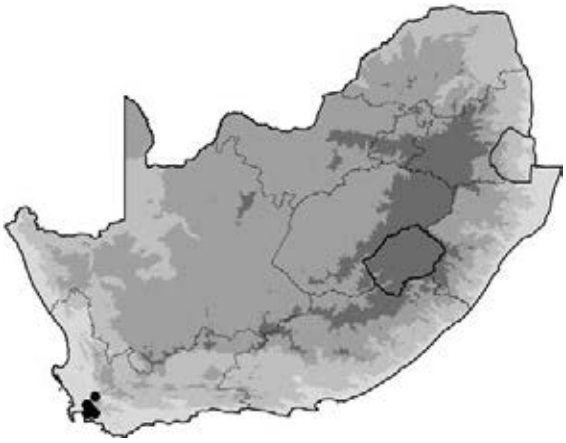
Distribution and ecology: restricted to a 65 km portion of the north–south trending mountains in the extreme

southwest of Western Cape, South Africa, from Bain's Kloof south to Jonkershoek and Steenbras; in rocky sandstone-derived soil at elevations of 400–1 000 m, generally in sheltered, wetter sites such as slopes below cliffs and near streams; flowering well only after fire the previous summer.

Pollination has not been critically studied, but visits by large-bodied but short-tongued xylocopid bees have been reported.

Diagnosis: when first described, *Schizorhiza neglecta* was associated with the Cape species of *Codonorhiza* (then *Lapeirousia*), but its basic chromosome number of x = 6 is discordant with those species, which have x = 10. Corm morphology is likewise unlike that of *Codonorhiza* and is unique for Crocoideae in the ellipsoid shape with the flat base of narrower diameter than the middle of the corm. The corky to papery tunics, rather than woody (*Lapeirousia*) or of compacted fibres (*Codonorhiza, Afrosolen*) are likewise distinctive. The large, smooth to slightly wrinkled, ± globose seeds nearly match those of *Lapeirousia* and *Afrosolen* but are quite unlike the smaller, ovoid, reticulate seeds of *Codonorhiza*. Leaf anatomy, including the absence of marginal veins or subepidermal sclerenchyma strands and closed vascular bundle sheaths conform to the condition in *Codonorhiza*, as do the pollen grains with a single banded operculum. All *Lapeirousia* and *Afrosolen* species examined for the character, have a 2-banded operculum. Morphologically, the flowers of *S. neglecta* appear most like those of the short-tubed *A. erythranthus* alliance, particularly the southern African *A. sandersonii*, especially in having the upper tepal reflexed to lie in the same plane as the lower tepals. The production of multiple cormlets in the lower nodes of the stem and in place of the parent corm at the end of the growing season are also unique for the *Lapeirousia* group of genera.

Although *Schizorhiza neglecta* accords with the subtropical and tropical *Afrosolen* in its floral and seed morphology and cytology, it is anatomically discordant in lacking a marginal vein in the leaves and in its temperate distribution.



Distribution of ***Schizorhiza neglecta***.

The type population of *Schizorhiza neglecta* from Jonkershoek, with white flowers and a shorter perianth tube, 8–10 mm long is diploid, $2n$ = 12, but counts from blue-flowered plants from Bain's Kloof with a longer perianth tube, 12–14 mm, are tetraploid, $2n$ = 24. These differences suggest that they might be better regarded as separate taxa and in the description above the significant differences between these populations are noted. The longer-tubed Bain's Kloof and Steenbras populations also have longer floral bracts 6–7 mm long (vs. 4–6 mm) and anthers 4.0–4.5 mm long (vs. 3.3–3.8 mm) than the Jonkershoek plants. The size differences may be explained by the ploidy difference (chromosome number for the Steenbras population is unknown and flower colour is uncertain, but residual pigmentation on herbarium specimens suggests that they were blue). Recognition of infraspecific taxa for this rare Cape plant awaits additional study.

REFERENCES [See under 13. *Afrosolen*]





Plate 16: A & B, ***Schizorhiza neglecta***, Wellington, WC.

12. **Lapeirousia**

Lapeirousia *Pourr.* in Histoire et Mémoires de l'Académie Royale des Sciences, Toulouse 3: 79 (1788). *Ovieda* Spreng.: 258 (1817), illegitimate homonym and superfluous name, not *Ovieda* L. (1753). *Meristostigma* A.Dietr.: 593 (1833), superfluous name. *Peyrousia* Poir.: 363 (1826), possible orthographic variant of *Lapeirousia* (also spelled *Lapeyrousia*), or superfluous name. Type: *L. compressa* Pourr. = *L. fabricii* (D.Delaroche) Ker Gawl.

Sophronia Licht. ex Roem. & Schult.: 482 (1817). Type: *S. caespitosa* Licht. ex Roem. & Schult. = *Lapeirousia plicata* (Jacq.) Diels

Chasmatocallis R.C.Foster: 40 (1939). Type: *C. macowanii* R.C.Foster = *Lapeirousia divaricata* Baker

Revisionary account: Goldblatt &Manning: 24–87 (2015).

Named in honour of the Compte de la Peyrouse, 18th century patron of French science and contemporary of the Abbe Pourret, author of the genus.

Deciduous geophytes. *Corms* bell-shaped with flat base, rooting from lower edges; axillary in origin; tunics of hard, woody layers, sometimes spiny at base. *Foliage leaves* few, lowermost linear to sword-shaped, inserted on stem near ground level, closely corrugate, upper leaves progressively smaller. *Stem* aerial or sometimes subterranean, compressed, often and angled, angles sometimes winged, simple or branched. *Inflorescence* a spike or when acaulescent, a dense rosette; bracts paired and opposed, outer green and firm to ± succulent, sometimes ridged, keeled, crisped or toothed; inner much shorter, usually hidden by outer, 2-keeled and often partly membranous, forked at apex. *Flowers* zygomorphic or actinomorphic in acaulescent species, often salver-shaped, blue, purple, red, pink or white, lower or all tepals usually with contrasting darker or lighter markings, sometimes sweetly scented; perianth tube cylindric or obliquely funnel-shaped, short to extremely long; tepals subequal or unequal, with dorsal largest. *Stamens* unilateral and arcuate or symmetrically disposed; filaments slender, free; anthers linear, splitting longitudinally. *Ovary* ± ovoid; style filiform, 3-branched; style branches usually forked for ± ½ their length, occasionally not divided. *Capsules* ovoid to oblong, cartilaginous, often showing outline of seeds. *Seeds* globose, flattened at chalazal end, either smooth with surface cells domed (rarely tuberculate) or rugulo-reticulate or reticulate with surface cell walls flat. *Pollen grains* monosulcate-operculate, operculum 2-banded. *Basic chromosome number* $x = 9$; diploid numbers $2n = 18, 16$.

Species 27: mainly in winter-rainfall western South Africa and southwestern Namibia, also central South Africa, Botswana and south tropical Africa, mainly in sandy soils or rock outcrops.

Molecular phylogenetic study has resulted in a narrower circumscription of *Lapeirousia* than was accepted until now through the removal of the tropical and eastern southern African species to *Afrosolen* (= *Psilosiphon*) and of several Cape species to *Codonorhiza*. *Lapeirousia* is now restricted to species with spicate inflorescences (unless acaulescent), unequal floral bracts with the outer large and foliose and the inner much smaller, and bell-shaped or obconic corms with hard, woody tunics. The pollen grains, unlike *Codonorhiza* and *Schizorhiza*, have a 2-banded operculum and the basic chromosome numbers, $x = 9$ or 8, depart from those in these two genera.

Lapeirousia species are strikingly diverse in floral morphology, with actinomorphic or zygomorphic flowers with short to extremely long floral tubes and perianth colours of white to pink, deep violet or red, usually with contrasting markings on the lower tepals. *Lapeirousia odoratissima* has the longest perianth tube in the genus, up to 140 mm long, and the fragrant white flowers of this species are adapted for pollination by long-proboscid hawk moths. Species with deeply pigmented but unscented flowers with tubes of moderate length are pollinated by long-proboscid nemestrinid flies. Speciation in the genus has been associated with repeated shifts in pollination systems (Goldblatt & Manning 1996). Several species have underground stems with the flowers crowded in a basal cluster or rosette. The genus has its greatest diversity in western southern Africa, where it is centred in Namaqualand and adjacent Western Cape and the western Karoo of Northern Cape.

Key to sections

Note: Measure corm diameter at corm base, and bract length from the middle of spike if there is considerable variation along the spike. Seeds may shrink with age through desiccation.

1a Corm bell-shaped, basal margin bluntly ridged to crenate or minutely spiny with fine teeth directed downward (not with laterally directed spines or teeth); flowers radially symmetric or zygomorphic:



LAPEIROUSIA. L. simulans: A, flowering plant (including front view of detached flower); B, capsules; C, seed. ***L. fabricii*** subsp. ***fabricii***: D, flower side view (top) and front view (bottom). ***L. oreogena***: E, flower side view (left) and front view (right). ***L. pyramidalis*** subsp. ***pyramidalis***: F, flower side view (left) and front view (right).

2a Plants with aerial stems (unless depauperate); flowers zygomorphic . . . . . 1. sect. *Chasmatocallis*
2b Plants acaulescent; flowers radially symmetric . . . . . 2. sect. *Sophronia*
1b Corm bell-shaped to obconic, thus ± triangular in profile, basal margin serrated to spiny and bearing short to long teeth; flowers zygomorphic . . . . . 3. sect. *Lapeirousia*

Key to species

1a Plants tufted, ± acaulescent with axis contracted above ground level and inflorescence congested; flowers radially symmetric:
2a Floral bracts 60–150 mm long; perianth tube 100–140 mm long . . . . . 13. *L. odoratissima*
2b Floral bracts 40–50 mm long; perianth tube 12–60 mm long:
3a Flowers violet, lower ⅓ of tepals dark violet to black with wedge-shaped white mark in centre of dark zone; perianth tube 50–60 mm long . . . . . 10. *L. oreogena*
3b Flowers whitish or pale blue, sometimes with dark blue to purple mark near base of tepals; perianth tube 12–45(-55) mm long:
4a Perianth tube 12–30 mm long; tepals 7–9 mm long; anthers 1.8–3.0 mm long, blue or whitish. . . . . 9. *L. plicata*
4b Perianth tube (33–)35–55 mm long; tepals 10–12 mm long; anthers 3–4 mm long, white or pale yellow:
5a Flowers ± white; leafy upper parts of floral bracts ± straight, channelled to apex, not ribbed. . . . . 12. *L. kalahariensis*
5b Flowers white or pale blue; leafy upper parts of floral bracts falcate, unifacial above and strongly ribbed . . . . . 11. *L. montana*
1b Plants with aerial stems unless depauperate (e.g. *L. exilis*, *L. arenicola*); flowers zygomorphic with stamens unilateral:
6a Flowers predominantly white to creamy white, often flushed pink outside; perianth tube 7–15 mm long:
7a Corm bell-shaped, basal rim minutely serrated or entire and lobed:
8a Perianth tube 7–10 mm long, obliquely funnel-shaped; corm margin with short fine teeth directed downward; plants of the Cederberg, Gifberg and Bokkeveld Mtns. . . . . 1. *L. divaricata*
8b Perianth tube 13–15 mm long, ± slender throughout; corm margins entire; plants of the Knersvlakte . . . . . 7. *L. angustifolia*
7b Corm obconic (triangular in profile), basal rim bearing prominent, spreading spines:
9a Dorsal tepal 18–23 × 5–8 mm . . . . . 20. *L. spinosa*
9b Dorsal tepal 9–11 × 2–3 mm . . . . . 21. *L. tenuis*
6b Flowers variously coloured; perianth tube 20–70 mm long:
10a Corm bell-shaped, basal rim bluntly ridged to crenate or minutely serrate with teeth directed downward:
11a Outer floral bracts obtuse to retuse when opened flat . . . . . 8. *L. pyramidalis*
11b Outer floral bracts tapering to an acute apex:
12a Flowers deep violet or cherry-red to magenta, lower tepals with white to yellow markings near base:
13a Floral bracts with median keel, without white patches; flowers cherry-red to magenta; perianth tube 40–55 mm long . . . . . 3. *L. silenoides*
13b Most or all floral bracts 2-keeled, fenestrate with white patches; flowers violet to purple, lower tepals streaked with white; perianth tube 30–40 mm long . . . . . 2. *L. jacquinii*
12b Flowers not as above:
14a Outer floral bracts mostly 6–10 mm long; lower tepals ± linear to narrowly lanceolate with a short, filiform tooth near base . . . . . 5. *L. anceps*
14b Outer floral bracts (10–)12–25 mm long; lower tepals broadly lanceolate to ovate, with or without teeth:
15a Perianth white to pink, pale blue or maroon-brown, not marked with red on lower tepals:
16a Perianth tube slender below, ± abruptly expanded to wider upper part; tepals ascending below to form part of floral cup, spreading distally; tepals predominantly pink to lilac with yellow nectar guides on lower tepals; style dividing opposite or beyond anther tips . . . . . 14. *L. barklyi*
16b Perianth tube slender ± throughout, slightly wider distally; tepals spreading from base; tepals predominantly white to ivory-coloured or pale blue; style dividing between base and middle of anthers:
17a Plants slender, less than 60 mm high, often unbranched; flowers pale blue (rarely ± white) with violet streaks on lower tepals . . . . . 6. *L. exilis*
17b Plants usually > 100 mm high, usually repeatedly branched from base; flowers white, pale yellow, yellow-brown or dull maroon, usually without contrasting markings on lower tepals:
18a Perianth tube 28–35 mm long; tepals 13–15 × 2–3 mm; bracts (12–)15–20(–25) mm long. . . . . 15. *L. littoralis*
18b Perianth tube (25–)30–45(–70) mm long; tepals 18–30 × 1.3–2.0 mm; bracts 10–18(–23) mm long. . . . . 16. *L. caudata*
15b Perianth white to pink or creamy beige, lower tepals always marked with red to brown near base:
19a Perianth tube 40–55 mm long; corm with basal margins entire to crenately lobed. . . . . 4. *L. verecunda*
19b Perianth tube (10–)12– 35 mm long; corm with basal margins minutely serrated:
20a Lower tepals ± 13 × 5 mm. . . . . 17. *L. macrospatha*
20b Lower tepals 8–11 × 3–4 mm:
21a Corm relatively shallowly buried, and underground part of stem not bearing cormlets at nodes; perianth tube mostly 15–25 mm long . . . . . 18. *L. arenicola*
21b Corm relatively deeply seated, with underground part of stem bearing cormlets at nodes; perianth tube mostly 27–35 mm long. . . . . 19. *L. simulans*
10b Corm obconic (triangular in profile) with margins bearing prominent, spreading spines:
22a Flowers white to beige or blue-mauve (rarely pink), usually with red markings on lower tepals:

23a Perianth tube slender below, expanded in upper 5–10 mm into a wider gullet; tepals spreading from above base; lower tepals without tooth at base; style dividing opposite base to upper ⅓ of anthers; basal leaf smooth . . . . . 27. *L. fabricii*
23b Perianth tube slender, ± uniformly wide throughout; tepals spreading from base; lower tepals not bearing a tooth at base; style dividing opposite or above base of anthers; basal leaf sparsely hairy. . . . 26. *L. kamiesmontana*
22b Flowers predominantly blue, violet, purple or magenta, variously marked on lower tepals:
24a All or only median lower tepal with tooth-like projection near base:
25a Only lower median tepal with tooth near base; upper lateral tepals strongly recurved; lower tepals with white V-shaped mark near base on darker violet background . . . . . .23. *L. purpurea*
25b All three lower tepals with tooth near base; upper lateral tepals not obviously recurved; lower tepals white near base with large red to purple blotch in centre . . . . . 22. *L. violacea*
24b All lower tepals without tooth-like projections:
26a Basal leaf smooth or minutely papillate along edges of ribs; perianth tube (25–)35–45 mm long; perianth pale to deep blue to violet, lower tepals white(–pale yellow) at base . . . . . 24. *L. dolomitica*
26b Basal leaf sparsely hairy; perianth tube 40–50 mm long; perianth deep magenta to purple marked with white lines on lower margins and darker magenta in lower midline. . . . . 25. *L. lewisiana*

Sect. 1. **Chasmatocallis** *(R.C.Foster) Goldblatt & J.C.Manning* in Strelitzia 35: 27 (2015). *Chasmatocallis* R.C.Foster: 40 (1939). Type: *C. macowanii* R.C.Foster = *Lapeirousia divaricata* Baker

Corm bell-shaped; tunics with basal rim bluntly lobed or minutely denticulate with minute teeth directed downward. *Stem* mostly aerial (sometimes ± subterranean in *L. exilis* and *L. silenoides*) and often branched, stems compressed with angles often crisped. *Inflorescence* a spike. *Flowers* bilaterally symmetric, lower tepals usually with nectar guides of contrasting colour; variously coloured and perianth tube short to elongate, cylindric or funnel-shaped. *Capsules* often with auriculate lobes and locular ridges. *Seeds* smooth (scarcely wrinkled) with surface cells domed or tuberculate (*L. pyramidalis*). *Basic chromosome number x* = 9 (or 10).

Species 9: winter-rainfall parts of Northern and Western Cape, South Africa.

1. **Lapeirousia divaricata** *Baker* in Journal of Botany, British and foreign 14: 337 (1876). Goldblatt & Manning: 27 (2015). Type: South Africa, [Northern Cape], without precise locality or date, *Thom s.n.* (K, holo.).

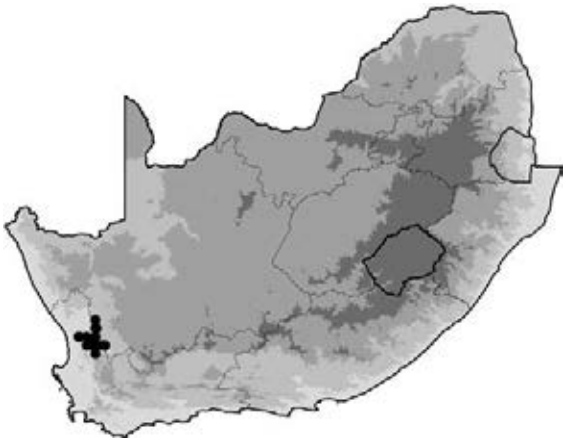
Gladiolus setifolius L.f.: 96 (1782). *Lapeirousia setifolia* (L.f.) N.E.Br.: 30 (1928), illegitimate homonym, not *L. setifolia* Harms (1901). Type: South Africa, without precise locality, probably in 1774, *Thunberg s.n.* (UPS-THUNB 1067, holo.).

Chasmatocallis macowanii R.C.Foster: 40 (1939). Type: South Africa, [Western Cape], Pakhuis Pass, Oct. 1897, *MacOwan 1975* (GH, holo.; G, SAM, iso.).

Plants 120–250 mm high, with axillary cormlets below ground. *Corm* bell-shaped, ± 10 mm diam.; tunics dark brown, often glossy, basal margin finely serrated, teeth directed downward. *Stem* simple or more often branched and then mostly well above ground, ± terete. *Leaves* 3 to 6 (or more), lowermost usually exceeding others, linear, suberect or falcate, 2.0–3.5 mm wide, strongly ribbed, generally exceeding stem, up to 350 mm long, upper cauline leaves shorter, sometimes resembling bracts and not ribbed, usually subtending branches. *Inflorescences* 5- to 12-flowered spikes, usually crowded; outer bracts green or flushed reddish, often white to semitransparent below, firm, 8.5–12.0 mm long, obtuse or acute, usually folded in midline or channelled, margins hyaline, inner bracts ½–⅔ as long. *Flowers* zygomorphic, white or sometimes flushed with pink to lilac (aging pink), lower tepals often with pink to purple streak in midline and bearing tooth-like ridge in lower midline; perianth tube short, 7–10 mm long, narrow below, curved and widening toward apex; tepals unequal, lanceolate, acute, dorsal 14–16 mm long, erect, separating from tube below lower tepals, margins undulate, remaining tepals joined for ± 4 mm, upper lateral tepals sharply reflexed shortly above base, lower 3 tepals united for additional 2–3 mm, ± 12 mm long, bent at right angles shortly above base, directed downward distally. *Stamens* unilateral and arcuate; filaments ± 6 mm long, exserted 4 mm from tube; anthers ± 4 mm long, white; pollen white. *Style* dividing opposite anther tips; branches forked for ± ⅔ their length, recurved. *Capsules* obovoid, 4.5–7.0 mm long, apices of locules forming auriculate lobes decurrent on low locular ridges. *Seeds* ± globose, flattened at chalazal end, 1.0–1.2 mm diam., light brown. *Chromosome number* 2*n* = 20 (? or 18 ± 2B). *Flowering time*: mainly late August to late September, but October at higher elevations.

Distribution and ecology: restricted to northern Western Cape and southwestern Northern Cape, South Africa, extending from Citrusdal in the Olifants River Valley north through the valleys of the Cederberg to the Gifberg and Bokkeveld Mtns; exclusively in sandy ground in soils derived from Cape sandstones, in valley bottoms, seeps or poorly drained flats.

Diagnosis: named for its uneven and widely angled (divaricate) branching pattern, *Lapeirousia divaricata* is readily recognised by its short-tubed, white to pale pink flowers, a stem normally branched well above the ground, and short floral bracts that are white to



Distribution of ***Lapeirousia divaricata***.

translucent on the sides. The lower tepals bear a conspicuous tooth-like ridge in the lower midline, a feature shared with only a few other species of the genus. The bell-shaped corm has finely toothed margins with the teeth directed downward. The relatively small capsules of *L. divaricata* are ridged with apically auriculate locules, a feature consistent with several other species of sect. *Chasmatocallis*.

Lapeirousia spinosa, originally subsp. *spinosa* of *L. divaricata*, has similar, short-tubed white flowers but a corm that is triangular in profile with the basal rim bearing prominent spreading spines. The sister relationship of *L. divaricata* with *L. jacquinii* retrieved in the molecular phylogeny is unexpected as the flowers of the two are very different, but they do share virtually identical corms and distinctive fenestrate floral bracts with white or semitransparent patches.

The flowers of *Lapeirousia divaricata* remain open at night, unlike most species of the genus, and are visited by a range of large, long-tongued bees from midmorning until sunset, and in the later afternoon and early evening by settling moths. The flowers are self-compatible and readily self-pollinate as the style branches remain in contact with the anthers during anthesis.

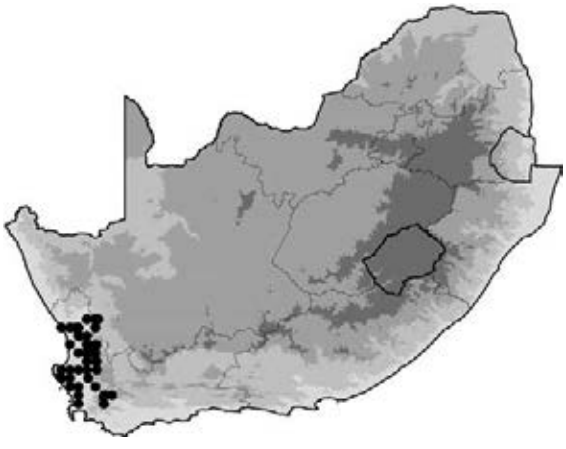
2. **Lapeirousia jacquinii** *N.E.Br.* in Journal of the Linnean Society, Botany 48: 20 (1928); Goldblatt & Manning: 29 (2015). Type: South Africa, without precise locality, illustration in Jacq.: t. 269 (1794 [1788–1795]) '*Gladiolus anceps*'.

Plants 80–120(–200) mm high. *Corm* bell-shaped, 7–9 mm diam.; tunics light to dark brown, basal rim minutely serrate, teeth directed downward. *Stem* often ± prostrate below for a short distance, erect above, often branched close to ground, compressed and triangular in cross section, one side narrower than other two, angles strongly winged, wings undulate and usually slightly denticulate. *Leaves* 3 to 5, ± crowded at ground level, lowermost longest, ascending or arcuate, often quite short, lanceolate to falcate, 50–200 × 4–12 mm, strongly ribbed, remaining leaves smaller, weakly ribbed, progressively bract-like above. *Inflorescences* 2- to 5(–10)-flowered spikes; outer bracts green-glaucous, often ± translucent on sides, (10–)15–20 mm long, margins narrowly hyaline, prominently 2-keeled or lowermost sometimes 1-keeled, keels undulate to crisped, minutely denticulate, inner bracts ± ⅔ as long, membranous and translucent with two prominent green keels, forked apically for 2–3 mm. *Flowers* zygomorphic, violet (rarely white), lower 3 tepals darker violet or reddish in lower midline with margins white to pale yellow in proximal half, scentless; perianth tube cylindric, 30–40 mm long, widening and weakly curved near apex; tepals unequal, dorsal largest, 8–10 × 4–5 mm, oblanceolate, initially erect but usually reflexed when fully open, then held in same plane as lower; upper lateral tepals spreading at right angles to tube, weakly spooned, apices curved upward, lower 3 tepals directed forward with upcurved tips, 7–8 × ± 2 mm. *Stamens* unilateral, ± erect; filaments ± 7 mm long, exserted 4–5 mm; anthers parallel, ± 3 mm long, violet; pollen usually blue-violet. *Style* dividing near base of anthers, style branches deeply forked and recurved. *Capsules* oblong, 7–9 mm long, apices of locules forming auriculate lobes decurrent on weakly developed locular ridges. *Seeds* globose, 1.1–1.5 mm diam., dark brown. *Chromosome number* 2*n* = 18. *Flowering time*: (late July) August to mid-September.

Distribution and ecology: one of the most common species in the genus, extending from Cape Town along the Atlantic Coast of Western Cape, South Africa as far north as southern Namaqualand near Garies in Northern Cape, also inland through the Breede River Valley east of Worcester as far as Overhex, Aan de Doorns and into the western valleys of the Cederberg and Bokkeveld Mtns; in sandy ground, often disturbed.

Hybrids with *Lapeirousia pyramidalis* subsp. *pyramidalis* have been recorded near Rawsonville.

Diagnosis: *Lapeirousia jacquinii* is easily distinguished in flower and in fruit by the prominently 2-keeled outer floral bracts (occasionally 1-keeled, especially the



Distribution of ***Lapeirousia jacquinii***.

lowermost). The stems are conspicuously 3-angled with the angles winged and undulate and sometimes minutely toothed. The long-tubed flowers are deep violet (rarely white) with darker violet or red markings outlined in white on the lower tepals, a colour combination very similar to that in *L. violacea*, with which it is sometimes sympatric. This last species has quite different corms, triangular in profile and bearing long spines radiating from the base, unlike the bell-shaped corm of *L. jacquinii*, the basal rim of which bears minute, downward-directed teeth. The outer bracts of the two species also differ, those in *L. violacea* being folded or keeled and the keels minutely crisped. The floral similarity in the two species is evidently due to convergence for the same long-proboscid fly pollinators. *Lapeirousia jacquinii* is self-compatible and facultatively autogamous, and reproduces readily from seed, thus rapidly colonising new habitats. It is also often cross-pollinated in the parts of its range where long-proboscid flies are active.

The immediate relationships of *Lapeirousia jacquinii* have been shown by molecular study to be with *L. divaricata*, which has similar corms but short-tubed, white to palest pink flowers, and short, 1-keeled floral bracts. The two species share unique, fenestrate outer bracts with pale, almost translucent sides.

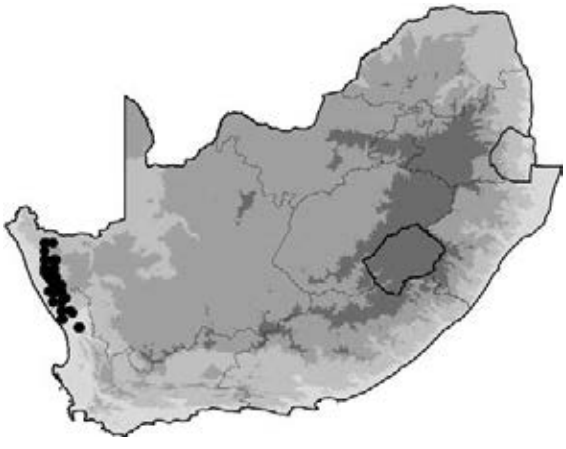
3. **Lapeirousia silenoides** *(Jacq.) Ker Gawl.* in König & Sims, Annals of Botany 1: 238 (1804); Goldblatt & Manning: 31 (2015). *Gladiolus silenoides* Jacq.: 168 (1791). *Ovieda silenoides* (Jacq.) Spreng.: 147 (1824); *Peyrousia silenoides* (Jacq.) Poir.: 365 (1826). *Meristostigma silenoides* (Jacq.) A.Dietr.: 596 (1833). Type: South Africa without precise locality or collector, illustration in Jacq.: t. 270 (1794 [1788–1795]).

   Lapeirousia speciosa Schltr.: 105 (1900). Type: South Africa, [Western Cape], Kareebergen, 17 July 1896, *Schlechter 8187* (B, holo.; BM, BOL, COI, E, G, GRA, K, PH, PRE, iso.).

Plants 50–150(–200) mm, taller in sheltered or shaded sites, ± acaulescent in exposed sites or in seasons of low rainfall. *Corm* bell-shaped, 8–10 mm diam.; tunics light brown, basal rim ridged (minutely serrate in plants from Spektakel Mtns). *Stem* aerial or sometimes ± entirely underground, often branched close to base, compressed, 2-angled, often 2-winged below first flower, wings often minutely serrate. *Leaves* few, lowermost longer than others, lanceolate to linear, ribbed or corrugate, ± as long or longer than stem, 1.5–5.5 mm wide; remaining leaves shorter and broader, progressively bract-like above. *Inflorescence* usually a crowded to lax spike, or a head-like cluster at ground level, up to 12-flowered, initially 2-ranked, spiral with age; outer bracts linear to lanceolate, sometimes very broad at base, occasionally ± succulent, outer 15–20 mm long, unifacial for distal 2–4 mm, acute and curving upward, folded or lightly keeled below, keels usually minutely serrate, margins membranous; inner bracts ± ½ as long, with broad transparent margins. *Flowers* zygomorphic, bright cerise to dark magenta (rarely white), lower 3 tepals each with creamy white markings near base, limbs with large central blotch of dark red or purple, scentless; perianth tube cylindric, slender, ± erect, 40–55 mm long, curved outward near apex; tepals subequal, ± broadly obovate, obtuse, limbs concave, 10–12 × ± 5 mm, dorsal erect or sometimes slightly inclined toward stamens, upper lateral tepals reflexed, lower 3 united basally for ± 1 mm, inclined at ± 45° to horizontal. *Stamens* unilateral, ± erect; filaments 7–8 mm long, exserted ± 4 mm from tube; anthers 3–4 mm long, blue-violet; pollen white or pale blue to mauve. *Style* erect, dividing close to or just beyond anther tips, ultimately exceeding them; branches 1.0–1.5 mm long, forked for ± ½ their length, recurved. *Capsules* obovoid to oblong, trigonous, 10–15 × 5–7, usually with well-developed wing-like locular ridges in distal half. *Seeds* globose, light brown, variable in size even on same plant, 1.2–2.2 mm diam. *Chromosome number* 2*n* = 18. *Flowering time*: (July) August to mid-September.

Distribution and ecology: widespread in Namaqualand, South Africa, extending from near Nuwerus in Western Cape northward to the Anenous Mtns west of Steinkopf in Northern Cape; restricted to granite-derived soils, either in deep, coarse granitic sand, where plants tend to be robust in years of adequate rainfall, or in granite outcrops where the corms are usually wedged in rock cracks in little or no soil.

Diagnosis: the bright magenta to cerise flower with darker colour in the centres of the lower tepals and cream-coloured streaks or blotches on the lower tepal bases instantly identify *Lapeirousia silenoides* over most of its range. To the south, in the Vanrhynsdorp and Clanwilliam districts, *L. pyramidalis* may be similarly coloured, though more often purple to violet, but the two species can be separated by their different bracts, narrow to fairly broad and acute with an upturned apex in *L. silenoides* but broad and often retuse with the apex curving downward in *L. pyramidalis*. The



Distribution of ***Lapeirousia silenoides***.

two are undoubtedly related as is evidenced not only by their similarly marked and sometimes almost identically coloured flowers but by the similar, red-brown corms and capsules with wing-like locular ridges, a character shared by relatively few other species of *Lapeirousia*.

Bract shape is fairly variable in *L. silenoides*. In the centre of its range, in the Kamieskroon area, the bracts are narrow and often quite long, and plants there are often tallest and are occasionally slender. Both south and north of this area the plants are smaller, and generally less robust, with the bracts shorter and broader. Plants with particularly broad-based bracts occur in the south of its range, notably in the vicinity of Bitterfontein. This variant, named *L. speciosa* by Rudolf Schlechter (1900), has flowers identical with those of plants from further north and although the difference in the shape of the bracts in the type material is striking, the presence of populations intermediate for bract shape and the consequent difficulty in placing these makes an infrageneric classification seem unnecessary.

On rocks plants tend to be fairly dwarfed, but in years of ample rainfall the main stem branches repeatedly at the base, producing a cushion-like form. In years of poor rainfall, plants can be virtually acaulescent with the flowers produced close to ground level. Similarly, at higher elevations in the Kamiesberg the aerial stem is often hardly or not at all produced above the ground, and plants assume a low tufted growth habit.

Self-incompatible, *Lapeirousia silenoides* often has relatively low seed set in the wild, and in cultivation does not produce capsules unless actively cross pollinated even though the recurved style branches do come into contact with pollen. Pollination studies show that the species is regularly visited by long-proboscid nemestrinid flies. Plants reproduce very successfully by seed and *L. silenoides* can be seen flowering along roadsides in masses, the seed having fallen from parent plants growing on banks and slopes above the road.

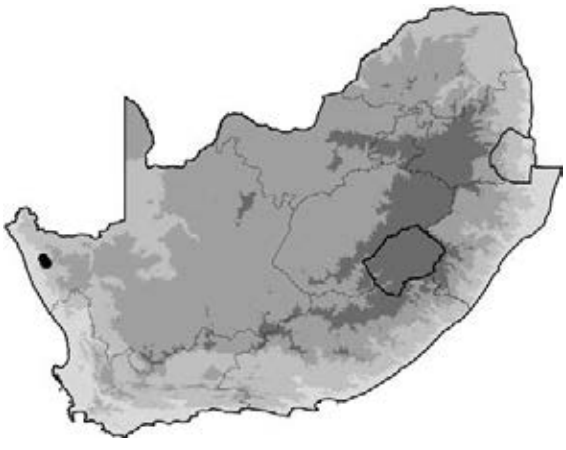
4. **Lapeirousia verecunda** *Goldblatt* in Contributions from the Bolus Herbarium 4: 38 (1972); Goldblatt & Manning: 33 (2015). Type: South Africa, [Northern Cape], Namaqualand, upper east slopes of Spektakel Pass, 24 Aug. 1970, *Goldblatt 573* (BOL, holo.; K, MO, NBG, PRE, iso.).

Plants 80–150 mm high. *Corm* bell-shaped, 10–13 mm diam.; tunics red-brown, slightly rugose, basal rim slightly lobed. *Stem* simple or with 1 to 3 branches from base, slightly compressed and 2-angled, one or both angles winged, wings decurrent on leaves or bracts. *Leaves* 5 to 7 (more depending on number of branches), lowermost longest, linear, ascending to falcate, closely ribbed, 70–100 × 3.5–5.0 mm, seldom exceeding stem; upper leaves < ½ as long as lowermost, progressively shorter and bract-like distally. *Inflorescences* 9- to 12-flowered, 2-ranked, spikes; outer bracts green, firm, narrowly lanceolate, acute, often recurved at tips, 10–20 mm long, margins membranous, channelled or folded in midline; inner bracts ± ½ as long, notched at tips. *Flowers* zygomorphic, white, tube and reverse of tepals copper-pink, lowermost or all 3 lower tepals with red, heart-shaped mark in lower midline; perianth tube cylindric, slender, 40–50(–55) mm long, slightly curved forward distally; tepals subequal, ovate-elliptic, slightly narrowed at base, subacute or obtuse, 10–12 × 5.5–6.0 mm, dorsal erect, lower 3 tepals ± horizontal. *Stamens* unilateral, erect; filaments ± 6 mm long, exserted ± 3 mm; anthers parallel, contiguous, ± 3 mm long, purple; pollen purple. *Style* dividing opposite anther tips, branches ± 2 mm long, divided for ½ their length, recurved. *Capsules* obovoid-trigonous, ± 10–13 × 7 mm, with prominent wing-like locular ridges in distal half. *Seeds* ± globose, smooth, dark brown, 1.6–1.9 mm diam. *Chromosome number* 2*n* = 18. *Flowering time*: late August to the end of September, rarely early October.

Distribution and ecology: a narrow endemic of the Spektakel Mtns west of Springbok in Northern Cape, South Africa, recorded from the eastern slopes of Spektakel Pass, at elevations of 700–800 m and to the north near Nigramoep; mainly on stony shale slopes (Nama Shale Formation).

The flower colour and the long perianth tube of *L. verecunda* are stereotypical adaptations for the *Moegistorhynchus longirostris* long-proboscid fly pollination system, but to date no pollinators have been recorded visiting the flowers.

Diagnosis: this attractive species has odourless, long-tubed, usually 50–55 mm long, white flowers with red, round to heart-shaped marks on one or more of the three lower tepals, and flushed red on the reverse of the tepals and tube. The plane tepals, and fairly long and comparatively narrow bracts with deflexed apices are distinctive. *Lapeirousia verecunda* belongs to the group of species in sect. *Chasmatocallis* with bell-shaped corms that are ridged or regularly lobed on the basal



Distribution of ***Lapeirousia verecunda***.

rim. *Lapeirousia silenoides* has similar bracts but cerise flowers with spoon-shaped lower tepals.

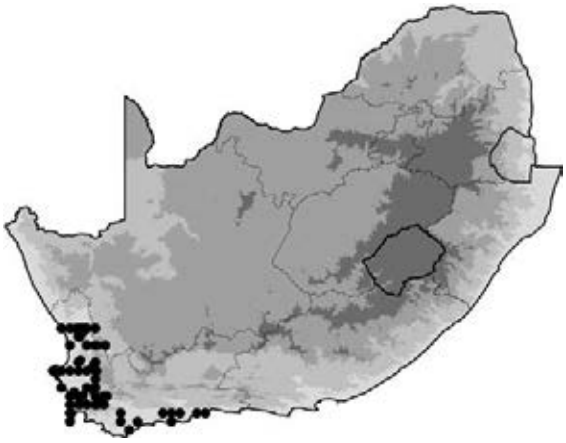
5. **Lapeirousia anceps** *(L.f.) Ker Gawl.* in König & Sims, Annals of Botany 1: 238 (1804); Goldblatt & Manning: 34 (2015). *Gladiolus anceps* L.f.: 94 (1782). *Ovieda anceps* (L.f.) Spreng.: 147 (1824). *Peyrousia anceps* (L.f.) Poir.: 363 (1826). *Meristostigma anceps* (L.f.) A.Dietr.: 596 (1833). Type: South Africa, without precise locality, *Sparrman 192* (LINN 59/19, holo.).

Lapeirousia pentheri Baker: 27 (1906). Type: South Africa, [Western Cape], Breede River, *Penther 728* (BOL, BM, K, syn.).

Plants 100–300 mm high. *Corm* bell-shaped, red-brown, 8–10 mm diam.; tunics lightly ridged, rim bluntly lobed. *Stem* usually repeatedly divaricately branched, compressed and elliptic in cross section, 2- or 3-angled, angles slightly winged, wings weakly serrated. *Leaves* 5 to 7, lowermost usually longer and wider than others, (40–)80–200 × 3–15 mm, ascending to falcate, lanceolate, ribbed, remaining leaves shorter, mostly crowded near base, becoming increasingly bract-like above. *Inflorescences* (2)4- to 8-flowered spikes, at first 2-ranked, ultimately spiral; outer bracts grey-green, (5–)6–10 mm long, apices and margins often tinged red, channelled, folded along upper midline, acute in profile; inner 3–5 mm long, transparent with two green keels. *Flowers* zygomorphic, white to beige or faintly flushed pink, reverse of tepals and tube pink, lower 3 tepals each with red mark in lower midline, and usually with small, claw-like cusp near base; perianth tube narrow and cylindric, weakly arched distally, (20–)40–80 mm long (3–6 times as long as tepals); tepals narrowly lanceolate to ± linear, acute, dorsal largest, 12–14 × 4–5 mm, erect or recurved when fully open, upper lateral 12–14 × ± 3 mm, widely separated from dorsal, lower tepals united basally for 2–3 mm, free parts 12–14 mm long, extended horizontally. *Stamens* unilateral, ± erect; filaments ± 6 mm long, exserted ± 4 mm from tube; anthers parallel, ± 2.5 mm long; pollen grey-blue or white. *Style* arching adaxial to anthers, dividing between base and middle of anthers; branches 2–3 mm long, divided for ½ their length and recurved. *Capsules* ± barrel-shaped, 9–10 × ± 7 mm. *Seeds* red-brown, globose, smooth, somewhat flattened at chalazal end, ± 1.5 mm diam. *Chromosome number* 2*n* = 18. *Flowering time*: (late September–)October, to late November at higher elevations and in the south.

Distribution and ecology: a widely distributed species, extending from the sandy coastal plain of central Namaqualand near Hondeklip Bay in Northern Cape, South Africa southward through the mountains and coastal plain of Western Cape to near Mossel Bay in the east; almost always in deep sandy soils, sometimes growing among tufts of Restionaceae, flowering profusely following fires.

Diagnosis: *Lapeirousia anceps* is readily recognised by the combination of short floral bracts 5–10 mm long and white to ivory-coloured flowers flushed pink on the outside of the tepals and tube, usually with a relatively long perianth tube, mostly 50–80 mm but occasionally only 20–40 mm, and narrow tepals 3–4 mm wide (sometimes the dorsal up to 5 mm). The lower tepals usually have a claw-like projection just above the base. The bell-shaped corms have either bluntly lobed or minutely serrated basal rims. The species has no close allies, and the short floral bracts are particularly surprising in view of its long perianth tube. *Lapeirousia anceps* is pollinated by species of long-tongued nemestrinid and tabanid flies. The variation in the length of the perianth tube in the species correlates with variation in the proboscis length in the pollinators, thus shorter tubed populations are pollinated by flies with correspondingly shorter probosces.



Distribution of ***Lapeirousia anceps***.

6. **Lapeirousia exilis** *Goldblatt* in Contributions from the Bolus Herbarium 4: 44 (1972); Goldblatt & Manning: 37 (2015). Type: South Africa, [Northern Cape], Namaqualand, Ratelpoort, ± 25 km north of Springbok, 6 July 1970, *Tölken 3238* (BOL, holo.; K, MO, NBG, iso.).

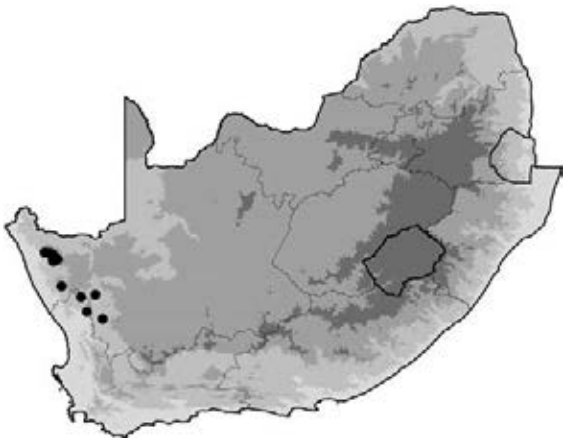
Plants small, usually 30–50 mm high. *Corm* ± 8 mm diam., light brown, bell-shaped, ridged at base, margin slightly lobed (not serrated). *Stem* subterranean or produced shortly above ground, rarely taller, usually unbranched. *Leaves* usually 2, basal longest, falcate or ± trailing, 80–160 × 1–2 mm, ribbed, second leaf much shorter, often only slightly longer than floral bracts, 2–3 mm wide, channelled in lower half. *Inflorescence* a congested spike, sometimes ± a basal rosette, 6- to 13-flowered, 2-ranked in bud, becoming spiral as flowers open; outer bract 15–25 mm long, lowermost longest, with unifacial apices, upper leaves channelled, apices rounded without unifacial tips, not keeled, translucent over veins, margins pale, membranous; inner bract ± ⅓ as long as outer, transparent with two green keels. *Flowers* zygomorphic, white to pale blue with proximal 1–2 mm fading to ± white, lower 3 tepals with a dark blue median streak in lower midline (fading in dried material), strongly and sweetly scented; perianth tube slender, erect, curved and widening at apex,

20–25 mm long; tepals subequal, ± 8 mm long, spreading, dorsal suberect at anthesis, later spreading, lower 3 tepals slightly smaller broadly to narrowly ovate, obtuse, narrowed at base and ± clawed. *Stamens* unilateral, ± erect; filaments ± 4 mm long, inserted close to top of tube, ± fully exserted; anthers ± 3 mm long, pale blue; pollen ± white. *Style* arching adaxial to stamens, dividing opposite anther bases; style branches forked for ½ their length and recurved. *Capsules* broadly ovoid, trigonous, 8–11 × ± 6.5 mm. *Seeds* globose, smooth, flattened at chalazal end, ± 1.3 mm diam., light brown. *Chromosome number* 2*n* = 18. *Flowering time*: mid-June to mid-August.

Distribution and ecology: scattered range across Northern Cape, South Africa, from Steinkopf north of Springbok southward to the rugged northern edge of the Bokkeveld Escarpment northeast of Nieuwoudtville; in stony ground in granitic gravel, sand, or occasionally clay.

The species is pollinated by large-bodied bees and bombyliid flies. The moderately long perianth tube appears to indicate a pollinator with long mouthparts, but nectar is held fairly high in the tube and within reach of bees and bombyliid flies.

Diagnosis: *Lapeirousia exilis* is distinguished by the short, usually underground stem and tufted habit, and pale blue flowers with a perianth tube up to 25 mm long. The flowers are zygomorphic, with white and darker blue markings only on the lower tepals, and unilateral stamens. *Lapeirousia plicata* is superficially similar but has radially symmetric flowers with markings on all tepals and the stamens diverge widely as the flowers age. In addition, *L. exilis* has channelled, dorsiventral floral bracts typical of sect. *Chasmatocallis* whereas the bracts in *L. plicata* have elongated leaf-like tips above the sheathing bases. The seeds of *L. exilis* also accord with sect. *Chasmatocallis* in their smooth surface and domed surface cells, thus quite different from the sculptured, ± reticulate to rugose surface and flat surface cells of *L. plicata* and its acaulescent allies of sect. *Sophronia*.



Distribution of ***Lapeirousia exilis***.

Molecular data support the differences in flower, bract and seed morphology in allying *L. exilis* with sect. *Chasmatocallis* rather than with sect. *Sophronia*.

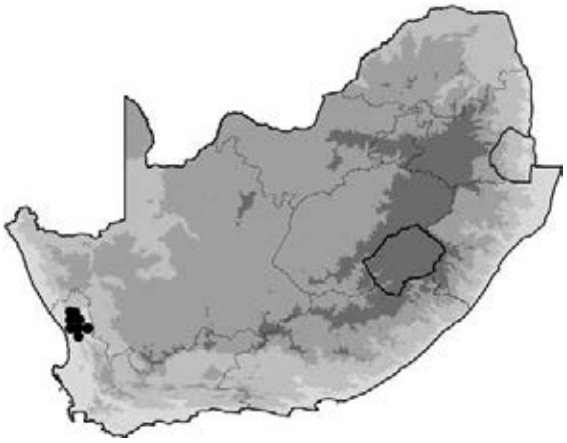
7. **Lapeirousia angustifolia** *Schltr.* in Botanische Jahrbucher für Systematik 27: 105 (1900); Goldblatt & Manning: 39 (2015). Type: South Africa, [Western Cape], Zoutrivier, 15 July 1896, *Schlechter 8144* (B, holo.; BOL, BM, COI, F, G, GRA, K, PH, PRE, iso.). [Schlechter's handwritten collection number has also been misread as *8149* or *8188*]

Plants 30–140(–180) mm high. *Corm* bell-shaped, 7–10 mm diam.; tunics brown, surface lightly ridged, basal rim smooth or bluntly lobed. *Stem* simple or sometimes 1- or 2-branched from base, slightly compressed. *Leaves* few, lowermost longest, linear, ascending, usually exceeding stem, up to 100(–180) mm long, ribbed, cauline leaves broader and shorter than basal, ± bract-like. *Inflorescence* a 6- to 15-flowered spike, spiral in flower; outer bracts green, firm, 8–13 mm long, oblong to broadly ovate, channelled, obtuse (retuse when opened), apex deflexed in profile, margins hyaline; inner bracts ± ½ as long, transparent with two green keels. *Flowers* zygomorphic, white to pale lilac or mauve, lower 3 tepals pale yellow at base and with violet median streak, tube pink outside, lower tepals each with small claw-like tooth in lower midline, with light sweet scent; perianth tube 13–15 mm long, slender below, ± abruptly curved and expanded in upper 5–6 mm; tepals unequal, dorsal erect or slightly arched over anthers, 7–9 × 4 mm, oblanceolate, upper lateral tepals outspread, lower 3 united basally for ± 2 mm, 7–9 mm long, directed downward 35°–40°. *Stamens* unilateral, suberect; filaments 7–8 mm long, exserted 3.0–3.5 mm; anthers parallel, 2.5–3.0 mm long, lilac; pollen ± white. *Style* dividing opposite middle ⅓ of anthers; style branches ± 2.5 mm long, forked for slightly > ½ their length. *Capsules* obovoid-trigonous, 5–8 mm long, without locular ridges. *Seeds* globose, somewhat flattened to irregularly lobed at chalazal end, 1.0–1.2 mm diam., brown, smooth with outer epidermal walls weakly colliculate. *Flowering time*: early July to late August.

Distribution and ecology: restricted to the Knersvlakte of southern Namaqualand in Western Cape, South Africa; in sandy or light clay soils, sometimes in areas covered with quartz pebbles.

The appearance, size and exact flowering of *L. angustifolia* are very unpredictable from season to season. Pollination of the pale, faintly scented flowers is unknown but is likely to be by long-tongued bees.

Diagnosis: the flowers of *Lapeirousia angustifolia*, like those of *L. pyramidalis* subsp. *pyramidalis*, are white to pale lilac or mauve in colour and also pleasantly, if not as strongly sweet-scented, but are readily distinguished by the shorter perianth tube, 13–15 mm long vs. 25–40 mm, and the claw-like cusps on the lower tepals.



Distribution of ***Lapeirousia angustifolia***.

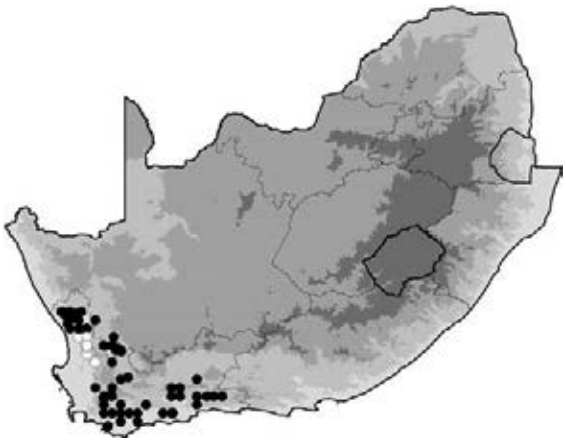
The small capsules lack the wing-like locular ridges characteristic of *L. pyramidalis* and the small seeds, 0.9–1.3 mm diam., slightly wrinkled with colliculate epidermal cells, also differ from the slightly larger seeds of *L. pyramidalis* subsp. *pyramidalis*, 1.5–1.9 mm diam., which have derived, tuberculate epidermal cells (hedgehog-like under the microscope). Molecular phylogenetic studies confirm the immediate close relationship of the two taxa.

8. **Lapeirousia pyramidalis** *(Lam.) Goldblatt* in Contributions from the Bolus Herbarium 4: 41 (1972); Goldblatt & Manning: 40 (2015). *Ixia pyramidalis* Lam.: 334 (1789). *Witsenia pyramidalis* (Lam.) Pers.: 42 (1805). Type: said to be from Isle de France [Mauritius], but certainly from western South Africa, said to be collected by *Commerson* but probably by *P. Sonnerat s.n.* (P-Herb. Jussieu, holo.).

Plants (50–)80–140 mm high. *Corm* bell-shaped, ± 10 mm diam.; tunics light red-brown, lightly ridged, basal margin entire or bluntly lobed. *Stem* simple or 1- to few-branched from near base, slightly compressed. *Leaves* 4 or 5, lowermost longest, up to 160 mm long, linear to lanceolate, 2–6 mm wide, strongly ribbed, upper leaves shorter and broader, becoming progressively bract-like above. *Inflorescences* 6- to 20-flowered spikes, initially 2-ranked, later becoming spiral; outer bracts green, firm, ± succulent, 10–20 mm long, channelled, ovate when flattened, obtuse in side view (deltoid and retuse when unfolded), apex deflexed in profile, margins hyaline; inner bracts ⅓–½ as long, transparent with 2 green keels. *Flowers* zygomorphic, either white to pale mauve, pale blue or pale pink, lower tepals each with a small triangular to diamond-shaped median mark in lower half (subsp. *pyramidalis*) or violet, purple or dark carmine, lower tepals each with white or cream-coloured markings near base and a central zone of darker pigment (subsp. *regalis*), either intensely sweet-scented day and night (subsp. *pyramidalis*) or evidently scentless (subsp. *regalis*); perianth tube 25–55 mm long, slender, straight or widening slightly in upper 5 mm; tepals subequal, narrowly to broadly ovate, narrowed into claw-like base ± 1.5 mm long, lower tepals each occasionally with a small claw-like cusp near base, dorsal tepal 9–15 × 6–7 mm, erect, held apart from others, upper lateral tepals slightly reflexed, lower 3 tepals usually held closely together and at right angles to tube, 8 × 5 mm. *Stamens* unilateral, ± erect to ascending; filaments 5–6 mm long, exserted ± 3.5 mm; anthers ± 3 mm long, usually pale yellow to white; pollen ± white. *Style* dividing between base and apex of anthers or slightly beyond; branches ± 2.5 mm long, forked for ½ their length, often becoming tangled in anthers. *Capsules* obovoid, 8–10 mm long, with wing-like locular ridges in distal half. *Seeds* ± globose to ovoid, usually somewhat flattened at chalazal end, 1.3–1.5 × 1.4–1.9 mm, epidermal cells tuberculate. *Chromosome number* 2*n* = 18. *Flowering time*: July to September.

Distribution and ecology: one of the more widespread species of the genus, extending from the southern edge of Namaqualand, South Africa through dry areas of the northwestern parts of Northern Cape to interior and southern Western Cape and the Little Karoo; mostly on clay slopes and flats.

Diagnosis: *Lapeirousia pyramidalis* is immediately recognised by the broadly ovate to deltoid bracts with obtuse to retuse apices, combined with a relatively long perianth tube 25–55 mm long. In profile the bracts do not taper to a point but curve outward and have blunt tips. The flowers have shortly clawed, subequal tepals with broadly oval to rounded limbs resembling the Namaqualand species, *L. silenoides*, and we consider the two to be closely allied. Both have unusual capsules with prominent ridges on the locules and similar red-brown corms with a ridged or lobed basal margin, features also shared with the local Namaqualand endemic, *L. verecunda*. The tuberculate seeds of *L. pyramidalis* are unusual in *Lapeirousia*, in which most species of sect. *Chasmatocallis*, including those of *L. silenoides* and *L. verecunda*, have epidermal cells with evenly domed



Distribution of ***Lapeirousia pyramidalis*** subsp. ***pyramidalis***, ●; subsp. ***regalis***, ○.

(colliculate) outer walls. The difference is often striking, making it possible to distinguish the seeds of *L. pyramidalis* from other species of the genus.

Lapeirousia pyramidalis has a fairly consistent appearance over much of its range. Plants are compact with broadly obtuse floral bracts, and the flowers are white to pale blue or pale pink to lilac with a perianth tube 25–35 mm long, slightly curved and wider in the upper 5–7 mm, and always strongly scented during the day and in the evening. In the west of its range, in the Olifants and Biedouw River Valleys, and at Karoo Poort to the south, plants segregated as subsp. *regalis* are distinguished by bright red, purple, or dark violet flowers with a long, nearly straight perianth tube, 35–55 mm long, and lacking any discernible odour. As far as we know the two variants never grow sympatrically, but their ranges are more-or-less complementary, and they also favour different habitats, subsp. *pyramidalis* normally on shale and clay soils and subsp. *regalis* on stony sandstone ground. There is a marked size difference between the seeds of the two subspecies, with subsp. *pyramidalis* with seeds 1.7–2.0 mm diam. and subsp. *regalis* with seeds ± ½ this size, 1.0–1.2 mm diam.

The floral differences between the two subspecies reflect a shift in pollination strategy. Strongly scented subsp. *pyramidalis* is thought to be pollinated primarily by sphinx moths, which are most active at sunset and at night, whereas subsp. *regalis* is pollinated by long-proboscid flies.

Key to subspecies

1a Flowers whitish to pale blue (occasionally pale pink to mauve), strongly scented; perianth tube 25–40 mm long, cylindric below but expanded and curved outward in distal 5 mm . . . . . 8a. subsp. *pyramidalis*

1b Flowers dark purple, violet-blue or red, not scented; perianth tube (35–)40–55 mm long, ± cylindric throughout . . . . . 8b. subsp. *regalis*

8a. subsp. **pyramidalis**

Gladiolus fissifolius Jacq., Collectanea 4: 164 (1791) illegitimate superfluous name for *G. anceps* L.f. (= *Lapeirousia anceps* (L.f.) Ker Gawl.). *Lapeirousia fissifolia* Ker Gawl.: 238 (1804), as a new name for *G. fissifolius* Jacq.; Baker: 92 (1896). *Ovieda fissifolia* (Ker Gawl.) Spreng.: 147 (1824). *Peyrousia fissifolia* (Ker Gawl.) Poir.: 364 (1826). *Meristostigma fissifolium* (Ker Gawl.) A.Dietr.: 595 (1833). *L. homoidea* Klatt in Th.Durand & H.Schinz: 191 (1894), as a new name for *G. fissifolius* Jacq. Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 268 (1794 [1788–1795]).

Gladiolus bracteatus Thunb.: 186 (1800). *Lapeirousia bracteata* (Thunb.) Ker Gawl.: sub. t. 1246 (1810). *Ovieda bracteata* (Thunb.) Spreng.: 147 (1824). *Peyrousia bracteata* (Thunb.) Sweet: 499 (1830a). *Meristostigma bracteatum* (Thunb.) A.Dietr.: 597 (1833). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1008, holo.).

Flowers whitish to pale bluish, or flushed with pale pink, lower tepals cream-coloured at base with small basal median streak of purple and larger median purple mark, intensely sweetly scented night and day; perianth tube 25–40 mm long, narrow and cylindric below, broadened and curving outward in upper 4–5 mm; tepals subequal, dorsal ± erect, 9–12 × 6–7 mm, upper laterals spreading to reflexed, lower 3 directed downward, with short claw ± 1.5 mm × 2 mm, limbs abruptly expanded, broadly oval, 7.5–8.0 × 6 mm. *Stamens* unilateral, ± erect; filaments 5–6 mm long, exserted ± 3.5 mm; anthers ± 3 mm long, cream-coloured or light purple; pollen yellowish to white. *Style* usually dividing shortly above anther bases; style branches becoming tangled in anthers. *Seeds* 1.5–1.9 mm diam. *Flowering time*: late July to September.

Distribution and ecology: fairly widespread in Western Cape, extending from Worcester and Grabouw in the southwest through the Little Karoo and the Overberg to Riversdale in the east and into the arid Tanqua Karoo, and in dry sites along the interior Cederberg and Bokkeveld Mtns as far north as Nuwerus and Loeriesfontein in Northern Cape; mainly on clays and shale soils, occasionally on alluvial sands.

Populations in the Tanqua Karoo vary considerably in colour, from white to deep pink but even the darker forms are fragrant, with the perianth tube curved outward at the end and thus represent the typical subspecies and not subsp. *regalis*. The closely related *Lapeirousia angustifolia*, which has smaller flowers with a shorter perianth tube, 13–15 mm long, and faintly scented flowers, is restricted to dry flats of the Knersvlakte west and north of Vanrhynsdorp. Both species have been recorded near Hol River, north of Vredendal.

Hybrids with *Lapeirousia jacquinii* have been recorded near Rawsonville.

8b. subsp. **regalis** *Goldblatt & J.C.Manning* in Novon 4: 342 (1994); Goldblatt & Manning: 43 (2015). Type: South Africa, [Western Cape], Middelplaas, ± 5 km from Farm Biedouw on road to Wuppertal, 8 July 1941, *Leipoldt 3866* (BOL, holo.; BOL, NBG, iso.).

Flowers red, purple, violet or navy blue, lower tepals with cream-coloured markings on claws and darker blue or red markings in centre of limbs, unscented; perianth tube 40–50(–55) mm long, cylindric and ± straight; tepals subequal, 10–12 mm long, dorsal held apart from others when fully open. *Stamens* and *style* as in subsp. *pyramidalis*. *Capsules* oblong-trigonous, locules with prominent ridges, 7–9 mm long. *Seeds* 1.3–1.4 mm diam. *Flowering time*: late July to early September.

Distribution and ecology: restricted to the northwestern corner of Western Cape in the middle Olifants River

Valley between Citrusdal and Klawer, extending inland into the interior valleys of the Cederberg and Pakhuis Mtns; on light sandy soils, in stony habitats.

The unscented, dark red to violet flowers with pale markings on the tepals are adapted for pollination by long-proboscid nemestrinid flies.

Sect. 2. **Sophronia** *(Licht. ex Roem. & Schult.) Goldblatt & J.C.Manning* in Annals of the Missouri Botanical Garden 77: 373 (1990); 41 (2015). *Sophronia* Licht. ex Roem. & Schult.: 482 (1817). *Lapeirousia* subg. *Sophronia* (Licht. ex Roem. & Schult.) Baker: 482 (1892). Type: *S. caespitosa Licht. ex Roem. & Schult.* = *Lapeirousia plicata* (Jacq.) Diels

Corm bell-shaped; tunics with basal rim not produced into teeth or spines. *Stem* subterranean, internodes at ground level crowded. *Inflorescence* a head-like congested spike. *Flowers* radially symmetric, with perianth tube ± cylindric, short to elongate; stamens symmetrically arranged. *Seeds* with reticulate sculpturing. *Basic chromosome number x* = 8.

Species 5: western and central southern Africa extending to tropical Africa.

9. **Lapeirousia plicata** *(Jacq.) Diels* in Engler & Prantl, Die naturlichen Pflantzenfamilien, edn. 2, 15a: 488 (1930); Goldblatt & Manning: 44 (2015). *Galaxia plicata* Jacq.: 8, t. 292 (1795 [1788–1795]). *Ixia heterophylla* Willd.: 199 (1798), as a new name for *G. plicata* in *Ixia* [not *I. plicata* L. (1756)]. *Meristostigma heterophyllum* (Willd.) A.Dietr.: 199 (1833). *L. heterophylla* (Willd.) R.C.Foster: 4 (1939). *L. fasciculata* Ker Gawl.: 238 (1804), illegitimate superfluous name for *G. plicata* Jacq. *Ovieda fasciculata* (Ker Gawl.) Spreng.: 147 (1824). *Peyrousia fasciculata* (Ker Gawl.) Sweet: 499 (1830a). Type: South Africa, without precise locality, illustration in Jacq.: t. 292 (1795 [1788–1795]). Epitype: South Africa, Western Cape, Matjiesfontein, gravel flats near village, flowers white, 18 July 1974, *Goldblatt 2115* (MO, NBG), designated by Goldblatt & Manning: 44 (2015).

Plants small, acaulescent, forming diffuse or compact cushions, seldom > 50 mm high. *Corm* bell-shaped; tunics red-brown, rough-surfaced, basal rim slightly crenate. *Stem* entirely under ground. *Foliage leaves* up to 3, lowermost longest, usually exceeding inflorescence, up to 300 mm long, blades linear, suberect to strongly inclined, closely ribbed, margins of sheaths undulate or often crisped, remaining leaves broader than basal. *Inflorescence* congested, head-like, few- to several-flowered; bracts ovate at base, outer larger than inner, with apex often produced as ribbed leaf-like tip, margins usually crisped especially in basal half. *Flowers* actinomorphic, pale blue, ± white or pale yellow, with blue to violet spot at base of each tepal, scented of cloves or with light, sweet odour; perianth tube 12–30 mm long, ± cylindric, straight; tepals subequal, ± lanceolate, 7–9 mm long, acute, spreading or often slightly deflexed when fully open. *Stamens* symmetrically arranged around style; filaments exserted 1.5–2.0 mm, arching outward later in anthesis; anthers mostly 1.8–3.0 mm long, usually blue (or ± white), initially erect, later ± horizontal. *Style* dividing opposite base to middle of anthers, rarely below anther bases; style branches forked for ⅓–½ their length or undivided (subsp. *effurcata*). *Capsules* ovoid-oblong, 8–10 mm long. *Seeds* 6–9 per locule, ± globose, with reticulate to rugulose surface, dark brown, 1.0–1.5 mm diam. *Chromosome number* 2*n* = 16 (subsp. *plicata*). *Flowering time*: autumn, winter or spring, mostly June to mid-August, occasionally in May.

Distribution and ecology: widespread in South Africa, extending from Vanrhynsdorp and Robertson in the southwest of Western Cape, through the Little and Great Karoo to Northern Cape, North West and Free State Provinces and into southern Namibia; in fairly heavy clay soils, less often in light clay or sand, in fairly flat places, as well as on limestone or calcrete, usually where drainage is poor. Flowering is earliest in the north and east of its range, mainly in June but sometimes in May or July; in the west and south flowering usually begins in July lasting into August.

Diagnosis: smallest of the several acaulescent species of sect. *Sophronia*, the tufts of *Lapeirousia plicata* seldom reach 50 mm including the flowers. The perianth tube ranges from 12–20 mm long in southern and western populations, to as much as 30 mm in the northeastern populations. A distinctive feature of *L. plicata* is the orientation of the stamens, the filaments of which are initially erect but arch outward during anthesis, so that the dehisced anthers come to lie in a ± horizontal position. The style typically divides opposite the base to middle of the anthers but sometimes below the anther bases and rarely slightly beyond the anther tips.

Three subspecies of *Lapeirousia plicata* were recognised by Goldblatt (1972), based on morphological differences and by a moderate degree of geographical discontinuity. One of these, subsp. *longifolia*, is now a separate species, *L. kalahariensis*. Two other subspecies are recognised, subsp. *effurcata*, with unusually broad, widely channelled outer floral bracts with undulate margins and consistently white flowers and undivided style branches, and subsp. *plicata* with blue or white flowers with apically notched to deeply divided style branches and somewhat narrower floral bracts, sometimes with short, leafy, ribbed apices. A third series of populations from Bushmanland, the Great and Upper Karoo, subsp. *foliosa*, extending into Free State, mostly have white or cream-coloured flowers (sometimes described as pale yellow) but rarely blue and the outer floral bracts have

leaf-like, ribbed tips up to 30 mm long, sometimes unifacial toward the apices. These populations are also usually early blooming, often in flower in May and June.

Key to subspecies

1a Outer floral bracts with ribbed, leafy tips up to 30 mm long; perianth tube mostly 19–30 mm long; flowers white to cream-coloured (pale yellow), occasionally with a blue to purple spot near tepal bases . . . . . 9c. subsp. *foliosa*

1b Outer floral bracts channelled to apices or with short, ribbed, leafy tips < 10 mm long; perianth tube mostly 12–22 mm long; flowers blue or white with blue to violet mark in lower midline of tepals:

2a Style branches usually forked for ⅓–½ their length, rarely undivided; flowers blue or white . . . . . 9a. subsp. *plicata*

2b Style branches always undivided; flowers white, flushed blue outside . . . . . .9b. subsp. *effurcata*

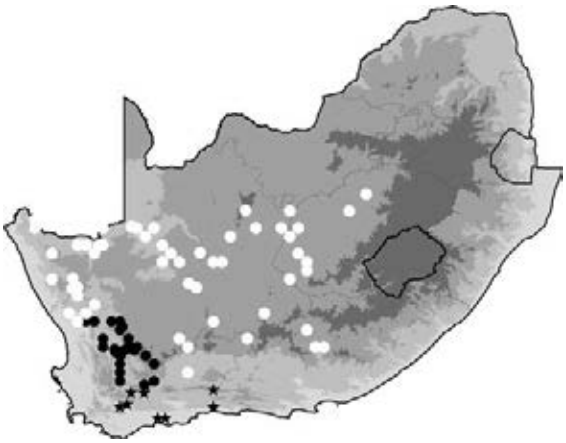
9a. subsp. **plicata**

Leaves usually 2 or 3, only lowermost with unifacial blade, ± linear, up to 150 × 2–3 mm, suberect, ribbed, usually ciliate or papillate on rib edges, margins plane or undulate, ciliolate. *Bracts* green, outer usually falcate, channelled throughout or with short, ribbed leafy apex up to 10 mm long, margins undulate to slightly crisped, usually ciliate. *Flowers* either blue with white zone at tepal bases and violet or purple triangular mark at distal edge of white zone or white with violet mark near tepal bases; perianth tube mostly 12–22 mm long; tepals 7–8 mm long, spreading or slightly reflexed. *Stamens*: filaments exserted ± 2 mm, diverging; anthers 1.8–3.0 mm long, blue to purple. *Style* dividing below to opposite base (rarely opposite middle) of anthers; style branches usually forked for ⅓–½ their length or shortly notched at apex, 1.0–1.5 mm long, recurving. *Flowering time*: mainly July and early August.

Distribution and ecology: restricted to the southern African winter-rainfall zone, subsp. *plicata* occurs in the Western Karoo from Calvinia and the Bokkeveld Plateau in Northern Cape south through the Tanqua Basin to Touws River, Matjiesfontein and Laingsburg in Western Cape, where it meets the range of subsp. *effurcata* in the western Little Karoo.

9b. subsp. **effurcata** *(G.J.Lewis) Goldblatt* in Annals of the Bolus Herbarium 4: 51 (1972). Goldblatt & Manning: 47 (2015). *Lapeirousia effurcata* G.J.Lewis: 7 (1952). Type: South Africa, [Western Cape], near Riversdale, Elands Drift, limestone koppies, Aug. 1946, *Ferguson s.n.* (BOL 24923, SAM, syn.).

Plants with foliage leaves usually 2 or 3, only lowermost unifacial, ± linear, up to 150 × 2–3 mm, suberect to spreading, margins plane. *Bracts* green, outer much exceeding flowers, channelled throughout, margins undulate to slightly crisped. *Flowers* usually white



Distribution of ***Lapeirousia plicata*** subsp. ***plicata***, ●; subsp. ***effurcata***, ★; subsp. ***foliosa***, ○.

(rarely pale blue) with blue mark in lower midline of tepals; perianth tube mostly 12–20 mm long; tepals ± 7 × 2–3 mm, ± spreading. *Stamens*: filaments exserted ± 3 mm, arching outward; anthers ± 2 mm long, blue. *Style* dividing slightly below to opposite base of anthers; style branches entire, recurved, ± 1 mm long. *Flowering time*: mainly July and August.

Distribution and ecology: restricted to stony flats in the Worcester–Robertson Karoo, the western Little Karoo and locally in the limestone belt of the southern Cape near Riversdale; on limestone outcrops and also on stony, sandy or clay ground.

A curious feature of subsp. *effurcata* is that the flowers are reported to be heavily scented toward evening. Flowers of subsp. *plicata* have a light, sweet scent during the day, but we have not noted an increase in scent toward evening.

9c. subsp. **foliosa** *Goldblatt & J.C.Manning* in Strelitzia 35: 48 (2015). Type: South Africa, Northern Cape, Loeriesfontein, between Graafwater and Donkiedam, 4 July 1990, *Oliver 9484* (NBG, holo.).

Sophronia caespitosa Licht. ex Roem. & Schult.: 482 (1817). *Lapeirousia caespitosa* (Licht. ex Roem. & Schult.) Baker: 174 (1892). Type: South Africa, [Northern Cape], Sakrivierspoort, *Lichtenstein s.n.* (probably originally at B, no longer extant). Neotype: South Africa, Northern Cape, 10 km NE of Fraserburg on Loxton Road, 5 July 1000, *Manning* et al. *2260* (NBG, neo.).

Lapeirousia galaxioides Baker: 174 (1892). Type: South Africa, [Northern Cape], diamond fields at Klipdrift, without date, *Bowker s.n.* (K, holo.).

Plants often larger in vegetative features than subsp. *plicata*, with foliage leaves 2 or 3, lowermost longest, 150–350 × 2–3 mm, suberect, ribbed, smooth or ciliate to papillate on rib edges, margins usually plane,

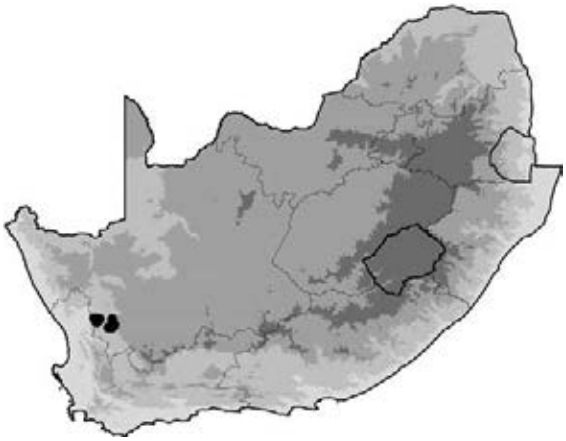
often ciliate. *Outer bracts* upright below, tapering distally to leaf-like, channelled or unifacial tip mostly 15–30 mm long, linear, straight or falcate. *Flowers* white to cream-coloured (pale yellow), occasionally pale blue, tepals often with purple spot in lower midline, often (?always) scented of cloves; perianth tube mostly 19–30 mm long, well exserted from sheathing part of bracts; tepals 7–9 mm long. *Stamens*: filaments exserted ± 2 mm; anthers 2–3 mm long, blue (often fading white in herbarium specimens). *Style* dividing opposite base to apex of anthers (rarely exceeding anthers); style branches 1.2–2.0 mm long, usually deeply forked. *Flowering time*: mainly May and June.

Distribution and ecology: widespread across the arid parts of southern Africa, extending from the Knersvlakte of southern Namaqualand in Western Cape, along the eastern margins of Namaqualand north to southern Namibia and east across Bushmanland to Gordonia and the Kimberley District in Northern Cape, and in the western Free State and Upper Karoo as far east as Colesberg and Murraysburg and with records in Eastern Cape near Cradock.

Diagnosis: subsp. *foliosa* is recognised by the floral bracts with leaf-like, ribbed, unifacial tips at least 12 and up to 40 mm long, versus floral bracts usually channelled to the tips or with short, unifacial tips up to 10 mm long but the distinction is not absolute. Flowers are usually white to cream-coloured, occasionally pale yellow, and are strongly clove-scented according to notes with several collections. The flowers are sometimes larger than those of subsp. *effurcata* and subsp. *plicata*, with a perianth tube 19–30 mm long. Plants from the Roggeveld Escarpment with blue flowers are included in subsp. *foliosa*, evidently the only blue-flowered populations of the subspecies, on the basis of their floral bracts with leafy tips up to 20 mm long.

10. **Lapeirousia oreogena** *Schltr. ex Goldblatt* in Contributions from the Bolus Herbarium 4: 53 (1972) & t. 1670 (1973); Goldblatt & Manning: 49 (2015). Type: South Africa, [Northern Cape], 6 km east of Nieuwoudtville, 14 Sept. 1970, *Goldblatt 541* (BOL, holo.; K, MO, PRE, iso.).

Plants forming dense tufts at ground level, 50–100 mm high, including flowers. *Corm* bell-shaped, ± 10 mm diam.; tunics light brown, surface lightly wrinkled. *Stem* subterranean, upper internodes contracted. *Foliage leaves* usually solitary, linear, straight, ribbed, 120–200 mm long. *Inflorescence* several- to many-flowered, congested in head-like tuft; outer bracts 30–60 mm long, bifacial and channelled throughout, usually ± falcate, often twisted, margins undulate and crisped, inner up to ½ as long, margins often plane. *Flowers* actinomorphic, salverform, dark blue-violet, almost black in centre with white triangular to arrowhead markings close to tepal bases; perianth tube erect, cylindric, 50–60 mm long; tepals subequal, 12–14 mm long, lanceolate, acute, spreading but becoming slightly deflexed with age. *Stamens* symmetrically disposed around style, erect; filaments exserted ± 3 mm; anthers erect, contiguous around style, ± 3.5 mm long. *Style* erect, usually dividing opposite middle ⅓ of anthers; style branches ± 2.5 mm long, deeply forked and recurved. *Capsules* ovoid to oblong, 7–10 mm long, without locular ridges. *Seeds* globose, ± 2 mm diam., red-brown, reticulately sculptured. *Chromosome number* 2*n* = 16. *Flowering time*: August to mid-September, rarely late July.



Distribution of ***Lapeirousia oreogena***.

Distribution and ecology: restricted to the Calvinia District of Northern Cape, South Africa, from the hills just to the north of Nieuwoudtville extending south at least as far as the Farm Matjiesfontein, ± 12 km from Nieuwoudtville, and also recorded in the hills southeast of Calvinia and northeast of the town in the Agterhantam; in heavy red, dolerite-derived clay soil, either in open ground or among rocks in shallow soil, occasionally on stony tillite ground.

Lapeirousia oreogena flowers fairly early in the season before the plants are overshadowed by annuals and taller geophytes that reach maturity some weeks later. Although plants are invariably autogamous when grown in the greenhouse, they produce ample nectar and are regularly pollinated by long-proboscid nemestrinid flies. Evidently *L. oreogena* is outcrossed when pollinators are available, but in seasons when pollinators are scarce (or emerge late), self-pollination ensures seed production.

Diagnosis: the acaulescent *Lapeirousia oreogena* is distinguished from its allies of similar habit by its large dark blue to violet flowers with slightly reflexed tepals and a perianth tube 50–60 mm long. The tepals are almost black at the base with white, triangular to arrowhead-shaped marks. The centrally placed purple anthers form a ring around the style and have dark purple pollen. Like some other acaulescent members of sect. *Sophronia*, the leafy outer bracts extend well above the flower buds and have wavy to crisped margins.

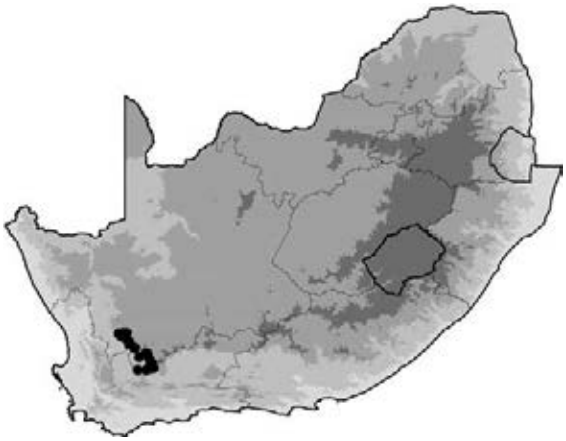
11. **Lapeirousia montana** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 359 (Ergänzungen: 25) (1882). Baker: 93 (1896). Goldblatt & Manning: 50 (2015). Type: South Africa, [Northern Cape], without precise locality, as 'Hantams Gebirge', 1869, *Meyer 10* (B, holo.).

Plants acaulescent, branched at base, forming compact tufts 30–50 mm high, including flowers. *Corm* bell-shaped, 8–10 mm diam.; tunics light brown, basal rim crenate. *Stem* underground. *Leaves* 1 or 2, lowermost always longest, linear, 80–180 mm × 2–3 mm, straight or falcate, remaining foliage floral bracts but often resembling leaves and identifiable as bracts by position. *Inflorescence* of several to many flowers in congested head-like structure borne at ground level, internodes very short but evident on dissection or in fruit; bracts leaf-like, wide and pale below for 15–25 mm, tapering to a green unifacial upper half resembling leaf blade and 15–40 mm long. *Flowers* actinomorphic, white to pale blue, then with lower third of tepals white, usually with dark blue triangular or diamond-shaped median mark near base, slightly scented of narcissus, lily or carnation; perianth tube cylindric, (25–)32–45(–55) mm long, with filaments decurrent as intrusive ridges dividing tube into 3 compartments and ± blocking tube in lower half; tepals subequal, lanceolate, (10–)12–15 × 4–5 mm, spreading horizontally or deflexed up to 30° below horizontal. *Stamens* symmetrically disposed around style; filaments exserted 2–3 mm from tube; anthers erect, 3–4 mm long, ± white; pollen white to ivory-coloured. *Ovary* oblong, 4–5 mm long; style straight and erect, usually dividing opposite middle to just below anther tips; style branches divided for ½ their length, 1.8–2.5 mm long. *Capsules* ± ovoid, 8–10 mm long, showing outline of seeds. *Seeds* globose, dark brown, ± 2 mm diam., with reticulate sculpturing, *Chromosome number* unknown. *Flowering time*: late August to late September.

Distribution and ecology: a relatively narrow endemic of the western Karoo in Northern Cape, South Africa, centred in the southern Roggeveld, but extending from the escarpment edge near Middelpos to sites in the Klein Roggeveld (the type, said to be from the Hantam Mtns 'Hantams Gebirge', has not been recollected there); in seasonally wet ground in relatively light clay or sandy soil in valley bottoms, around seasonal pools or in shallow soil over rocky pavement.

Lapeirousia montana is a generalist species despite its long perianth tube, and nectar ascends well up into the tube where it is accessible to settling moths, butterflies, bee flies (Bombyliidae) and bees. Floral scent is usually strong but variable, sometimes reminiscent of narcissus, lily, carnation or even an unpleasant acrid odour.

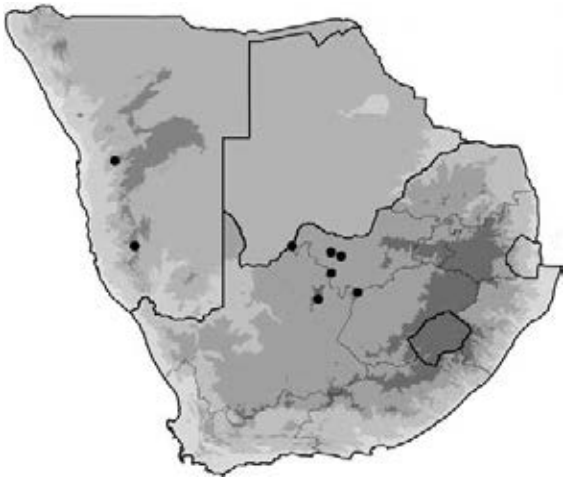
Diagnosis: the acaulescent *Lapeirousia montana* is allied to the widespread *L. plicata*, which it replaces in the southern Roggeveld, and is distinguished from that species by the larger flower with longer perianth tube, mostly 32–45 mm long, and tepals 10–15 mm long, always with ± straight margins. The anthers are ± white and 3–4 mm long. *Lapeirousia plicata* has smaller flowers with a perianth tube 12–30 mm long, tepals 7–9 mm with undulate margins, and anthers usually blue and mostly 1.8–3.0 mm long. The upper leaves and floral bracts are typically crisped in *L. plicata* vs. with straight margins in *L. montana*.



Distribution of ***Lapeirousia montana***.

12. **Lapeirousia kalahariensis** *Goldblatt & J.C.Manning* in Strelitzia 35: 51 (2015), as a new rank and name for *L. plicata* subsp. *longifolia* Goldblatt: 50 (1972). Type: South Africa, [Northern Cape], Danielskuil, in sand, 22 Mar. 1939, *Esterhuysen 1157* (BOL, holo.).

Plants ± acaulescent or shortly caulescent, 50–100 mm high excluding basal leaves. *Corm* bell-shaped, 10–12 mm diam.; tunics brown, rough-surfaced, basal rim lightly crenate. *Stem* usually reaching 10–40 mm above ground, several-branched, branches crowded to form a compact, stalked rosette. *Foliage leaves* ± 5, usually lowermost longest, up to 200 mm long, linear, lightly ribbed, margins of sheathing portion ± straight, remaining leaves shorter than basal, becoming ± bract-like. *Inflorescence* congested, head-like, many-flowered; outer bracts ovate at base, tapering to apex, channelled throughout, often hooked at tips, 50–100 mm long, leaf-like distally, reaching or slightly exceeding flowers, margins undulate to slightly crisped; inner ± ½ as long, transparent with 2 green keels. *Flowers* actinomorphic, evidently uniformly white to cream-coloured, ?probably sweetly scented; perianth tube (30–)33–40 mm long, slender, straight; tepals subequal, ± lanceolate, 10–14 × ± 3 mm, acute, held ± at right angles to tube. *Stamens* symmetrically disposed in a ring around style; filaments exserted ± 2 mm, arching outward after anthers split; anthers (3–)4 mm long, white. *Style* dividing opposite middle ⅓ of anthers; style branches ± 2.3 mm long, recurved, forked for ± ½ their length, rarely undivided. *Capsules* obovoid, ± 5 mm long, concealed in leaf bases, papillate in upper ⅓. *Seeds* probably globose (only immature known), surface reticulate. *Flowering time*: March, probably also April.



Distribution of ***Lapeirousia kalahariensis***.

Distribution and ecology: relatively widely distributed across the southern edge of the Kalahari, extending from Danielskuil and Kuruman west of Kimberley in Northern Cape, South Africa to south-central Namibia; habitat uncertain but including compacted calcareous sand flats.

Nothing is known about the pollination biology of *L. kalahariensis*, but the relatively long perianth tube and white flowers are consistent with pollination by moths.

Diagnosis: important diagnostic features for the species that distinguish it from *Lapeirousia plicata* include outer floral bracts that are channelled throughout and not unifacial distally, and a stem produced up to 40 mm above ground. The flowers are recorded as being uniformly white, or in one collection yellowish, always lacking the blue or purple markings characteristic of *L. plicata*. The tepals, 10–14 mm long, and tube, 30–40 mm long, are somewhat longer than in *L. plicata*, which has tepals 7–10 mm long and a tube typically 12–20 mm long, rarely up to 35 mm. Significantly, *L. plicata* occurs within the range of *L. kalahariensis* but typically blooms there later in the year, in May and June, sometimes in July. *Lapeirousia kalahariensis* also shows a resemblance to *L. odoratissima* from southern tropical Africa, but that species has much larger flowers, the perianth tube 100–140 mm long, and a well-developed, strongly ribbed basal leaf.

13. **Lapeirousia odoratissima** *Welw. ex Baker* in Transactions of the Linnean Society of London, Botany ser. 2, 1: 273 (1878); Sölch: 10 (1969); Geerinck *et al.*: 344 (1972); Goldblatt: 480 (1990b); Goldblatt & Manning: 53 (2015). Type: Angola, [Huila], sandy woods near Lopollo, in 1859, *Welwitsch 1551* (BM, lecto., so annotated in unrecognised hand; B, BM, C, G, K, iso.).

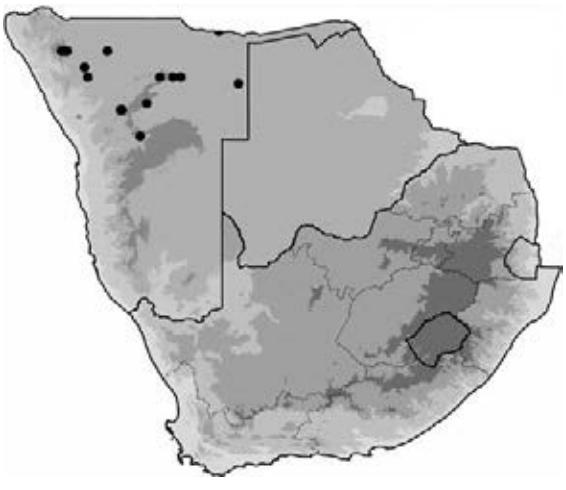
Lapeirousia stenoloba Vaupel: 548 (1912). Type: Namibia, Omaheke, 1 300 m, in brown sand, 17 Mar. 1911, *Seiner 329* (B, lecto., designated by Sölch on sheet).

Lapeirousia congesta Rendle: 435 (1895); Baker: 354 (1898). Type: Tanzania, ‚between Zanzibar and Uyui' [near Tabora], in 1866, *Taylor s.n.* (BM, holo.).

Lapeirousia juttae Dinter: 13 (1912). Type: not cited, unknown.

Plants 100–180(–250) mm high, with condensed aerial axis and often rosette-like. *Corm* bell-shaped, 15–20 mm diam.; tunics woody, brown, outer layers fragmenting irregularly, rarely becoming fibrous by decay. *Stem* ± underground or partly aerial and up to 100 mm long, with expanded internodes, simple or with several branches, each subtended by leaves or by leafy bracts *Leaves* few, often only 2 (hardly distinguishable from the bracts except by position), linear, strongly ridged, lowermost inserted below ground, exceeding bracts and up to twice as long, up to 300 × 3–5 mm. *Inflorescence* comprising 1 or more congested spikes, ± umbellate in appearance, flowers 3 to 6 per branch; *bracts* leafy, outer 60–150 mm long, lanceolate, lightly ridged, inner ± ⅓ shorter than outer, ± membranous. *Flowers* actinomorphic, salver-shaped, white to ivory-coloured, usually strongly scented especially in evenings; perianth tube cylindric, 100–140 mm long; tepals narrowly lanceolate to ± ovate, often attenuate, (25–)35–40(–50) × 3–11 mm, extended horizontally or sometimes slightly drooping. *Stamens* symmetrically arranged in a ring around style; filaments ± 4 mm long, exserted for 1.5–2.0 mm; anthers 6–8 mm long, linear, white; pollen yellow. *Style* usually ultimately reaching to ± apex of anthers, sometimes shorter; style branches 3–4 mm long, forked for ± ½ their length, diverging and recurved. *Capsules* obovoid-oblong, 15–18 mm long, concealed in leaf and bract bases. *Seeds* ± globose, 2.1–2.3 mm diam., with reticulo-rugose sculpturing. *Chromosome number* 2*n* = 16, 16 ± 0–2b *Flowering time*: December to March, occasionally in April.

Distribution and ecology: distributed widely across south tropical Africa but apparently common only in Namibia, extending from southwestern Angola across Zambia and adjacent Shaba in Congo to central and northern Malawi,



Distribution of ***Lapeirousia odoratissima***.

Zimbabwe, and in locally dry sites in western and central Tanzania; mostly on sandy flats in semi-arid habitats, sometimes in savanna woodland and even in exposed places in montane sites.

Diagnosis: the tufted or rosette-like growth habit combined with the large white flowers with an exceedingly long perianth tube, 100–140 mm long, set *Lapeirousia odoratissima* well apart in the genus. The other tufted to rosette-forming species of sect. *Sophronia* are all southern African with smaller, shorter-tubed flowers, coloured pale blue to violet, or white to pale yellow. One of only two species of the genus extending into tropical Africa, *L. odoratissima* has a chromosome number, $2n$ = 16 (x = 8) and reticulo-rugose seed sculpturing, thus corresponding with the southern African species of the section. The interior southern African *L. kalahariensis*, with white flowers and a perianth tube 30–40 mm long, appears to provide a link between *L. odoratissima* and the smaller southern African members of sect. *Sophronia*.

Sect. 3. **Lapeirousia**

Corm obconic, ± triangular in outline; tunics with basal rim produced into teeth, short or long, usually spreading. *Stem* mostly aerial (sometimes ± subterranean in *L. arenicola*) and often branched, stems compressed with angles often crisped. *Inflorescence* a spike. *Flowers* bilaterally symmetric, lower tepals with nectar guides of contrasting colour; perianth tube ± cylindric or funnel-shaped, short to elongate; stamens unilateral. *Capsules* without auriculate lobes or locular ridges. *Seeds* smooth (scarcely wrinkled) with surface cells domed. *Basic chromosome number* x = 8.

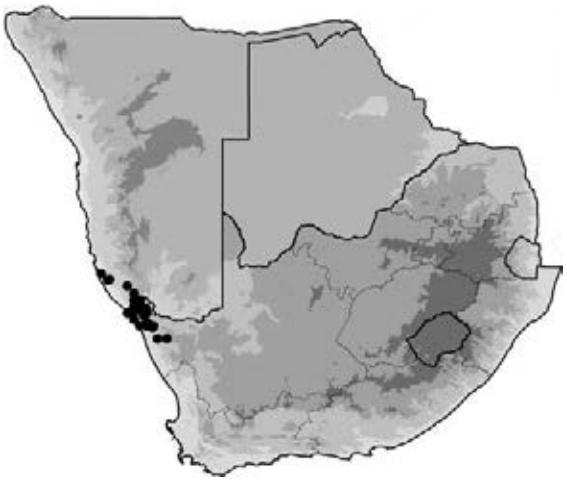
Species 14: mainly winter-rainfall western South Africa and southwestern Namibia extending into south tropical Africa.

14. **Lapeirousia barklyi** *Baker*, Handbook of the Irideae: 171 (1892); Goldblatt: 68 (1972) [including *L. macrospatha* Baker]; Goldblatt & Manning: 56 (2015). Type: South Africa, Namaqualand, without precise locality, Sept. 1876, *Barkly s.n.* (K, lecto. [not holo. as indicated by Goldblatt (1972)], designated here).

Plants 70–150 mm high, usually branched, sometimes repeatedly, mainly from base; stem compressed and 2-angled to 2-winged, wings often lightly serrated, with cormlet at each of 2 underground nodes. *Corm* bell-shaped, usually 60–90 mm below ground, ± 8 mm diam., tunics brown, fairly smooth, basal rim lightly serrated, teeth directed downward. *Leaves* 4 to 6 (or more), lowermost 1 or 2 longest and slightly to about twice as long as stem, linear, ascending to ± falcate, 1.5–2.0 mm wide, corrugately ribbed, upper leaves shorter than stem. *Inflorescences* 2- to 5-flowered spikes; outer bracts green, veins translucent, lanceolate and acute or acuminate, (10–)20–25 mm long, folded and angular along upper midline, often keeled near apex, margins broadly hyaline; inner bracts ± ½ as long as outer, transparent with 2 green keels, forked and turning brown at apex. *Flowers* zygomorphic, light purple-pink to lilac, lower tepals with basal ridge or claw-like tooth near base, marked with median yellow streak edged distally in dark red to purple, odourless; perianth tube obliquely funnel-shaped, (15–)20–25 mm long (often shorter in dry years, or apparently shorter in herbarium material), narrowly cylindric below, abruptly expanded in upper 4–5 mm into wide cylindric throat; tepals subequal, lanceolate, acute, upper 3 slightly larger, 24–27 × ± 6–7 mm, lower 3 united for 2–3 mm and thus slightly shorter, 18–22 × 5–6 mm, all weakly differentiated below into claws ± 8 mm long, claws forming wide cup, limbs spreading at right angles to claws, when fully open held ± in one plane. *Stamens* unilateral, arcuate; filaments ± 10 mm long, exserted ± 5 mm from tube but included in cup formed by tepal claws; anthers 5–6 mm long, included in floral cup, shortly apiculate, usually ± white; pollen white. *Style* arching over stamens, dividing close to or 1–2 mm beyond anther tips; branches ± 5 mm long, divided for ⅔ their length, spreading beyond anthers. *Capsules* oblong to ovoid, 8–10 mm long. *Seeds* 1.2–1.3 mm diam., round, smooth. *Chromosome number* $2n$ = 16. *Flowering time*: usually mid-September to early October, occasionally in late August.

Distribution and ecology: a species of the coastal Namib Desert, extending along the Atlantic coastal plain and adjacent coastal mountains from near Lüderitz Bay in Namibia in the north to Lekkersing and Port Nolloth in Northern Cape, South Africa in the south; in deep sands.

Diagnosis: the purple to violet perianth and relatively short-tubed flower combined with a broadly conical corm with well-developed basal teeth distinguish



Distribution of ***Lapeirousia barklyi***.

Lapeirousia barklyi. The floral tube, 15–25 mm long, is normally shorter than to about as long as the rest of the flower. This contrasts with *L. macrospatha*, which has a cream-coloured to beige perianth flushed pink on the reverse, and a tube 30–35 mm long and one and a half times as long as the rest of the flower. The closest relationships of *L. barklyi* may be with *L. fabricii*, a species of southern to central Namaqualand and Western Cape with a similar corm with marginal teeth but differing notably in its longer-tubed flower. The two can easily be distinguished by their bracts, which have an almost plane, smooth margin and keel in *L. barklyi* but are strongly crisped and serrate in *L. fabricii*.

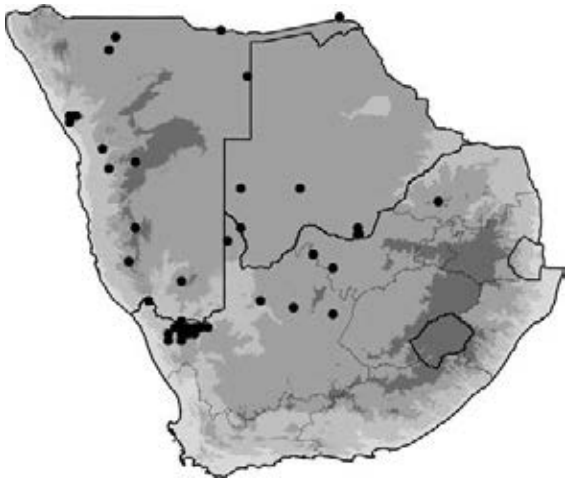
15. **Lapeirousia littoralis** *Baker* in Transactions of the Linnean Society, London, Botany ser. 2, 1: 272 (1878). Goldblatt & Manning: 57 (2015). Type: Angola, [Namibe], sandy coastal hills at Praia da Amelia near Villa de Mossamedes, July 1859, *Welwitsch 1546* (BM, holo.).

Lapeirousia burchellii Baker: 171 (1892). *L. caudata* subsp. *burchellii* (Baker) Marais & Goldblatt in Goldblatt: 30 (1972). Type: South Africa, [?North West], Morokweng, Chooi Desert, (–AC), Oct. 1812, *Burchell 2350* (K, lecto., designated by Goldblatt: 30 (1972); G, P, isolecto.).

Lapeirousia ramosissima Dinter: 255 (1931). Type: Namibia, Lüderitz: dunes near Gründorn, *Dinter 5043* (B, holo.; BOL, BR, G, K, PRE, SAM, Z, iso.).

Lapeirousia streyii Suess. in Suess. & Merxm.: 88 (1951). Type: Namibia, Lüderitz: dunes south of the Kuiseb, *Strey 2587* (M, holo.; PRE, iso. [not holo. as cited by Goldblatt (1972)]).

Plants 100–150(–200) mm high. *Corm* bell-shaped, 10–14 mm diam.; tunics woody, brown, outer layers breaking irregularly, rarely becoming ± fibrous, basal rim shortly denticulate. *Stem* several- to many-branched, branches short, clustered near base, stem ± rounded to weakly angled below nodes. *Leaves* few to several, linear, 2–4 mm wide, slightly corrugately ribbed, lowermost longest, inserted at or just below ground, often as long as inflorescence, rarely slightly longer, ascending to falcate, upper leaves progressively shorter. *Inflorescence* 1 or more short, 4- to 8-flowered spikes; outer bracts green, succulent, weakly keeled, (12–)15–20(–25) mm long; inner ½–⅔ as long, ± membranous with 2 green keels, forked at apex. *Flowers* zygomorphic, white to cream-coloured, scented or not; perianth tube slender below, curving outward and expanded above, 28–35 mm long, slightly wider in upper ± 4 mm; tepals subequal, narrowly lanceolate, 13–15 × 2–3 mm, acute, spreading. *Stamens* unilateral, arcuate; filaments 7–8 mm long, exserted 2–3 mm; anthers parallel, 4–5 mm long, ± white; pollen white or yellow. *Style* arching adaxially to stamens, branching between base and middle of anthers; style branches divided in distal ⅓–⅔, recurved above and usually tangled in anthers. *Capsules* globose, 8–12 mm long. *Seeds* globose, 1.7–2.1 mm diam., dark brown, with reticulate sculpturing. *Chromosome number* $2n = 16$. *Flowering time*: mainly July to October in southern Africa but also at other times, March and April in northern Namibia.



Distribution of ***Lapeirousia littoralis***.

Distribution and ecology: relatively widespread, extending from southwestern Angola and western, mainly coastal Namibia from near the Brandberg in the central west to the Lüderitz District in the south inland through Bushmanland and Gordonia as far east as Kimberley in Northern Cape, South Africa, and also in western Botswana; in sandy, well-drained soils, often on red sand flats.

Diagnosis: characterised by pale, uniformly coloured flowers with a long perianth tube expanded and curving outward distally, *Lapeirousia littoralis* can usually be recognised by its white flowers and relatively low stature with short branches from near the base. Plants mostly bloom in late winter or spring soon after the first rains of the season and are usually 100–150 mm high, and sometimes congested. The flowers have acute tepals ± 20 mm long and 2.0–2.5 mm wide and the floral bracts are usually 15–20(–25) mm long. *Lapeirousia littoralis* is closely related to *L. caudata* and the two have at times been united, but the latter is readily distinguished by the long slender branches, the main stem and branches up to 300 mm tall, and the creamy yellow to buff-brown or maroon flowers with particularly long, narrow, attenuate tepals 25–30 mm long and ± 1.3 mm wide. As the flowers fade and dry the tepals appear virtually filiform.

Molecular phylogenetic studies link *L. littoralis* and *L. caudata* with the western southern African *L. barklyi*, which has markedly different flowers. The seeds of *L. littoralis* and *L. caudata* are somewhat unusual, having a sculptured, ± reticulate surface, otherwise known only in sect. *Sophronia*. This suggests a possible link with sect. *Sophronia*, but neither molecular data nor any other morphological features point to a connection with that section.

16. **Lapeirousia caudata** *Schinz* in Verhandlungen des botanische Vereins der Provinz Brandenburg 31: 213 (1890); Goldblatt & Manning: 60 (2015). *L. littoralis* subsp. *caudata* (Schinz) Goldblatt: 478 (1990a). Type: Namibia, Amboland, Olukonda, *Rautanen 2* (Z, lecto., designated by Sölch on sheet; Z, isolecto.).

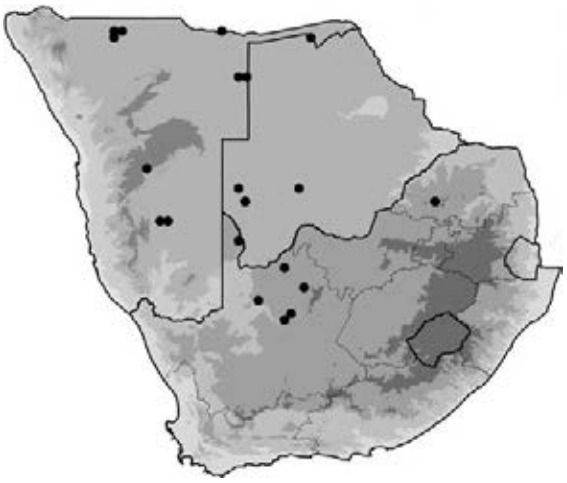
Lapeirousia delagoensis Baker: 171 (1892); Baker: 94 (1896). Type: Mozambique, Delagoa Bay, Lourenço Marques [Maputo], sandy places, *H. Bolus 7618* (K, lecto., designated by Goldblatt: 478 (1990a); BOL, G, SAM, isolecto.).

Lapeirousia lacinulata Vaupel: 546 (1912). Type: Zambia, Kantanina Hills, *Kässner 2170* (B, holo.; BM, BR, E, HBG, K, P, Z, iso.).

Plants 200–300 mm high. *Corm* bell-shaped, 10–14 mm diam.; tunics woody, brown, outer layers breaking irregularly, rarely becoming ± fibrous, basal rim shortly denticulate. *Stem* usually with several (up to 12) long branches, produced from near base, stem ± rounded to weakly angled below nodes. *Leaves* few to several, linear, 1.5–4.0 mm wide, lightly corrugately ribbed, lowermost longest, inserted ± at ground level, usually slightly longer than stems, ascending to falcate or trailing, upper leaves progressively shorter. *Inflorescence* comprising (1–)several, relatively lax, 8- to 12-flowered spikes; outer bract green, succulent, weakly keeled, 10–18(–23) mm long; inner ½–⅔ as long, ± membranous with 2 green keels, forked at apex. *Flowers* zygomorphic, greenish yellow, light yellow-brown or dull maroon, with strong sweet scent; perianth tube slender below, curving outward and expanded above, (8–)30–45(–70) mm long, wider upper part ± 6 mm long; tepals subequal, narrowly linear-filiform, (18–)25–30 × 1.3–2.0 mm, attenuate, spreading at right angles to tube, dorsal ± erect, upper laterals arching backward, lower 3 arching toward ground. *Stamens* unilateral, arcuate; filaments 7–8 mm long, exserted 2–3 mm; anthers parallel, 4–5 mm long, ± white; pollen white or yellow. *Style* arching adaxial to stamens, branching between base and middle of anthers; style branches divided in distal ⅓–⅔, recurved above and usually tangled in anthers. *Capsules* globose, 6–8(–11) mm long. *Seeds* globose, 1.7–2.1 mm diam., dark brown, with reticulate sculpturing. *Chromosome number* 2*n* = 16. *Flowering time*: mainly January to April (almost any month in Mozambique).

Distribution and ecology: occurring in a wide swath across south tropical Africa and northern southern Africa, from northern Namibia and Zambia, across Botswana to Zimbabwe and in South Africa to western Limpopo and Northern Cape, with isolated populations in southern Mozambique; in southern Africa in arid western and southern Namibia and Northern Cape, South Africa; in sandy, well-drained ground, sometimes growing on sand dunes.

The likely pollinators are moths, in light of the pale coloured, long-tubed flowers and often clove-like fragrance. The style branches are tangled with the anthers, suggesting that self-pollination may occur in the absence of insect-mediated pollen transfer.



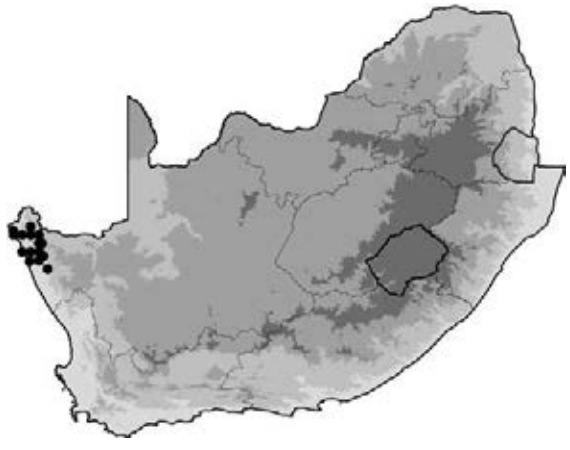
Distribution of ***Lapeirousia caudata***.

Diagnosis: *Lapeirousia caudata* is characterised by uniformly coloured, pale dull yellow, yellow-brown or maroon flowers with a long perianth tube, mostly 30–45 mm long, expanded and curving outward distally. The relatively long tepals, 25–30 mm long, are up to 2 mm wide and as the flowers fade and dry the tepals appear filiform and less than 1 mm wide. The habit is also distinctive, and well-grown plants have several (up to 12) long branches 200–300 mm high, produced from near the base, and relatively lax spikes with short bracts, 10–18(–23) mm long. The tepals spread outward from the base in somewhat lax fashion with the dorsal tepal ± erect and the lower three arching toward the ground. Plants from southern Mozambique, mostly from immediately around Maputo, stand out in having particularly long-tubed flowers, the tube up to 70 mm long, and in often being very robust. Floral variation is notable in plants from western Zambia, and flowers with a perianth tube 8–13 mm long and tepals ± 18 mm long have been recorded.

Lapeirousia caudata was treated by Goldblatt (1990b) as subsp. *caudata* of *L. littoralis* as collections then available suggested the existence of plants intermediate between the two species, especially for bract and perianth tube length. Observation of living material of both taxa suggests that differences between them in overall habit and tepal dimensions and orientation are best interpreted as evidence that they are separate but closely allied species. The overlap in perianth tube and bract length in the two species most likely varies independently in each and does not indicate the existence of truly intermediate plants. Both species are included in sect. *Lapeirousia*, with which corm morphology and chromosome number accord, but they have seeds with reticulate to rugose surface sculpturing, a feature otherwise found in *Lapeirousia* only in sect. *Sophronia*.

17. **Lapeirousia macrospatha** *Baker* in Flora capensis 6: 94 (1896); Goldblatt & Manning: 345 (1994); Goldblatt & Manning: 61 (2015). Type: South Africa, [Northern Cape], between Port Nolloth and Eleven Mile Station, 22 Aug. 1883, *H. Bolus 697* (K, holo.; B, BOL, G, SAM, iso.).

Plants 60–100 mm high, including flowers. *Corm* ± 7–8 mm diam., ± bell-shaped, usually 40–60 mm below ground; tunics dark brown, fairly smooth, basal margin lightly serrated with teeth directed downward. *Stem* usually branched, then from base, compressed and lightly 2-angled, angles smooth or lightly serrated. *Leaves* 3 to 6 (or more), lowermost usually conspicuously longer than others, ± twice as long as stem, linear, ascending to falcate, 2.0–3.5 mm wide, strongly ribbed, upper cauline leaves shorter, sometimes resembling bracts and not ribbed, usually subtending branches. *Inflorescences* 2- to 4-flowered spikes; outer bracts green, firm, 20–35 mm long, lanceolate, acute, slightly keeled, margins hyaline, those of lower flowers unifacial and ribbed distally; inner bracts forked at tips, transparent in centre, ± ½–⅔ as long as outer. *Flowers* zygomorphic, cream- to ivory-coloured, fading to dull pink, pink on outside of tepals and tube, lower tepals each marked with a small yellowish basal mark surrounded by a dark purple zone, usually with a small claw-like cusp at base of lowermost or all 3 lower tepals; perianth tube 30–35 mm long, widening and lightly curving outward near apex; tepals unequal, lanceolate and acute, dorsal largest, ± 20 × 7 mm, initially erect or arching forward over stamens later reflexed, upper lateral tepals slightly reflexed, lower three tepals united for ± 2 mm, ± 13 × 5 mm, held at right angles to tube, tilted at ± 30° below horizontal. *Stamens* unilateral, arcuate; filaments ± 9 mm long, reaching mouth of tube or exserted up to 2 mm; anthers contiguous, 3–5 mm long, mauve; pollen pale violet. *Style* dividing opposite middle of anthers; style branches ± 3 mm long, divided for ± ⅔ their length. *Capsules* oblong, 12–15 × ± 7 mm, apices of locules forming auriculate lobes decurrent on weakly developed locular ridges. *Seeds* globose, ± flattened or lobed at chalazal end, ± 1.6 mm diam., red-brown. *Flowering time*: August to late September.



Distribution of ***Lapeirousia macrospatha***.

Distribution and ecology: restricted to the southern Richtersveld and coastal northern Namaqualand in Northern Cape, South Africa, from near Eksteenfontein south at least as far as Grootmis; mainly in deep, fine-grained red sand, sometimes common locally and even dominant.

Diagnosis: *Lapeirousia macrospatha* is recognised by its large flowers with a long, slender perianth tube 30–35 mm long, widening noticeably toward the apex and white to ivory-coloured flushed red on the outside and with red markings on the lower tepals. The red-brown, bell-shaped corms bear fine marginal, downward directed teeth and are virtually identical with those of *L. arenicola*, which has similarly coloured flowers but much smaller in size with a ± cylindric perianth tube 20–33 mm long. The larger flower of *L. macrospatha* is reflected in a dorsal tepal ± 20 × 7 mm, whereas the smaller flowers of *L. arenicola* have a dorsal tepal 8–11 × 3–4 mm. The longer anthers of *L. macrospatha*, 3–5 mm long, also reflect the larger flowers than those of *L. arenicola*, in which the anthers are 1.5–2.5 mm long. The two species appear to grow in an identical habitat, deep red sand, *L. arenicola* extending along the Cape West Coast from near Klawer through the sand plains and coastal dunes of western Namaqualand to the southern Richtersveld on the Anenous flats, slightly overlapping but largely complementing the more northern distribution of *L. macrospatha*. DNA sequence-based phylogeny supports the hypothesis that *L. arenicola* and *L. macrospatha* are sister species.

Lapeirousia macrospatha was until recently regarded as merely a longer-tubed variant of then poorly understood *L. barklyi*, but that species has mauve-pink flowers with a relatively wide floral cup formed by the upper part of the perianth tube and the tepal bases. The corms also differ, those of *L. barklyi* triangular in profile with laterally extended spines, like those of L. *fabricii* and its allies.

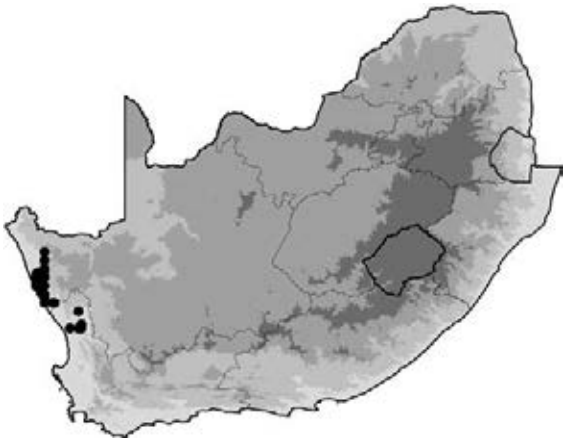
18. **Lapeirousia arenicola** *Schltr.* in Botanische Jahrbücher für Systematik 27: 105 (1900); Goldblatt & Manning: 64 (2015). Type: South Africa, [Western Cape], Atties [near Vredendal], 30 July 1896, *Schlechter 8329* (B, holo.; BM, BOL, COI, E, G, GRA, K, MO, P, PH, PRE, S, UPS, iso.).

Plants 100–120(–150) mm high, often ± tufted. *Corm* bell-shaped, 35–55 mm below ground, ± 6 mm diam.; tunics red-brown, smooth, basal rim lightly serrated, teeth directed downward. *Stem* usually branched, mainly at base, compressed and 2-angled, angles often weakly winged and slightly serrated, normally without cormlets at below ground nodes. *Leaves* 3 to 6(–many), lowermost usually conspicuously longer than others, linear, ascending to falcate, 2–3 mm wide, strongly

ribbed, upper cauline leaves shorter, usually resembling bracts and not or barely ribbed, usually subtending branches. *Inflorescences* 2- to 6-flowered spikes, lax or crowded; outer bracts green, leaf-like, 15–25 mm long, lanceolate, acute, keeled throughout or at least distally, unifacial apically for 3–5 mm, keels often red, minutely serrated, margins hyaline, inner bract transparent with two green keels, ½–⅔ as long as outer, forked at tip. *Flower* zygomorphic, cream-coloured to beige-pink, lower tepals each with red mark near base; perianth tube 15–25(–33) mm long, cylindric, curving slightly outward at apex; tepals subequal or dorsal slightly larger, lanceolate and acute or obtuse, 8–11 × 3–4 mm, usually spreading ± horizontally when fully open, all in same plane. *Stamens* unilateral, erect; filaments ± 7 mm long, exserted ± 3.5 mm from tube; anthers contiguous, 1.5–2.5 mm long, violet; pollen mauve. *Style* dividing opposite upper half of anthers; style branches ± 1.5 mm long, divided for ± half their length. *Capsules* oblong, (8–)10–12 × ± 6 mm, apices of locules forming auriculate lobes decurrent on wing-like locular ridges in upper half. *Seeds* globose, flattened at chalazal end, ± 1.4 mm diam., dark shiny brown. *Chromosome number* $2n = 16$. *Flowering time*: August to September, occasionally in early October.

Distribution and ecology: restricted to the South African Atlantic Coast and near interior, extending from near Vanrhynsdorp and Vredendal in Western Cape northward through the sandveld and low coastal hills of Namaqualand as far north as the Anenous Flats at the southern edge of the Richtersveld in Northern Cape; in deep sandy soils, especially the rather fine-grained red-tinged sands of lowland and coastal Namaqualand.

Diagnosis: low-growing and typically a small plant, *Lapeirousia arenicola* is distinguished by its small size, pale beige-pink, slender-tubed flowers with narrow tepals. Perhaps most easily confused with *L. macrospatha* which has similarly coloured flowers, *L. arenicola* has a uniformly narrow, cylindric perianth tube 17–33 mm long and tepals 10–11 × 3–4 mm whereas *L. macrospatha* has a wider tube, 25–35 mm long, expanded toward the apex and considerably larger tepals, the uppermost ± 20 × 7 mm. Although the two species appear similar on casual examination, they are quite distinct and do not intergrade although their ranges overlap slightly. Both have been found growing together just north of the road to Port Nolloth below Anenous Pass. Perianth tube length may coincide but the tepals of *L. arenicola* are always smaller and the tube more often than not is substantially shorter than in *L. macrospatha*. The two species are closely related and have been shown to be immediately related in molecular phylogenetic studies.

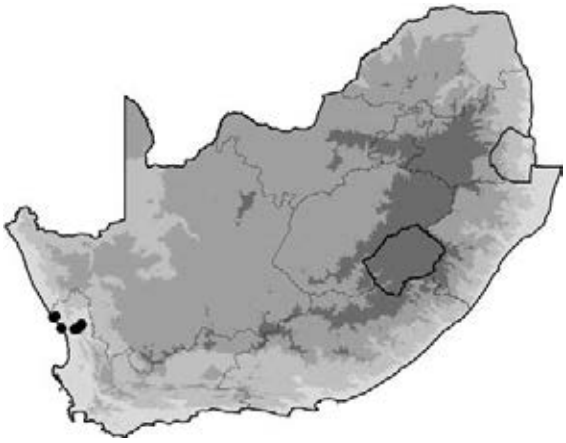


Distribution of ***Lapeirousia arenicola***.

Lapeirousia arenicola has a striking supefficial similarity to *L. simulans*, which co-occurs with it at several sites along the West Coast and where their nearly identical flowers make a strong impression. *Lapeirousia arenicola* is always more compact in habit and often has a somewhat shorter perianth tube, so that they can be distinguished when seen growing side-by-side, but more significant differences are underground: the corms of *L. arenicola* lie 35–55 mm below the surface and the underground part of the stem rarely produces cormlets whereas corms of *L. simulans* are usually 55–85 mm below ground and always have a fairly large cormlet at each of two underground nodes. *Lapeirousia arenicola* is self-compatible but probably facultatively outcrossing early in the flowering season, when plants produce fairly large, long-tubed flowers with stronger colouring than later in the season, at which time the flowers of some populations have weakly contrasting markings, are smaller, and have a perianth tube 15–18 mm long (compared with ± 25 mm on the same plants earlier in the season). We assume these late-blooming flowers are primarily autogamous.

19. **Lapeirousia simulans** *Goldblatt & J.C.Manning* in Novon 4: 341 (1994); Goldblatt & Manning: 66 (2015). Type: South Africa, [Western Cape], sandveld ± 11 km north of Vanrhynsdorp, 14 Sept. 1992, *Goldblatt & Manning 9454* (NBG, holo.; K, MO, PRE, WAG, iso.).

Plants 100–180 mm high. *Corm* bell-shaped, 7–8 mm diam., 55–85 mm below ground; tunics dark brown, glossy, margins lightly serrate, teeth directed downward. *Stem* 2- or 3(5)-branched (rarely simple), branching ± divaricate, bearing a cormlet at each of 2 underground nodes, compressed and 2-angled, angles minutely serrated. *Leaves* 3 or more, lowermost longest, usually ± twice as long as stem, linear, 2.0–4.5 mm wide, corrugately ribbed, remaining leaves progressively shorter, becoming ± bract-like and usually subtending branch. *Inflorescence* lax spikes of (2)3 to 5 flowers; outer bracts green, transparent on veins, with slightly serrate keels decurrent on stem angles, 10–18 mm long; inner bracts ± ½ as long as outer. *Flowers* zygomorphic, ± white, reddish brown on reverse, lower 3 tepals each with small claw-like tooth near base and with small basal and larger median dark red spot, unscented; perianth tube cylindric, 27–35 mm long, slightly wider and curved near apex; tepals unequal, upper 3 slightly larger than lower 3, when fully open all held ± horizontally at right angles to tube, ± 11 × 4 mm, lower 3 held closely together,



Distribution of ***Lapeirousia simulans***.

10 × 3.0–3.3 mm. *Stamens* unilateral, erect; filaments 5–6 mm long, exserted ± 3 mm from tube; anthers 2.0–2.5 mm long, purple; pollen light purple. *Style* erect, adaxial to stamens, dividing between mouth of tube and anther bases; style branches ± 2 mm long, divided for slightly > ½ their length. *Capsules* oblong, 8–12 mm long, slightly warty in upper ½, without auriculate apices or locular ridges. *Seeds* globose, light brown, 1.2–1.4 mm diam. *Flowering time*: early to late September.

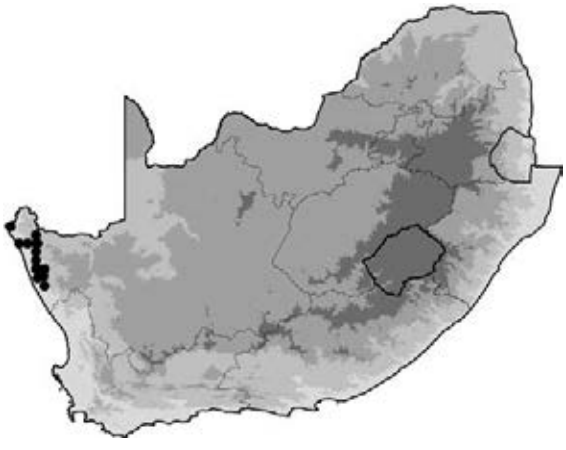
Distribution and ecology: restricted to southern Namaqualand, South Africa, from the Groen River west of Garies in Northern Cape south to Vanrhynsdorp in Western Cape; mainly in sandy ground.

Pollination of *Lapeirousia simulans* is unknown, but flower colouring and perianth tube length indicate a strategy using long-proboscid flies. Self-compatibility and autogamy assure reproduction by seed in the absence of cross pollination by insects. Vegetative reproduction is ensured by production of cormlets at the underground nodes of the deeply buried corm.

Diagnosis: the small corms with glossy dark brown tunics and a basal rim of minute, downward directed teeth closely resemble those of *Lapeirousia arenicola* and several other members of sect. *Lapeirousia*. The flowers in *L. simulans* and *L. arenicola* are so similar in tube length and general size and markings that they can be distinguished only with difficulty, and their flowering times overlap although that of *L. simulans* is generally somewhat later in the season, usually mid- to late September, by which time the last flowers of *L. arenicola* are often depauperate, and have shorter tubes and duller colouring than earlier in the season. The two species are most readily distinguished by the underground part of the stem. The corms of *L. arenicola* lie 35–55 mm below the surface on a straight stem that lacks axillary cormlets but the underground stem of *L. simulans* is 55–85 mm long so that the corm lies at a greater depth than in *L. arenicola*, and each of the two underground nodes consistently bears a large cormlet, a feature fairly rare in the genus, although also known in a few other species.

20. **Lapeirousia spinosa** *(Goldblatt) Goldblatt & J.C.Manning* in Novon 4: 343 (1994); Goldblatt & Manning: 68 (2015). *L. divaricata* var. *spinosa* Goldblatt: 66 (1972). Type: South Africa, [Northern Cape], ± 68 km west of Steinkopf to Port Nolloth, 24 Sept. 1970, *Goldblatt 567* (BOL, holo.).

Plants 50–90(–140) mm high. *Corm* ± bell-shaped (to ± obconic), 9–15 mm diam., 20–40 mm below ground; tunics blackish, often glossy, basal rim with prominent horizontal spines. *Stem* ± erect, sometimes branched at base, somewhat compressed but not often angled; without cormlets at nodes below ground. *Leaves* 3 or 4 (or more if plants branched), lowermost usually longest, usually shortly exceeding stem, linear to narrowly lanceolate, ascending or falcate, 2–4 mm wide, strongly corrugately ribbed; remaining leaves shorter and progressively more bract-like above, ribs weakly or not developed. *Inflorescences* spikes of (3–)5 to 9 flowers, usually moderately crowded; outer bract green or flushed reddish below, firm, 12–20(–35) mm long, enclosing slender part of tube, veins transparent, margins narrowly hyaline; channelled below, lightly keeled in upper ½, keels minutely serrated or crisped; inner bract up to ½ as long as outer, 2-keeled, with broad transparent margins. *Flowers* zygomorphic, white or flushed pink to lilac (more so with age and when dry), lower tepals yellow below and each with one or two purple median marks near limb base, bearing basal tooth-like ridge ± 2 mm long, lightly sweet-scented; perianth tube 9–12 mm long (shorter in dried material), narrow below, curved and widening above; tepals unequal, lanceolate, acute, dorsal largest, 18–23 × 7–8 mm, erect, held apart from others, lower margins undulate or lightly crisped, upper lateral tepals united with lower 3 for ± 5 mm, directed forward below, reflexed distally, lower 3 tepals horizontal below, limbs 12–14 × 7–8 mm, flexed sharply downward at ± 45°, margins undulate. *Stamens* unilateral and arcuate; filaments 9–12 mm long, exserted 7–9 mm from tube; anthers parallel, 4–6 mm long, white; pollen white. *Style* arching over stamens, dividing between



Distribution of ***Lapeirousia spinosa***.

base and middle of anthers; branches 4–5 mm long, forked for slightly more than ½ their length, recurved. *Capsules* ovoid, 6–7 mm long, with auricular lobes above locules. *Seeds* globose, ± 1.2 mm diam., flattened at chalazal end, smooth, brown. *Chromosome number* 2*n* = 16. *Flowering time*: mid-August to mid-September.

Distribution and ecology: restricted to west-central and northern Namaqualand, from the Orange River at Arris Drift in Northern Cape, South Africa, southward to Wallekraal east of Hondeklipbaai (not recorded in Namibia but almost certainly occurring there); usually in compacted sandy soil in places where the ground is covered by small quartz pebbles but on the plains west of Anenous Pass occurring in thousands in light clay devoid of stones.

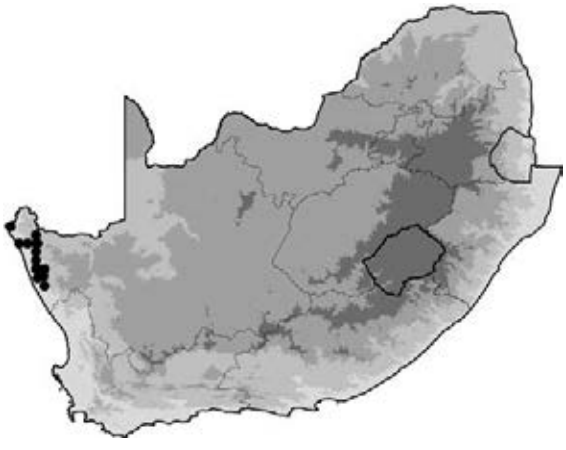
Diagnosis: early collections of *Lapeirousia spinosa* were first included in the broadly similar *L. divaricata* and flowers of the two species are alike in their white (or palest pink) colour, short perianth tube, and general shape, with the lower three tepals united with the upper laterals for several millimetres and ornamented with a tooth-like median ridge. The flowers of *L. spinosa* are larger, with a perianth tube 9–12 mm long and a dorsal tepal 18–23 mm long vs. a tube 7–10 mm long and dorsal tepal 14–16 mm long in *L. divaricata*. The latter species is restricted to moist or seasonally waterlogged, sandy habitats in the Bokkeveld, Cederberg and Olifants River Mtns, and is also taller with relatively lax spikes, and bell-shaped corms with minutely serrated lower margins. *Lapeirousia spinosa* occurs on dry, well-drained sandy flats, is a fairly compact plant, and has obconic corms and tunics with prominent, laterally directed spines. Molecular studies place the two species in separate clades, with *L. spinosa* now assigned to sect. *Lapeirousia* and *L. divaricata* in sect. *Chasmatocallis*.

21. **Lapeirousia tenuis** *(Goldblatt) Goldblatt & J.C.Manning* in Novon 4: 344 (1994); Goldblatt & Manning: 70 (2015). *L. divaricata* var. *tenuis* Goldblatt: 66 (1972). Type: South Africa, [Northern Cape], between Eleven Mile Station and Oograbies Poort (Port Nolloth and the mountains of the interior), 23 Aug. 1883, *H. Bolus 6575* '*Lapeirousia divaricata* Baker' (BOL, holo.; G, K, SAM, iso.).

Plants 60–160(–220) mm high. *Corm* broadly obconic (triangular in outline), 10–15 mm diam., up to 40 mm below ground, tunics dark brown to blackish, basal margins with fine laterally extended teeth 1–3(–4) mm long, tunics often accumulating. *Stem* mostly 2- or 3-branched or unbranched; branches produced well above ground level, slightly compressed, oval in section, occasionally lightly or obscurely angled, angles smooth. *Leaves* 3 or 4, only lowermost well developed, straight and linear or falcate, usually ± as long as to twice as long as stem, rarely slightly shorter, 2–3(–4) mm wide, corrugately ribbed; remaining leaves < ½ as long as lowermost and progressively more bract-like above. *Inflorescences* spikes of 9 to 16 flowers, lateral spikes with fewer flowers, 2-ranked in bud, becoming spiral after anthesis; outer bract grey-green, transparent on veins, acute, 7–11 mm long, folded on midline but not keeled, apices acute and curving upward, inner bract ⅓–½ as long as outer, transparent with two green keels, forked at tip. *Flowers* zygomorphic, pale lilac-pink, lower tepals each with darker blotch or streak in midline and claw-like cusp near base, cusp ± white surrounded basally by red-purple zone, occasionally upper lateral tepals also lightly marked in lower ½, lightly sweet-scented; perianth tube 10–15 mm long, slender below, curving outward and wider in upper ⅓; tepals narrowly lanceolate to ± linear, dorsal 9–11 × 2–3 mm, ± erect, upper laterals recurving from base, lower 3 united for ± 2 mm, extending horizontally below, flexed downward distally. *Stamens* unilateral, ± erect; filaments ± 6 mm long, exserted ± 3 mm from tube; anthers ± 3 mm long, parallel, light purple; pollen ± white. *Style* straight, adaxial to stamens, dividing between middle and apex of anthers; branches ± 2.5 mm long, deeply divided and recurved. *Capsules* globose-trigonous, ± 4–5 mm long. *Seeds* globose, 1.6–2.0 mm diam., smooth, brown, glossy. *Flowering time*: mainly in July, occasionally mid- to late August, and once recorded in bloom in early September.

Distribution and ecology: restricted to coastal central and northern Namaqualand from Kleinzee to near Port Nolloth in Northern Cape, South Africa; rare and poorly documented; on stony slopes in clay mixed with granite and quartzite pebbles.

Diagnosis: *Lapeirousia tenuis* and *L. divaricata* share corms with spiny basal rims and comparatively small bracts but have markedly different flowers. In *L. divaricata* (and allied *L. spinosa*) the lower tepals are united with the upper laterals for some distance and the lower tepals have large, tooth-like median ridges whereas the flowers of *L. tenuis* have narrow tepals that spread ± uniformly from the apex of the perianth tube. The lower tepals appear to be united for a short distance but are not fused to the upper tepals at all, and they have claw-like basal cusps rather than tooth-like median ridges.

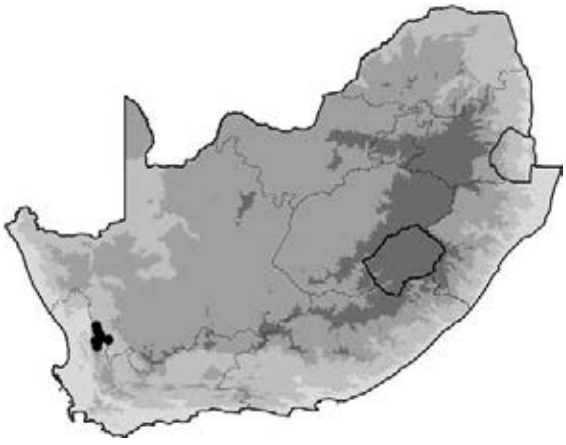


Distribution of ***Lapeirousia tenuis***.

22. **Lapeirousia violacea** *Goldblatt* in Contributions from the Bolus Herbarium 4: 59 (1972); Goldblatt & Manning: 71 (2015). Type: South Africa, [Western Cape], Biedouw Valley, 26 Aug. 1970, *Goldblatt 569* (BOL, holo.; K, MO, iso.).

Plants 60–100 mm high. *Corm* broadly obconic, 8–10 mm diam.; tunics dark brown, with light vertical ridging, basal rim with spreading spines 2–5 mm long. *Stem* simple or 1- to 4-branched from near base, stem lightly compressed, generally 1-angled, angles decurrent on leaves or bract keels. *Leaves* 4 to 6 (or more when stem branched), lowermost longest, generally shorter than stem and ascending, narrowly lanceolate or falcate, 5–7 mm wide, corrugately ribbed, other leaves ½ as long or less, only lightly ribbed, upper of these often bract-like. *Inflorescences* (2)3- or 4-flowered spikes; outer bracts pale green, firm, 15–22(–30) mm long, folded and keeled in midline, keels minutely crisped, often 2–3 mm wide near apex; inner bracts mostly green with broad transparent margins, ⅔ to ± as long. *Flowers* zygomorphic, dark violet, lower tepals each with dark purple to red spear-shaped basal mark and white lines along lower margins; when fully open tepals held ± in one plane, lowermost or all three lower tepals bearing a small basal claw-like cusp; perianth tube 35–40 mm long, slender, widening and curving toward apex; tepals unequal, narrowly lanceolate, dorsal largest, ± 10 × 5 mm wide, separated from others, upper lateral tepals reflexed, lower 3 tepals joined basally for 3–4 mm, free parts held closely together, 7–8 × ± 4 mm. *Stamens* unilateral, ± erect; filaments ± 9 mm long, exserted ± 5 mm from tube; anthers ± 2.5 mm long, purple; pollen purple. *Style* dividing opposite base or middle of anthers; style branches ± 2 mm long, deeply forked and recurved. *Capsules* oblong-trigonous, remaining enclosed in bracts, 9–11 mm long, without locular ridges. *Seeds* globose, slightly domed outward at chalazal end, 1.1–1.3 mm diam., light brown. *Chromosome number* 2*n* = 16. *Flowering time*: August to mid-September.

Distribution and ecology: restricted to the mountains and intermontane valleys of northwestern Western Cape and adjacent Northern Cape, South Africa, extending from the valleys of the Biedouw and Doorn Rivers in the south through Botterkloof as far north as Papkuilsfontein south of Nieuwoudtville; in sandy soil, mostly in stony ground, rarely common, in valley bottoms and exposed hilly sites.



Distribution of ***Lapeirousia violacea***.

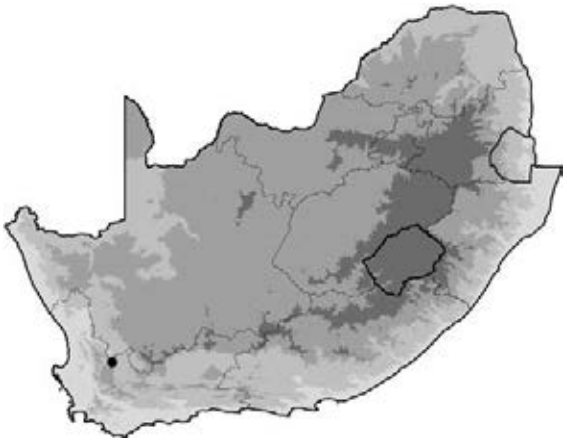
Diagnosis: *Lapeirousia violacea* shares dark violet flowers with reddish to purple and white markings on the lower tepals with *L. jacquinii*, but they differ markedly in their floral bracts and corms. The corms of *L. jacquinii* are bell-shaped without the long spiny, laterally projecting teeth typical of the obconic corms of *L. violacea*, which has inflated outer bracts folded or slightly keeled, thus very different from the shorter, typically two-keeled bracts of *L. jacquinii*. The two species share pollinators but hybrids between them are unknown in the wild. Both species are self-compatible and facultatively autogamous.

The large bracts and obconic, basally toothed corms of *L. violacea* suggest a relationship with *L. dolomitica* and its allies of Namaqualand and southern Namibia, as well as *L. purpurea* from the Swartruggens of Western Cape. *Lapeirousia violacea* and *L. jacquinii* share the same pollinators, long-proboscid *Prosoeca* flies.

23. **Lapeirousia purpurea** *Goldblatt & J.C.Manning* in Strelitzia 35: 74 (2015). Type: South Africa, Western Cape, Swartruggens, Gansfontein, rocky sandstone slopes, Sept. 2008, *Manning & Roux 3179* (NBG, holo.; K, MO, PRE, S, iso.).

Plants 100–150 mm high, simple or few- to many-branched, mostly from base, stem compressed and 1- or 2-angled. *Corm* triangular in outline, basal rim prominently serrated, 24–28 mm diam. at base. *Leaves* several, the basal ribbed, ⅓ to ± as long as stem, to 5 mm wide, upper leaves progressively smaller above, smooth, the uppermost resembling floral bracts. *Spike* 6- to 10-flowered; bracts green, outer 10–18 mm long, with shallow, slightly serrated keel, inner ± ⅓–½ as long as outer, membranous with two darker keels, notched at apex. *Flowers* blue-purple, lower tepals with V-shaped white mark above base surrounded by darker violet to ± black zone, lower median tepal with a small claw-like tooth above base, unscented; perianth tube slender below, widening and curving outward in upper ⅓, 35–38 mm long; tepals unequal, dorsal erect, ovate, ± 15 × 6 mm, upper laterals slightly smaller, recurved, lower tepals united basally for ± 3 mm, curving downward, ± 8 × 4 mm. *Stamens* unilateral, arcuate; filaments ± 7 mm long, exserted ± 3 mm from mouth of tube; anthers suberect, prominently tailed, ± 4 mm long; pollen yellow. *Style* arching above stamens, dividing opposite lower ⅓ to middle of anthers; style branches ± 3.5 mm long, divided for slightly > ½ their length. *Capsules* ovoid, ± 12 mm long, showing outline of seeds, with moderately well developed locular ridges. *Seeds* unknown. *Chromosome number* unknown. *Flowering time*: September.

Distribution and ecology: known from just two collections from interior valleys of the Swartruggens that



Distribution of ***Lapeirousia purpurea***.

drain into the Tanqua Basin in Western Cape, South Africa; in sandy ground among sandstone rocks.

The long-tubed, purple flowers with white markings on the lower tepals are evidently adapted for the *Prosoeca peringueyi* long-proboscid fly pollination system, but the floral biology of the species remains to be investigated.

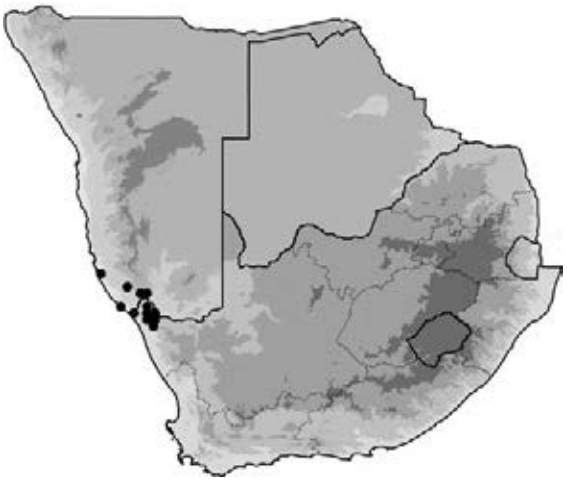
Diagnosis: The obconic corms of *Lapeirousia purpurea* have fine teeth projecting from the base and resemble the corms of *L. dolomitica*, *L. lewisiana* and *L. violacea*, also long-tubed species, but can be distinguished by the rich violet colour of the perianth, with the upper lateral tepals strongly reflexed and the lower three tepals with a V-shaped white mark above the base surrounded by a dark violet to black zone. The lower median tepal bears a small claw-like cusp near the base. In *L. violacea* all three lower tepals usually bear a small tooth near the base, and such teeth are lacking in *L. dolomitica* and *L. lewisiana*.

24. **Lapeirousia dolomitica** *Dinter* in Repertorium specierum novarum regni vegetabilium 29: 255 (1931); Goldblatt & Manning: 74 (2015). Type: Namibia, Alicetal, pump station near Pomona, June 1929, *K. Dinter 6432* (B, holo.; BM, BOL, G, GH, K, iso.).

Plants (50–)100–150 mm high. *Corm* 10–15 mm diam., broadly obconic (triangular in outline); tunics dark brown, rugose, basal rim with prominent laterally projecting spines. *Stem* simple or 1- or 2-branched from base, stem terete or compressed and 2-ridged to 2-winged below first flower. *Leaves* 1 to 3, lowermost basal and longest, straight to falcate, 100–150 mm long, usually ± as long as stem, 3.5–5.0 mm wide, strongly ribbed, smooth or minutely papillate along rib margins, remaining leaves much smaller, resembling floral bracts. *Inflorescences* spikes of (5–)8 to 15 flowers, initially 2-ranked, becoming spiral; outer bract 12–20 mm long, pale to dark green, margins hyaline or red, semi-transparent over veins, inflated, ± round in section, abaxial surface weakly keeled, keels usually restricted to distal half, inner bract ⅓–½ as long as outer, with two broad green keels. *Flowers* zygomorphic, pale blue to violet or lilac, lower 3 tepals partly or entirely yellow near base and darker blue or purple in median upper half, sometimes with short median ridges near base usually curving downward, sometimes sweetly scented; perianth tube slender, ascending, arching outward near apex, 25–35(–40) mm long (in severely stressed plants occasionally less than 25 mm); tepals unequal, lanceolate and acute, dorsal longest and erect, (12–)15–17 × 5–7 mm, narrowed below, upper laterals slightly shorter, spreading or reflexed, lower 3 tepals united for 2–3 mm, slightly narrowed toward base, held closely together, (10–)12–14 mm long. *Stamens* unilateral, ± erect; filaments ± 10 mm long, exserted 2–4 mm, arching outward; anthers 4.0–4.8 mm long, parallel, purple or cream-coloured; pollen lilac or cream-coloured. *Style* arching adaxial to stamens, usually dividing opposite middle ⅓ of anthers (rarely below anther bases in northern populations), dark violet; style branches 3–4 mm long, recurved, divided for ½ their length. *Capsules* ovoid-oblong, weakly trigonous, 12–14 mm long, without locular ridges, usually warty or papillose. *Seeds* globose, chalazal end somewhat flattened, ± 1.8 mm diam., glossy dark brown. *Chromosome number* 2*n* = 16. *Flowering time*: June to late July, sometimes in August.

Distribution and ecology: restricted to the most arid parts of the southern African winter-rainfall zone, extending from Pomona in southwestern Namibia south into the Richtersveld of Northern Cape, South Africa; in rocky places, often on quartzite shale but not normally in dolomite or any other type of limestone.

Diagnosis: *Lapeirousia dolomitica* is recognised by its distinctive, obconic corms with blackish, rough-surfaced tunics bearing prominent spines extending outward from the base, and by the somewhat inflated bracts with only weakly developed keels. When seen alive the bracts are unusual in having alternating longitudinal bands of pale translucent and dark opaque colouring. The flowers are pale blue or lilac (recorded in some collections as violet),



Distribution of ***Lapeirousia dolomitica***.

with pale yellow markings at the bases of the lower tepals and sometimes also short tooth-like, basal ridges. Among the long-tubed species of *Lapeirousia*, it has a perianth tube shorter than usual, mostly 25–35 mm long.

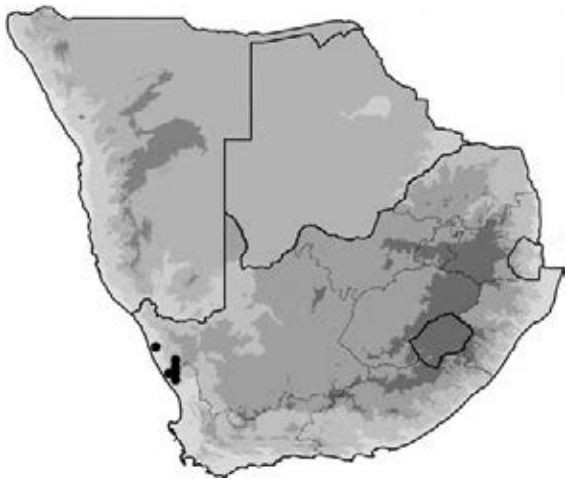
Lapeirousia dolomitica resembles *L. lewisiana* in its corms with spiny basal margins and particularly long style branches, up to 4 mm long but has glabrous leaves, only lightly inflated floral bracts, generally with weakly developed keels, paler coloured flowers with a somewhat shorter tube, mostly 25–35 mm long, and often papillose to warty whereas. In contrast, *L. lewisiana* has hairy leaves, strongly inflated bracts lacking keels, larger, deep magenta red flowers with a tube mostly 40–48 mm long, and consistently smooth capsules.

25. **Lapeirousia lewisiana** *B.Nord.* in Botaniska Notiser 123: 434 (1970); Goldblatt & Manning: 77 (2015). *L. dolomitica* subsp. *lewisiana* (B.Nord.) Goldblatt: 64 (1972). Type: South Africa, [Western Cape], Komkans, 11 Aug. 1962, *Nordenstam 965* (NBG, holo.; S, iso.).

Plants (50–)100–200 mm high. *Corms* 10–15 mm diam., broadly obconic; tunics dark brown, rugose, basal rim with well-developed, slender, laterally projecting spines. *Stem* simple or 1- or 2-branched from base, stem terete or compressed and 2-ridged to 2-winged below first flower. *Leaves* 1 to 3, lowermost basal and longest, straight to somewhat falcate, 100–150 mm long and usually ± as long as stem, 3.5–5.0 mm wide, strongly ribbed, sparsely and irregularly white-hairy on rib edges at least in lower half, remaining leaves small, resembling floral bracts. *Inflorescences* spikes of up to 14 flowers; outer bract ± 20 mm long, inflated, usually rounded and without keels except occasionally near tips. *Flowers* reddish purple to magenta, lower tepals with broad ± white median streak in lower, narrow half and darker red-purple blotch in upper centre; perianth tube (35–)40–48 mm long; tepals unequal, lanceolate to ± spathulate or obovate, apex acute or rounded, dorsal ± 12 × 6–7 mm, lower 3 united for ± 3 mm, narrow at base for 2–3 mm, held at ± 45° to horizontal, ± 10 × 5.5 mm. *Stamens* unilateral, ± erect; filaments exserted ± 3.5 mm; anthers 3–4 mm long, dark violet. *Style* arching over stamens, between middle and apex of anthers; style branches 3–4 mm long, recurved, divided for ½ their length. *Capsules* ovoid-oblong, weakly trigonous, 12–14 mm long, without locular ridges, smooth. *Seeds* globose, ± flattened at chalazal end, 1.9–2.2 mm diam., glossy dark brown. *Flowering time*: mid-July to mid-August.

Distribution and ecology: never common, but recorded from several collections from central and southern Namaqualand, where it is best known from the area between Garies and Bitterfontein in Northern Cape, South Africa, but also occurring locally to the west toward the coast as far south as Komkans in Western Cape; in stony, fine-grained soils.

Diagnosis: *Lapeirousia lewisiana* is closely allied to *L. dolomitica*, and the two species share virtually



Distribution of ***Lapeirousia lewisiana***.

identical obconic corms with prominent, spreading marginal spines, and long-tubed flowers, but the differences between them include flower colour and markings, perianth tube length, and leaf vestiture. *Lapeirousia lewisiana* has magenta-red (also sometimes described as purple) flowers, the lower three tepals with prominent white, median streaks in the proximal third, and the perianth tube is typically 40–45 mm long, and the basal foliage leaf is finely but sparsely hairy. In contrast *L. dolomitica* always has hairless leaves and a pale blue to violet perianth with paired white streaks on the lower tepals, the perianth tube 25–35 mm long or rarely slightly longer. Capsules are poorly known in *L. dolomitica* but are slightly warty or papillose where recorded, whereas *L. lewisiana* has smooth capsules. There are also slight differences in the bracts of the two species: although somewhat inflated in both species, the bracts of *L. dolomitica* have a weakly developed keel in the distal half whereas those of *L. lewisiana* are rounded or become slightly folded only along the midline near the tips.

Despite its close relationship to *Lapeirousia dolomitica*, *L. lewisiana* is most easily confused with the common Namaqualand species, *L. silenoides*, which it resembles in its long-tubed, darkly pigmented magenta-red flowers, but the latter has bell-shaped corms without spiny projections, and smaller bracts.

Also closely related to *Lapeirousia lewisiana*, *L. kamiesmontana* has similar vegetative features, including the corm tunics with spiny margins and slightly hairy foliage leaf, but flowers later in the season, usually two to three weeks after *L. lewisiana*, even at the same elevation and has white flowers, the lower tepals marked with red, the tube and the reverse of the tepals flushed dark red, and a perianth tube mostly 45–56 mm long.

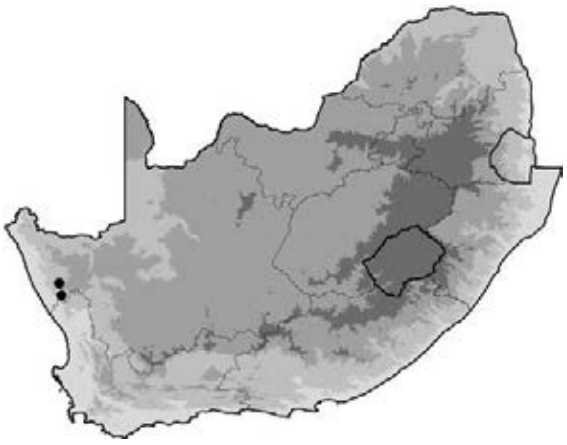
26. **Lapeirousia kamiesmontana** *Goldblatt & J.C.Manning* in Strelitzia 35: 79 (2015). Type: South Africa, Northern Cape, Kamiesberg, between De Kom and Garies, 27 Aug. 1976, *Goldblatt 3980* (NBG, holo.; K, MO, PRE, S, iso.).

Plants 100–180 mm high. *Corm* 10–14 mm diam., broadly obconic; tunics dark brown, rugose, basal rim with long, slender, spreading spines. *Stem* simple or 1- or 2-branched from base; stem round to slightly compressed. *Leaves* 1 to 3, lowermost basal and longest, straight to somewhat falcate, 80–160 mm long, sometimes exceeding flowers, 3.5–5.0 mm wide, strongly ribbed, sparsely woolly (rarely ± smooth), remaining leaves much smaller, resembling floral bracts. *Inflorescences* spikes of (5–)8 to 10 flowers, initially 2-ranked, becoming spiral; outer bract 10–15 mm long, acute, ± inflated, rounded, without keels, inner bract ± half as long, transparent with 2 green keels. *Flowers* white (pale yellow when dry), flushed red on reverse of tepals and tube, lower tepals with red blotch in lower ⅓ and paired, red lines near base running into throat (purple when dry); perianth tube mostly 45–56 mm long, ± uniformly wide throughout; tepals unequal, obovate and markedly narrowed in basal 2 mm, dorsal 16–18 × (7–)9–10 mm, lower tepals held ± horizontally, united basally for ± 1.5 mm, ± 15 × 5.5–6.5 mm. *Stamens* unilateral ± erect; filaments ± 10 mm long, exserted 2–3 mm; anthers 4.5–5.0 mm, violet; pollen purple. *Style* dividing opposite anther tips; style branches ± 3.5 mm long, divided for half their length, recurved, white. *Capsules* and *seeds* unknown. *Flowering time*: late August to early October.

Distribution and ecology: restricted to the southern Kamiesberg in Northern Cape, South Africa, from the flats around the Farm Doornkraal at ± 600 m elevation and in the Langkloof at elevations up to 950 m at least; in decomposed granitic soil and occasionally in granite outcrops.

The form and colour of the long-tubed flowers suggests pollination by long-proboscid flies, but no insect visitors have been recorded for the species.

Diagnosis: the broadly obconic corm with dark brown, rugose tunics spiny along the rim of *Lapeirousia kamiesmontana* are shared with *L. dolomitica* and *L. lewisiana*, from which it is distinguished by white flowers with distinctive red markings on the lower tepals, and a perianth tube mostly 45–60 mm long. The earlier-blooming *L. lewisiana* has dark red-purple to magenta flowers with white markings and a perianth tube (35–)40–48 mm long. The distinctive, somewhat woolly indumentum on the basal leaf is also shared in the genus only with *L. lewisiana*, but the ranges of the two species do not overlap, and the flowering times, even at the same elevation, are separated by at least two to three weeks in any particular year.



Distribution of ***Lapeirousia kamiesmontana***.

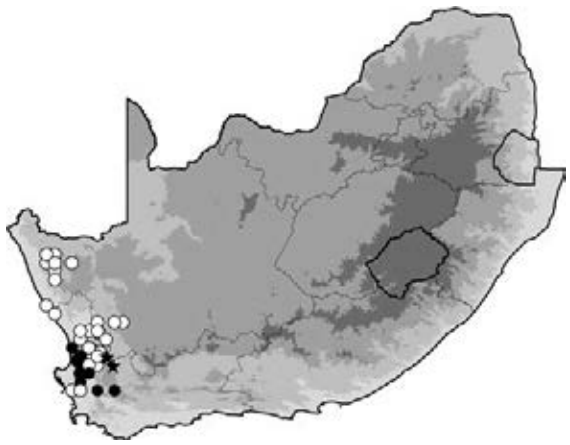
27. **Lapeirousia fabricii** *(D.Delaroche) Ker Gawl.* in Curtis's Botanical Magazine 31: sub t. 1246 (1810); Goldblatt & Manning: 81 (2015). *Ixia fabricii* D.Delaroche: 18, no. 5 (1766). *Gladiolus fabricii* (D.Delaroche) Thunb.: 186 (1800). *Oviedа fabricii* (D.Delaroche) Spreng.: 147 (1824). *Peyrousia fabricii* (D.Delaroche) Sweet: 499 (1830a). *Meristostigma fabricii* (D.Delaroche) A.Dietr.: 597 (1833). Type: South Africa, Olifants River Valley, *Leipoldt s.n.* [BOL [17111], neo., designated by Goldblatt & Barnard: 305 (1970)].

Plants mostly 100–250 mm high, usually 4- to 6-branched; stem compressed, angled and 2-winged, wings irregularly serrated. *Corm* 10–15 mm diam., broadly obconic; tunics brown, lightly ridged vertically, basal rim with short, spreading spines 1–2 mm long. *Leaves* several, lowermost longest, linear to falcate, ribbed, shorter or longer than stem; remaining leaves cauline, progressively shorter, not or barely ribbed, often subtending branches, upper becoming bract-like. *Inflorescences* (2–)4- to 8-flowered spikes; outer bract green or flushed red, (10–)14–20(–25) mm long, keeled, acute, margins often reddish, keel crisped or minutely serrate; inner bract transparent with 2 green keels, ½–⅔ as long as outer, forked at apex. *Flowers* zygomorphic, white to pale yellow or beige, purple or rarely pink, usually red or pink on reverse of tepals and tube, lower tepals each with red spot in midline, throat marked with fine red lines inside and out, decurrent on lower part of tube; perianth tube obliquely funnel-shaped, 30–65 mm long, narrow and cylindric below, abruptly expanded into wide upper part up to 10 mm long; tepals usually unequal (rarely subequal), all straight below and continuing upper part of tube as a tepal cup, then spreading horizontally, upper 3 largest, 20–24 × 7–12 (subsp. *fabricii*), 15–18 × 7–10 mm (subspp. *compressa* and *purpurascens*), lower 3 with claws ± 4 mm long, limbs 10–20 × 3.0–7.5 mm, each often with short claw, bearing claw-like cusp arching over limb base. *Stamens* unilateral, arched; filaments 6–10 mm long (subspp. *compressa* and *purpurascens*) or 10–17 mm long (subsp. *fabricii*), exserted 3–7 mm from upper part of tube and 1–3 mm from tepal cup; anthers 3–5 mm long, dark purple; pollen purple. *Style* arching over stamens; branches 3–5 mm long, usually dividing near middle of anthers, forked for ½ their length, recurved. *Capsules* oblong, 10–12 mm long, apices of locules forming ear-like lobes decurrent on low locular ridges. *Seeds* globose, flattened at chalazal end, 1.2–1.3 mm diam. *Chromosome number* 2*n* = 16. *Flowering time*: August to October depending on subspecies, usually fairly late in spring.

Distribution and ecology: widespread in the drier, western half of Western Cape, South Africa and common in Namaqualand in Northern Cape, extending from near Steinkopf in the north to Malmesbury in the south and inland to the western edges of the Tanqua Basin along the eastern foothills of the Swartruggens and Cederberg Mtns; most often in rocky sandstone or granite derived soils but occasionally in deep, hard sand, or in crevices in rocks.

Diagnosis and relationships: the flowers of *Lapeirousia fabricii* are among the largest in the genus, with a long perianth tube and often wide throat. The perianth tube ranges from 30–65 mm long and is usually expanded in the upper 5–10 mm in a short to long cup or gullet. The tepals are shortly clawed, particularly the lower three, which are united basally for ± 2 mm and the erect claws form the upper part of the floral cup. When fully open the lower and sometimes the upper tepal limbs spread at right angles to the tube, or the dorsal is suberect. The lower tepal claws often bear claw-like cusps that arch forward over the limb bases, but these cusps are sometimes absent and represented by thickened median ridges. Vegetatively, *L. fabricii* has distinctive flattened, narrowly winged stems, the wings usually minutely crisped or serrated. The well developed outer floral bracts are ribbed and have crisped to serrated keels.

Variation across the range of *Lapeirousia fabricii* is reflected in the recognition of three subspecies. The most common and widespread, subsp. *fabricii*, is centred in the northern half of the range and has predominantly pale yellow to beige flowers with red markings, lower tepals about half as wide as the dorsal, and a perianth tube mostly 50–65 mm long with a wide, deep throat up to 10 mm long. Populations south and west of the Olifants River Mtns with white or pale pink flowers with pink markings, lower tepals not or only slightly narrower than the dorsal, a perianth tube 30–45 mm long, and a short, relatively narrow throat usually only ± 5 mm long are treated as subsp. *compressa*. The third subspecies, subsp. *purpurascens*, is restricted to the dry interior valleys of the Cederberg and northern Swartruggens and has blue-purple flowers, lower tepals ± ½ as wide as the upper and a perianth tube 30–45 mm long. Its flowers also differ from the typical form in having a relatively shallow gullet ± 5 mm deep, and correspondingly shorter filaments 7–9 mm long.



Distribution of ***Lapeirousia fabricii*** subsp. ***fabricii***, ○; subsp. ***compressa***, ●; subsp. ***purpurascens***, ★.

The long-tubed flowers of the typical subspecies are known to be pollinated by long-proboscid flies and the same pollination strategy is inferred for subsp. *compressa* and subsp. *purpurea*, probably using a different fly species in the latter.

Key to subspecies

1a Flowers with deep gullet 9–13 mm long including limbs of lower tepals; perianth usually beige to pale yellow, or ± white, flushed red on reverse, with prominent red stripes in lower throat; filaments 13–20 mm long. . . . . .27a. subsp. *fabricii*

1b Flowers with shallow gullet ± 5 mm long; filaments 7–9 mm long:

2a Perianth white to pale or deep pink; anthers 3–4 mm long; lower tepals only slightly narrower than upper tepals and with or without tooth-like cusps. . . . . 27b. subsp. *compressa*

2b Perianth blue-purple (rarely pink-purple) with red markings; anthers 4–5 mm long; lower tepals ± half as wide as upper tepals and always with short tooth-like cusp near limb base. . . . . .27c. subsp. *purpurascens*

27a. subsp. **fabricii**

Gladiolus denticulatus Lam.: 728 (1786), illegitimate superfluous name for *G. anceps* L.f. (1782). *Lapeirousia denticulata* G.H.M.Lawr.: 134 (1955), as a new name for *G. denticulatus* Lam. Type: South Africa, without precise locality or collector, Herb. Lamarck (P, holo.).

Peyrousia aculeata Sweet: t. 39 (1830b). *Meristostigma aculeatum* (Sweet) Steud.: 130 (1841). *Ovieda aculeata* (Sweet) Klatt: 777 (1864). *Lapeirousia anceps* var. *aculeata* (Sweet) Baker: 156 (1877). Type: South Africa, without precise locality or collector, illustration in Sweet, British Flower Garden ser. 2: t. 39 (1830b).

Lapeirousia serrulata Schltr.: 432 (1897). Type: South Africa, [Western Cape], Clanwilliam, *Leipoldt 383* (B, holo.; BOL, SAM, iso.).

[*Lapeirousia aculeata* Sweet: 396 (1827), invalid name without description.]

Flowers pale yellow or beige to ± white, often red or pink on reverse of tepals and tube, lower tepals each with red spot in midline and claw-like projection at top of claw, throat marked with fine red lines inside and out decurrent on lower part of tube; perianth tube mostly 50–65 mm long, slender and cylindric below, expanded upper part 9–13 mm long; tepals unequal, straight below and continuing upper part of tube as a cup for ± 4 mm, then spreading, upper 3 tepals largest, 20–24 × 7–12 mm, lower 3 tepals much narrower, 10–12 × 3–4 mm. *Filaments* 14–17 mm long, exserted ± 7 mm

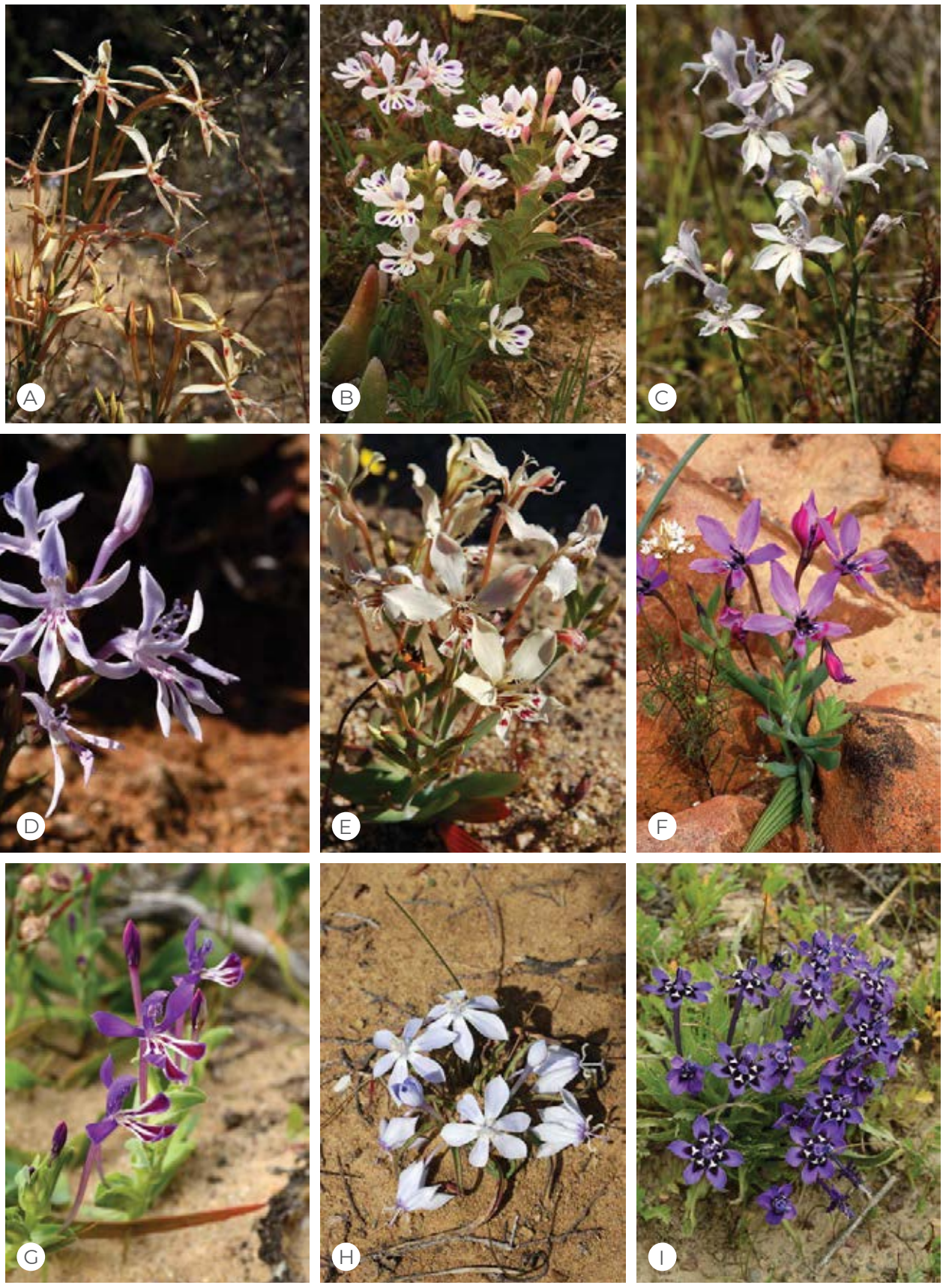


Plate 17: A, ***Lapeirousia anceps***, Clanwilliam, WC; B, ***L. angustifolia***, Vanrhynsdorp, WC; C, ***L. divaricata***, Nieuwoudtville, NC; D, ***L. dolomitica***, Steinkopf, NC; E, ***L. fabricii*** subsp. ***fabricii***, Springbok, NC; F, ***L. fabricii*** subsp. ***purpurascens***, Wuppertal, WC; G, ***L. jacquinii***, Worcester, WC; H, ***L. montana***, Komsberg, Pass NC; I, ***L. oreogena***, Nieuwoudtville, NC.

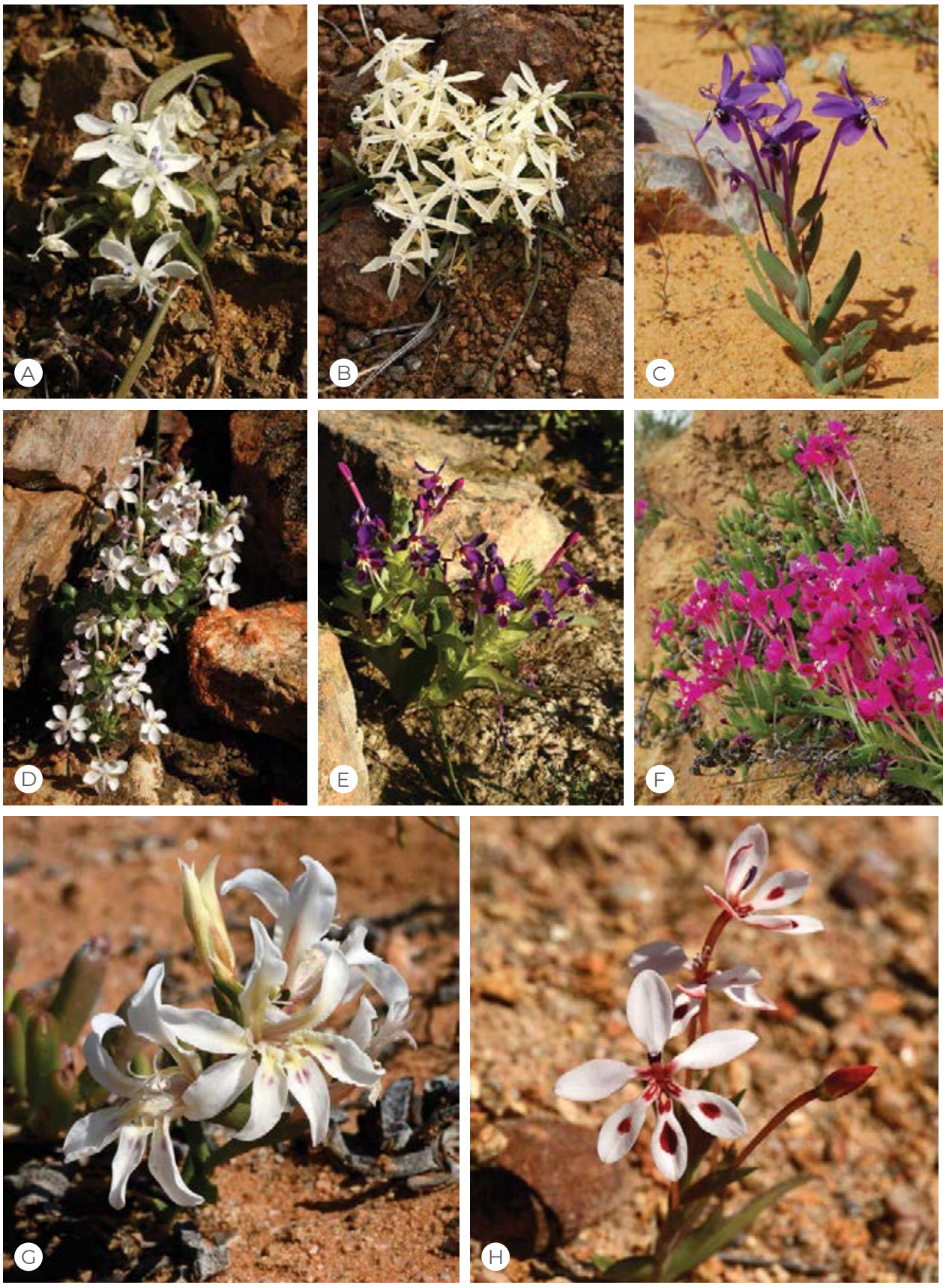


Plate 18: A, ***Lapeirousia plicata*** subsp. ***effurcata***, Matjiesfontein, WC; B, ***L. plicata*** subsp. ***foliosa***, Carnarvon, NC; C, ***L. purpurea***, Ceres, WC; D. ***L. pyramidalis*** subsp. ***pyramidalis***, Worcester, WC; E, ***L. pyramidalis*** subsp. ***regalis***, Clanwilliam, WC; F, ***L. silenoides***, Kamieskroon, NC; G, ***L. spinosa***, Steinkopf, NC; H, ***L. verrucunda***, Springbok, NC.

from tube and ± 3 mm from tepal cup; anthers 5–6 mm long. *Style* dividing between base and apex of anthers; style branches ± 5 mm long.

Distribution and ecology: subsp. *fabricii* ranges from near Steinkopf in northern Namaqualand along the Bokkeveld Mtns to Clanwilliam and the Biedouw Valley, and along the Atlantic Coast as far south as Darling.

The flowers are adapted for pollination by long-proboscid flies. Recorded pollinators include the horse fly, *Philoliche gulosa* and the nemestrinid, *Moegistorhynchus longirostris* (Goldblatt *et al.* 1995; Manning & Goldblatt 1997).

27b. subsp. **compressa** *(Pourr.) Goldblatt & J.C.Manning* in Strelitzia 35: 86 (2015). *Lapeirousia compressa* Pourr.: 79 (1788). *Ixia lapeirousia* J.F.Gmel.: 108 (1791), illegitimate superfluous name for *L. compressa* Pourr. Type: South Africa, without locality, said to have been collected by Philibert Commerson in Isle de France [Mauritius], but probably by Pierre Sonnerat, his colleague, who spent a short time at the Cape en route to Mauritius (P: Herb. Lamarck, holo.).

Like subsp. *fabricii* in vegetative features. *Flowers* white to ivory-coloured or pale (rarely dark) pink, flushed pink to red on reverse, lower tepals with red markings at limb bases; perianth tube 35–55 mm long, expanded in upper ± 5 mm into wide throat; tepals extending upward for ± 3 mm as a cup, spreading distally, dorsal 16–18 × 6–8 mm, lower tepals 15–20 × 5.5–7.5 mm. *Filaments* 6–10 mm long; anthers 3–4 mm long. *Style* dividing opposite lower to middle ⅓ of anthers, branches ± 3 mm long. *Flowering time*: September to mid-October, occasionally in early November.

Distribution and ecology: local in the upper Olifants River Valley, more common south and west of the Olifants River Mtns, extending as far south as Moorreesburg with isolated populations to the east along the margins of the Tanqua Basin from the interior Cederberg south to Karoo Poort.

Diagnosis: subsp. *compressa* is usually recognised by the nearly subequal tepals and almost radially symmetric flowers with a white to ivory-coloured or pink (rarely almost red) perianth, the lower tepals marked with pink to red near the base of the limbs. It intergrades with subsp. *fabricii* in the mid- to upper Olifants River Valley at Piekenierskloof and south of Citrusdal, where it can be difficult to assign plants to subspecies. Further north and to the west and south, populations with a beige to almost yellow perianth and lower tepals ± half as wide as the upper can readily be recognised as subsp. *fabricii*.

Hybrids between *Lapeirousia fabricii* subsp. *compressa* and *L. jacquinii* have been recorded south of Piketberg near the old bridge over the Berg River, where flowering times of the two taxa overlap, and between subsp. *compressa* and *L. anceps* at sites where both were in flower and growing together. These are among the few interspecific hybrids known in the genus.

27c. subsp. **purpurascens** *Goldblatt & J.C.Manning* in Strelitzia 35: 86 (2015). Type: South Africa, Western Cape, rocky sandstone slope 2 km south of Wuppertal, 25 Aug. 2009, *Goldblatt & Manning 13252* (NBG, holo.; K, MO, PRE, iso.).

Plants mostly 100–200 mm high. *Flowers* pale to deep purple, darker on reverse of tepals and tube, lower tepals each with dark red ± triangular mark in lower midline and with short yellow, claw-like cusp near base, throat dark turquoise to violet, often with pale narrow lines; perianth tube ± straight, slender, 30–45 mm long, expanded in upper ± 5 mm; tepals unequal (rarely subequal), upper three 15–18 × 7–10 mm, spreading distally; lower 3 erect below continuing upper part of tube as tepal cup for ± 4 mm, spreading distally, 10–12 × 4–5 mm. *Filaments* ± 7–8 mm long, dark turquoise, exserted 2–3 mm from tube; anthers 4–5 mm long. *Style* suberect, usually dividing between middle and apex of anthers; branches ± 3.5 mm long. *Flowering time*: mid-August to mid-September, thus early to midspring.

Distribution and ecology: a narrow endemic of the interior valleys of the northern Western Cape, extending from Wuppertal in the north through the drier valleys of the interior northern Cederberg and adjacent Swartruggens; in stony sandstone-derived ground.

The long-tubed, dark blue- or rarely red-purple flowers suggest pollination by long-proboscid *Prosoeca* flies, but there are no published observations on pollination of the subspecies.

Diagnosis: subsp. *purpurascens* is distinguished by its predominantly purple flowers with darker purple markings on the lower tepals, each of which bears a short, yellow, claw-like cusp near the base, and the short, dark violet to turquoise throat ± 5 mm long. Flowers of subsp. *fabricii*, which occurs within the range of subsp. *purpurascens* but blooms two to three weeks later, are creamy yellow to beige with bright red markings on the lower tepals. The throat in subsp. *fabricii* is up to 10 mm deep and the perianth tube is usually longer, 40–60 mm vs. 35–45 mm in subsp. *purpurascens*. Flowering in subsp. *fabricii* usually begins in mid-September, continuing into October, sometimes even as late as November so that the two subspecies are isolated by flowering time as well as pollinator preference. The stony sandstone habitat is essentially the same for both species although in Namaqualand subsp. *fabricii* grows on granite-derived soils and granite outcrops.

REFERENCES [See under 13. *Afrosolen*]

13. Afrosolen

Afrosolen *Goldblatt & J.C.Manning* in Bothalia 46: 3 (2016), as a new name for *Psilosiphon* Welw. ex Goldblatt & J.C.Manning: 108 (2015), illegitimate homonym, not *Psilosiphon* Entwhistle (1989). Type: *P. sandersonii* (Baker) Goldblatt & J.C.Manning = *A. sandersonii* (Baker) Goldblatt & J.C.Manning

Lapeirousia subg. *Paniculatae* [as *Paniculata*] Goldblatt & J.C.Manning: 373 (1990a). Type: *L. erythrantha* (Klotzsch ex Klatt) Baker = *Afrosolen erythranthus* (Klotzsch ex Klatt) Goldblatt & J.C.Manning

Revisionary account: Goldblatt & Manning: 108–138 (2015) [as *Psilosiphon*].

From the Greek *solen* (a pipe) compounded with Africa, for the tubular flowers of this African genus, the tube of which is elongate, hence pipe-like, in many species.

Deciduous geophytes. *Corm* flat-based, bell-shaped, rooting from base, axillary in origin; tunics of compacted fibres, outer layers decaying into loose fibrous network or vertical strips. *Foliage leaves* few to several, linear to sword-shaped, falcate or ± terete, plane with visible main vein; lowermost often longest and inserted on stem near ground level, upper leaves progressively smaller. *Stem* aerial, compressed and angled to winged, usually branched, often repeatedly. *Inflorescence* either much branched, forming a ± a round or flat-topped false panicle, with sessile flowers, or a simple or branched spike; bracts green and ± soft-textured, often becoming dry distally, inner ± as long as outer, often forked near apex. *Flowers* usually zygomorphic, or radially symmetric, long-lived, often salver-shaped or rotate, when zygomorphic, lower tepals usually with contrasting darker or lighter markings, sometimes sweetly scented; perianth tube cylindric or funnel-shaped, short to extremely long; tepals subequal or unequal with dorsal largest. *Stamens* symmetrically disposed or unilateral and arcuate; filaments slender, free; anthers oblong-linear, dehiscence longitudinal. *Ovary* globose, sessile; style filiform, branches forked for ⅓–½ their length, undivided or notched apically. *Capsules* cartilaginous, ± globose. *Seeds* ± globose, flattened at chalazal end, smooth or slightly wrinkled; surface cells usually domed or ± flat. *Pollen grains* monosulcate-operculate, operculum 2-banded. *Basic chromosome number* uncertain, diploid numbers, 2*n* = 16, 12, 10, 8 (diploids); 2*n* = 14, 12, 10, 8, 6 (tetraploids).

Species 15: sub-Saharan Africa, from Ethiopia to Zimbabwe, Mozambique and Angola, one species also in Nigeria; 11 species in southern Africa, mainly Botswana and Namibia.

The majority of species of *Lapeirousia* from tropical and eastern southern Africa have been transferred to the genus *Afrosolen* (= *Psilosiphon*) after molecular phylogenetic study showed them to fall outside the main clade of *Lapeirousia* and sister to the two tropical genera *Cyanixia* and *Savannosiphon*. *Afrosolen* is recognised by the flat-based corms with tunics of compacted fibres, soft-textured to submembranous floral bracts, and often undivided style branches, although they are deeply divided in some species. The inflorescence is typically a flat- to round-topped false panicle but tends in some species to a spike. Chromosome numbers are unusually varied, ranging from *2n* = 16 to 6 and including polyploidy and dysploidy. As in *Lapeirousia*, the monosulcate pollen grains have a 2-banded operculum.

Flowers of most species are zygomorphic with short to very long perianth tubes, up to 100–140 mm long in white-flowered *Afrosolen schimperi*. Two species, *A. coeruleus* and *A. avasmontanus*, have short-tubed, radially symmetric flowers, but on the basis of chromosome number and other characters appear not to be immediately related, suggesting that the radially symmetric flower has evolved independently in the two species. Pollination includes hawk moths in species with white or pale pink flowers with an elongate tube, bees for short-tubed species, and possibly long-proboscid flies or butterflies in species with deeply pigmented flowers with a long tube, although to date no long-proboscid flies have been recorded in northern Namibia where some of these species occur.

Key to species

1a Perianth tube 1–2 mm long; flowers actinomorphic; all tepals with contrasting markings:
2a Tepals 11.0–15.5 × (4–)5–7 mm (appearing shorter in poorly preserved specimens); flowers 1(2) on ultimate branches of inflorescence; corm tunics dark brown to blackish and decaying irregularly into vertical strips. . . . . 2. *A. avasmontanus*
2b Tepals 7.0–9.5 × 3–5 mm; flowers (2)3 to 5 on ultimate branches of the inflorescence; corm tunics light brown, outer layers of fine reticulate fibres . . . . . 6. *A. coeruleus*
1a Perianth tube 3–150 mm long; flowers zygomorphic with arcuate to ± erect unilateral stamens; contrasting markings, when present, confined to 3 lower (abaxial) tepals:

3a Perianth tube 100–150 mm long; flowers white, sometimes flushed pale blue to purple outside . . . . . .11. *A. schimperi*
3b Perianth tube 3–50 mm long; flower variously coloured:
4a Inflorescence a divaricately branched false panicle with main branches 1- or 2(3)-flowered:
5a Perianth white to pale pink; corms tunics straw-coloured and outer layers ± fibrous and reticulate; floral bracts dry before anthesis, becoming membranous, dry and light brown with tips often darker brown 10. *A. bainesii*
5b Perianth blue to violet, lower tepals with white markings edged dark blue to violet; corms tunics dark brown and outer layers breaking into vertical strips, not fibrous; floral bracts acute-attenuate and dark brown in distal half . . . . . 1. *A. sandersonii*
4b Inflorescence a ± false panicle or spike with at least some main branches 3- to 8-flowered:
6a Perianth tube 25–50 mm long:
7a Flowers creamy white; lower tepals with purple median spear-shaped markings; perianth tube 40–45 mm long; tepals 15–19 × 4–5 mm . . . . . .9. *A. otaviensis*
7b Flowers blue to violet, rarely pale blue to almost white; lower tepals with blue to violet markings; perianth tube 25–38 mm long; tepals 10–14 × 3–6 mm:
8a Flowers violet, lower tepals with white median mark edged in darker violet; tepals ± 14 mm long; floral bracts 8–10 mm long; perianth tube 35–37 mm long . . . . . 4. *A. erongoensis*
8b Flowers pale blue to white with bluish markings on lower tepals; tepals 10–12 mm long; floral bracts 3–6(–7) mm long; perianth tube 25–38 mm long. . . . . 3. *A. gracilis*
6b Perianth tube 3–25 mm long:
9a Perianth tube (15–)18–25 mm long:
10a Perianth greenish or blue-violet with red to purple and white markings on lower tepals; floral bracts 5–7 mm long; plants of Malawi, Mozambique, South Africa (Limpopo) and Zimbabwe . . . . . .8. *A. masukuensis*
10b Perianth pale blue or white; floral bracts 3–6(–7) mm long; plants of Namibia . . . . . 3. *A. gracilis*
9b Perianth tube (5–)7–15 mm long:
11a Dorsal tepal suberect or arched over stamens; lower tepals often (?always) with tooth-like median ridge up to 1 mm long; style branches undivided or notched at tips . . . . . 5. *A. rivularis*
11b Dorsal tepal reflexed, lying in same plane as lower tepals; lower tepals without tooth-like median ridges; style branches divided for ⅓–½ their length . . . . . .7. *A. erythranthus*

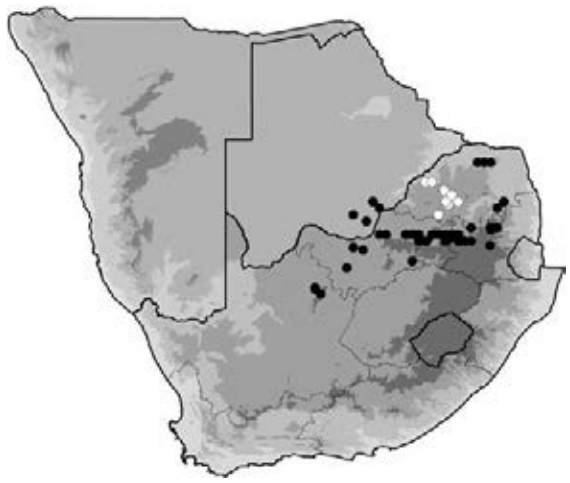
1. **Afrosolen sandersonii** *(Baker) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Lapeirousia sandersonii* Baker: 169 (1892). *Psilosiphon sandersonii* (Baker) Goldblatt & J.C.Manning: 109 (2015). Type: South Africa, 'Transvaal,' *Sanderson s.n.* [K, lecto., designated by Goldblatt: 463 (1990b)].

Plants 200–350(–450) mm high. *Corm* 25–30 mm in diam., tunics dark brown, hard-leathery internally, decaying irregularly into vertical sections, seldom becoming fibrous and never netted. *Stem* divaricately and often intricately branched, compressed, 2-angled below, 3-angled above branches, slightly winged, sheathed below by dark brown cataphylls. *Leaves* 2 to 4, ± linear to falcate, 2–3 mm wide, firm to rigid, main and secondary vein pairs ± prominent, closely set; lowermost leaf longest, sometimes exceeding inflorescence, upper leaves progressively shorter. *Inflorescence* a rounded to ± flat-topped false panicle, but with main axis sometimes evident, ultimate branches 1- or 2(3)-flowered; bracts 5–12 mm long, green with brown tips in bud, often flushed purple, becoming dry and dark brown with age, acute-attenuate, inner sometimes longer than outer, usually notched at apex. *Flowers* zygomorphic, blue to violet, lower 3 tepals each with deep red to purple and white spear-shaped mark guide in lower midline; perianth tube 8–12 mm (subsp. *limpopoensis*), or mostly 15–30 mm (subsp. *sandersonii*), slender, widening slightly in upper 2–3 mm; tepals subequal, lanceolate, 10–11 × 2–4 mm, dorsal held apart from others, reflexed, lower 3 joined for ± 1 mm and held close together, when fully open all ± spreading. *Filaments* unilateral, ± erect, ± 5 mm long, exserted 2.5–3.5 mm from tube; anthers 3–5 mm long, purple; pollen pale yellow or white. *Style* dividing near apex of anthers or shortly (rarely much) exceeding anther tips; branches 1–2 mm long, divided for up to ⅓ their length, notched apically or undivided. *Capsules* depressed globose, 4–5 × 4–5 mm. *Seeds* nearly globose, ± 1.5–2.0 mm diam. *Chromosome number* 2*n* = 10. *Flowering time*: mainly February and March, occasionally from late December or in April.

Distribution and ecology: occuring in eastern Botswana and in South Africa in Limpopo, North West Province and Northern Cape and locally in Mpumalanga; in rocky, and usually well-drained sites, including hill slopes, ridges and summits.

Diagnosis: allied to the *Afrosolen erythranthus* complex of short-tubed species, *A. sandersonii* has the repeatedly branched, panicle-like inflorescence with 1 or 2 (rarely 3) flowers on the major terminal branches. The blue-violet flowers have a moderately long perianth tube, mostly 15–30 mm long, and the floral bracts are often relatively long, 8–12 mm, acute-attenuate and flushed purple or brown and aging dark brown. The corm tunics are distinctive, being dark brown and fragmenting into vertical strips rather than becoming a fibrous network. *Afrosolen erythranthus* typically has fewer-branched inflorescences with 3 to 6 flowers per main terminal branch, floral bracts 4–6 mm long, and a perianth tube usually 6–11 mm long.

The variation in perianth tube length correlates with geographical distribution, with plants from Limpopo, mainly in the Waterberg and nearby, having particularly short tubes, 8–12 mm long, whereas populations in the southwest of the range, in the Kuruman Hills and adjacent country in Northern Cape, stand out in having a much longer perianth tube, 25–30 mm long. The regional



Distribution of ***Afrosolen sandersonii*** subsp. ***sandersonii***, ●; subsp. ***limpopoensis***, ○.

variation is not always consistent and plants from Mpumalanga sometimes have perianth tubes almost as long as those from further west. The long- and short-tubed plants are alike in other respects, especially the branching pattern and the rust-brown, acute-attenuate floral bracts. The populations from the Waterberg are referred to subsp. *limpopoensis* and the remaining, longer-tubed populations to subsp. *sandersonii*. The short-tubed subsp. *limpopoensis* broadly resembles *A. erythranthus* in its short perianth tube, 8–12 mm long, and relatively short floral bracts, 5–6 mm long, but the plants have the divaricately branched stem and brown floral bracts typical of *A. sandersonii*. They may represent recent or ancient hybridisation between *A. sandersonii* and *A. erythranthus*, although the ranges of the two taxa do not overlap today.

Afrosolen masukuensis is sometimes confused with *A. sandersonii*, but the inflorescence of that species is comparatively sparsely branched with the main branches 5- to 9-flowered and the flowers are smaller, although perianth tube length, 20–25 mm long, overlaps. *Afrosolen masukuensis* also differs in its smaller corms with paler, fibrous tunics, and appears to favour wetter, lowland sites in contrast to the montane, rocky well-drained habitats favoured by *A. sandersonii*.

Key to subspecies

1a Perianth tube mostly 15–30 mm long; floral bracts 8–12 mm long; style branches 1.5–2.0 mm long . . . . . 1a. subsp. *sandersonii*

1b Perianth tube mostly 8–12 mm long; floral bracts 5–6 mm long; style branches 1.0–1.3 mm long. . . . . 1b. subsp. *limpopoensis*

1a subsp. **sandersonii**

[*Lapeirousia bainesii* var. *breviflora* Baker: 156 (1877), invalid name without description. No specimens cited, but *Nelson 402* (K) from Rhenosterpoort is so annotated by Baker]

Plants 200–350(–450) mm high. *Corms* 25–30 mm diam. *Inflorescence* with bracts 8–12 mm long. *Flowers* with perianth tube 15–30 mm long; tepals 10–12 × 3–4 mm. *Filaments* 5–7 mm long, exserted 3.0–4.5 mm. *Style* dividing near apex of anthers, branches 1.5–2.0 mm long, divided for up to ¼ their length or barely notched at tips (or apparently undivided).

Distribution: encompassing almost the entire range of the species, thus extending from eastern Botswana into South Africa in northern Limpopo, North West Province and Northern Cape and local in Mpumalanga.

1b subsp. **limpopoensis** *(Goldblatt & J.C.Manning) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Psilosiphon sandersonii* subsp. *limpopoensis* Goldblatt & J.C.Manning: 114 (2015). Type: South Africa, Limpopo, Waterberg, between Groothoek and Vaalwater, 1 000 m, 6 Jan. 1959, *Werdermann & Oberdieck 1640* (PRE, holo.; B, BR, GH, K, MO, WAG, iso.).

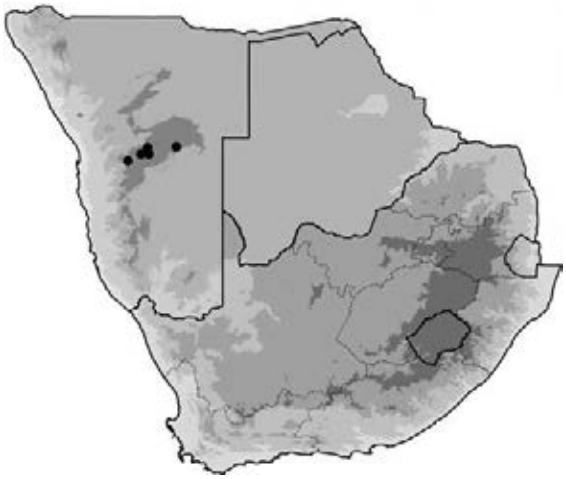
Like subsp. *sandersonii*, but *corms* 15–25 mm diam., tunics sometimes becoming fibrous and netted with age. *Spike* with floral bracts 5–6 mm long. *Flowers* with perianth tube 8–12 mm long; tepals 10–11 × 3.0–3.5 mm. *Filaments* ± 5 mm long, exserted 2.5–3.0 mm. *Style* dividing near or beyond apex of anthers, branches ± 1.0–1.3 mm long, divided for up to ⅓ their length.

Distribution and ecology: restricted to western Limpopo, South Africa, in the Waterberg Mtns and surrounding country.

Diagnosis: As outlined above subsp. *limpopoensis* bears a superficial similarity to the largely tropical African *Afrosolen erythranthus* in its relatively short perianth tube, but the dark, tough, non-reticulate corm tunics, intricate branching pattern, and rather dark floral bracts all accord better with *A. sandersonii*.

2. **Afrosolen avasmontanus** *(Dinter) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Lapeirousia avasmontana* Dinter: 256 (1931). *Psilosiphon avasmontanus* (Dinter) Goldblatt & J.C.Manning: 114 (2015). Type: Namibia, Lichtenstein, Auas Mtns, 20 Feb. 1923, *Dinter 4454* (B, holo. [K, photo.]; GH, S, Z [3 sheets], iso.).

Plants 200–300 mm high. *Corm* bell-shaped, 15–20 mm diam., tunics dark brown to blackish, inner layers ± woody, outer decaying irregularly, often into vertical strands. *Stem* ± divaricately branched in upper half, rounded to slightly triangular in section, sometimes obscurely winged or ridged at one or more angles. *Leaves* 3 or 4, linear, 2–3 mm wide, main vein prominent, lowermost inserted near ground level and longest, usually slightly exceeding inflorescence, others inserted above ground, progressively smaller above, those subtending branches ± bract-like. *Inflorescence* a rounded, ± flat-topped false panicle, ultimate branches with 1(2)



Distribution of ***Afrosolen avasmontanus***.

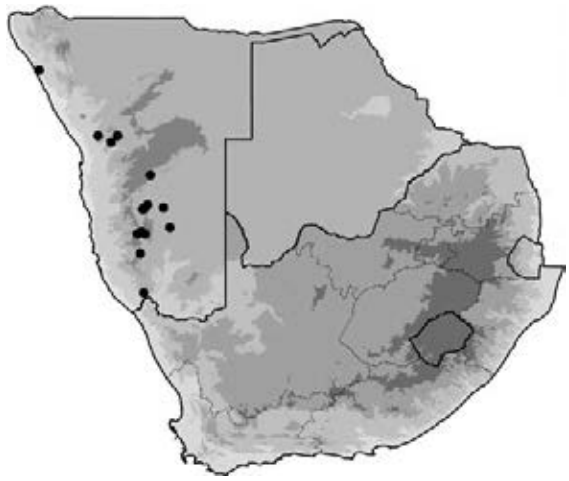
flowers; bracts 5–6 mm long, green below, membranous in upper half and bent outward by tepals, becoming completely dry in fruit, inner ± as long as or slightly longer than outer. *Flower* actinomorphic, blue to light purple with median white heart-shaped mark feathered purple on edges in basal half of each tepal; perianth tube ± 1 mm long, cylindric below, widening in upper ½; tepals spreading but curving upward near tips, subequal, lanceolate to elliptic, 11.0–15.5 × (4–)5–7 mm. *Stamens* symmetrically arranged; filaments 4–5 mm long, diverging distally; anthers diverging, 4–5 mm long, apices curving inward after dehiscence; pollen light blue-purple to ± white. *Style* straight, 6–7 mm long, dividing near anther apices, branches ± 1.2 mm long, barely notched apically. *Capsules* ± globose, weakly 3-lobed, showing outline of seeds, 6–8 × ± 7 mm. *Seeds* globose, dark brown, 1.5–2.0 mm diam., rounded to weakly angled by pressure, tapering toward attached funicle, surface smooth. *Chromosome number* 2*n* = 16. *Flowering time*: February to April.

Distribution and ecology: endemic to central interior Namibia in the hills and mountains around Windhoek, extending north toward Okahandja and east to Wit Vlei; in well-drained sites on open stony ground or sometimes in light bush.

Diagnosis: the relatively large, pale blue flowers with a white centre, radially symmetric perianth and stamens, and large, ± flat-topped inflorescence distinguish *Afrosolen avasmontanus* from other tropical and subtropical African species of the genus. It may be confused with the more widespread *A. coeruleus*, which also has radially symmetric flowers, but those of *A. avasmontanus* have relatively larger, pale blue tepals, 11.0–15.5 mm long, with heart-shaped white markings, whereas *A. coeruleus* has smaller tepals, 8–9 mm long, with spear-shaped white markings. The corm tunics in *A. avasmontanus* are dark brown and ± woody, breaking into vertical strips as they decay, and the inflorescence is divaricately branched, the terminal branches with a solitary (rarely 2) flowers. The corm tunics in *A. coeruleus* are light brown, becoming finely fibrous and netted as they decay, and the inflorescence has fewer, ascending branches, some of which terminate in spikes of 3 to 5 flowers. Although they are the only two species of *Afrosolen* in Namibia with radially symmetric flowers, chromosome cytology confirms that *A. avasmontanus* and *A. coeruleus* are not immediately related. *Afrosolen avasmontanus* is diploid with 2*n* = 16 whereas *A. coeruleus* has 2*n* = 8. The two karyotypes have about the same total chromosome length (a proxy for total DNA per cell), making it clear that a polyploid relationship is not involved here. The similar corm tunics and dichotomously branched inflorescences of *A. avasmontanus* and the eastern southern African *A. sandersonii* suggest that the two are closely related.

3. **Afrosolen gracilis** *(Vaupel) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Lapeirousia gracilis* Vaupel: 548 (1912). *Psilosiphon gracilis* (Vaupel) Goldblatt & J.C.Manning: 117 (2015). Type: Namibia, 'Great Namaqualand, Doorns', dolomite, 1 450 m, Mar. 1907, *Range 292* (B, holo. (K, photo); m [fragment], iso.)

Plants 120–300 mm high. *Corm* bell-shaped, 12–18 mm diam.; tunics light brown, of layers of compacted fibres, becoming loosely fibrous with age, fibres extending upward as short, soft spines. *Stem* often slender, 2–several-branched, main axis dominant, branches ascending, flexed at base of main spike, 2-angled and winged below first branch, 3-angled or ± winged above. *Leaves* 2 or 3(4), lowermost inserted just below ground, linear to narrowly lanceolate, 3–5(–8) mm wide, ± as long as or somewhat longer than inflorescence, thickened around main vein, second leaf usually largest, upper leaves decreasing in size, becoming bract-like. *Inflorescence* a spike or false panicle, main terminal branches 2- to 6-flowered; bracts 3–6(–7) mm long, soft, green below, becoming ± membranous above, sometimes flushed purple, or membranous and dry before anthesis, then usually transparent with fine brown veins, subequal or outer slightly larger. *Flowers* zygomorphic, pale blue to mauve or white, then often with blue tube, lower three tepals white or pale yellow in lower ⅓ edged distally with darker blue to violet, occasionally one or more lower tepals with a small median tooth-like ridge, lightly fragrant [also said to be unpleasantly scented]; perianth tube cylindric, slightly curved outward at apex, (18–)25–38 mm long; tepals lanceolate, dorsal largest and held apart, suberect to reflexed, 10–12 × 4–6 mm, margins slightly undulate, lower three slightly smaller, held close together. *Stamens* unilateral; filaments exserted ± 2 mm; anthers 4–5 mm long, pale lilac, blue or ± white; pollen cream-coloured. *Style* arching over to filaments, dividing between middle and tips of anthers, branches 1.5–2.0 mm long, divided for ± ¼ their length. *Capsules* ± globose, obtusely trigonous, 4–5 × 5–6 mm. *Seeds* globose to weakly angular, ± 2 mm diam., dark brown, smooth. *Chromosome number* 2*n* = 12. *Flowering time*: mainly late January to April (May), also recorded in October.



Distribution of ***Afrosolen gracilis***.

Distribution and ecology: restricted to western and south-central Namibia, occurring in a relatively broad band along the western part of the country from the Fish River Canyon in the south to the Hoanib River in the Kaokoveld in the northwest; in rocky sites, often on limestone, dolomite or other calcareous rock types, but is also said to grow on sandy flats and, especially in more arid places, is often associated with springs and places where additional water is available.

Flowering normally occurs at the end of summer, mostly in February and March but sometimes as late as May. One collection from the Brandberg blooming in October is difficult to explain, and perhaps indicates an unusual pattern of rainfall that particular year. The relatively long perianth tube of *A. gracilis* plus the pale perianth and floral scent suggests that the flowers are adapted for pollination by moths or butterflies with relatively long probosces.

Diagnosis: *Afrosolen gracilis* is recognised by the slender perianth tube, typically 22–35 mm long (occasionally slightly longer or shorter), pale blue or white perianth, usually short floral bracts, 3–6(–7) mm long, and comparatively slender habit with up to 6 flowers per terminal branch. It most closely resembles *A. bainesii* and *A. otaviensis*, both of which also have long-tubed flowers but *A. bainesii* has white to pale pink flowers with dark red to brown markings, a tube 40–47 mm long, a more robust habit, longer floral bracts, 7–12 mm long, and the highly ramified inflorescence has only 1(2) flowers per ultimate branch. Confusion is more likely with *A. otaviensis*, which has 2 to 5 flowers per terminal branch, but larger, unscented flowers with a perianth tube 40–45 mm long, and longer floral bracts, (7–)8–11 mm long.

4. **Afrosolen erongoensis** *(Goldblatt & J.C.Manning) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Psilosiphon erongoensis* Goldblatt & J.C.Manning: 119 (2015). Type: Namibia, Erongo Mtns, western edge of the Erongo Mtns above Farm Ameib, 27 Mar. 1976, *Craven & Craven 115* (WIND, holo.; PRE, iso.).

Plants 300–550 mm high. *Corm* bell-shaped, 15–20 mm diam., tunics light brown, coarsely fibrous. *Stem* repeatedly branched, main axis ± straight, dominant, lateral branches diverging at ± 30°, weakly compressed below, triangular in middle and rectangular above, angles slightly winged. *Leaves* 4 to 7, ± linear, grey-green, main vein prominent, lowermost 2 basal and longest, mostly 4–5 mm wide, reaching to ± apex of inflorescence, upper leaves cauline and decreasing in size above, those subtending branches becoming ± bract-like. *Inflorescence* ± a rounded to flat-topped false panicle, main terminal branches with (2–)4 or 5 flowers in short spikes; bracts 8–10 mm long, soft-textured, ± green with translucent, membranous margins, lanceolate, acute, becoming dry apically, inner slightly shorter than outer. *Flowers* zygomorphic, violet-blue, lower three tepals with white mark near base edged dark violet distally, ?unscented; perianth tube 36–38 mm long, cylindric, expanded and curved in upper 3 mm; tepals subequal or dorsal slightly larger, lanceolate, ± acute, margins evidently straight, ± 14 × 3–4 mm, lower 3 united for 1.5 mm. *Stamens* unilateral, ± erect; filaments ± 8 mm long, exserted ± 5 mm; anthers 5–6 mm long, evidently yellow; pollen yellow. *Style* nearly straight, dividing opposite anther tips; branches ± 3 mm long, forked for ± ⅓ their length, violet. *Capsules* and *seeds* unknown. *Chromosome number* unknown. *Flowering time*: March and April.

Distribution and ecology: restricted to the Erongo Mtns of west central Namibia; among granite outcrops.

Diagnosis: the violet flowers with shorter perianth tube, ± 37 mm long, and short, narrower tepals, ± 14 × 3–4 mm, distinguish *Afrosolen erongoensis* from *A. otaviensis*, which has creamy white flowers with violet longitudinal markings on the lower tepals, a perianth tube 40–45 mm long, tapering gradually from



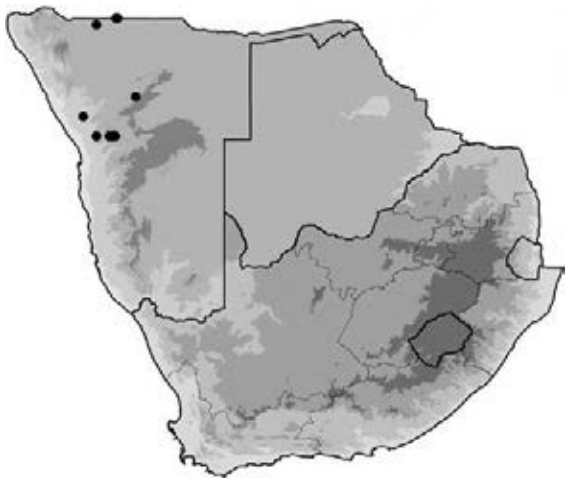
Distribution of ***Afrosolen erongoensis***.

base to apex, and tepals 15–19 × 4–5 mm. The branching of the inflorescence and general aspect of the two species differ hardly at all. Despite these similarities, *A. erongoensis* may be more closely related to *A. gracilis*, which has pale blue or less often white flowers, a perianth tube (18–)25–38 mm long and, significantly, short, pale floral bracts 4–6(–7) mm long (vs. 8–10 mm in *A. erongoensis*). Chromosome number, useful in determining relationships in *Afrosolen*, is unknown.

5. **Afrosolen rivularis** *(Wanntorp) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Lapeirousia rivularis* Wanntorp: 53 (1971). *Psilosiphon rivularis* (Wanntorp) Goldblatt & J.C.Manning: 119 (2015). Type: Namibia, Karibib, Ameib Ranch, ± 25 km NE of Usakos, granite kopje [koppie] south of track, ± 5 km east of farmhouse, 15 Apr. 1968, *Wanntorp & Wanntorp 907* (S, holo.; M, iso.).

Plants 100–300 mm high, laxly few-branched. *Corm* bell-shaped, 8–12 mm diam.; tunics dark brown, fibres medium-textured, reticulate. *Stem* weakly compressed and 3- or 4-angled, usually few branched. *Leaves* mostly 2(3), lower 1 or 2 ± basal, linear, 2–3 mm wide, reaching to ± middle of inflorescence, firm, main vein lightly raised, lowermost longest, upper leaves subtending branches, progressively shorter. *Inflorescence* a spike, main axis mostly 2- to 5(6)-flowered; bracts 4–5 mm long, membranous in upper half, apices becoming dry and brown, inner bract ± as long as outer, entire or shallowly forked at tip. *Flowers* zygomorphic, pale blue with white nectar guides on lower three tepals outlined in blue-violet, with tooth-like median ridge up to 1 mm long, distal half of throat lined dark blue on abaxial side; perianth tube ascending, widening gradually from base, ± 1.3 mm wide at base, 3 mm at mouth, (5–)7–9 mm long, ± straight; tepals narrowly lanceolate, margins usually straight, subequal, (7–)10–13 × 2.0–2.5 mm wide, dorsal tepal suberect to arching forward, held apart from others, lower tepals directed forward, nearly horizontal, united basally for ± 1.5 mm. *Stamens* unilateral and arcuate; filaments ± 7.5 mm long, exserted ± 4 mm; anthers parallel, contiguous, ± 4 mm long, pale blue-mauve; pollen pale blue-mauve. *Style* suberect, adaxial to stamens, ± 15 mm long, dividing opposite upper ⅓ of anthers; branches ± 1 mm long, undivided or notched at apex, spreading. *Capsules* 3.5–4.5 mm long, top-shaped in profile, 3-lobed in distal half, with 2 or 3 seeds per locule. *Seeds* ± globose, dark brown, ± 2 mm diam. *Chromosome number* unknown in Namibian populations, $2n = 12$ (in one Zambian population). *Flowering time*: mostly late February to early April. (Description based only on plants from Namibia.)

Distribution and ecology: extending across the northern half of Namibia into adjacent Angola and Zambia, particularly common in the Erongo Mtns in Namibia, and also occuring on the Brandberg, the Paresis Mtns near Otjiwarongo and north of Etosha Pan; usually in seasonally wet depressions on rock outcrops and seasonally waterlogged grassland on shallow soils.



Distribution of ***Afrosolen rivularis***.

Diagnosis: typically a diminutive plant, *Afrosolen rivularis* is recognised by the pale blue, zygomorphic flowers with a relatively narrow perianth tube mostly 7–9 mm long and tepals usually 10–13 mm long (occasionally smaller), the lower three bearing white markings edged in darker blue and often a prominent tooth-like ridge in the lower midline. The style, ± 15 mm long, divides into short, undivided branches ± 1 mm long. Plants at the type area in the Erongo Mtns rarely exceed 200 mm in height but elsewhere in Namibia may reach up to 270 mm. Plants from Zambia and central Angola, currently included in *L. rivularis*, are taller, sometimes up to 450 mm, have larger flowers that lack ridges on the lower tepals, and among other differences have a longer style, 16–20 mm long and style branches 2–3 mm long, divided for ± one third to half their length. More field work is needed to establish the status of these populations. Zambian plants have a diploid chromosome number of $2n = 12$, suggesting a relationship with the widespread *A. erythranthus*, which has the same number in south-tropical African populations. Chromosome number is not known for *L. rivularis* in Namibia.

6. **Afrosolen coeruleus** *(Schinz) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Lapeirousia coerulea* Schinz: 212–213 (1890). *Psilosiphon coeruleus* (Schinz) Goldblatt & J.C.Manning: 121 (2015). Type: Namibia, Ombale, südost Ondonga, Mar. 1886, *Schinz 13* (K, lecto., designated by Goldblatt: 445 (1990b); COI, isolecto.).

Ixia dinteri Schinz: 14 (1900). Type: Namibia, Karibib, Spitzkop, marshy ground, in 1898, *Dinter 22* (*32* on the type) (Z, holo.).

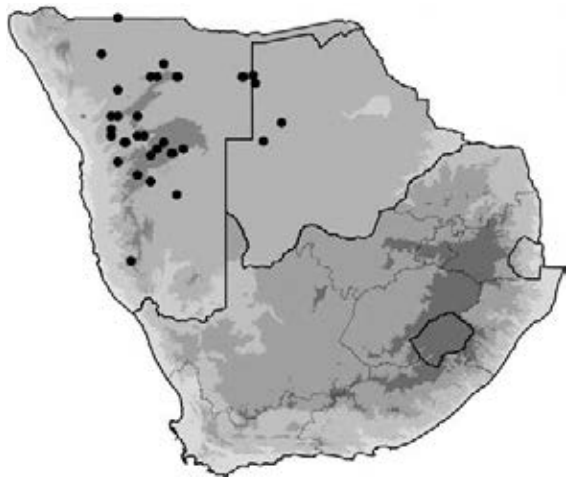
Plants (120–)150–300 mm high. *Corm* bell-shaped, 12–16 mm diam., light brown, tunics of pale compacted fibres decaying to become coarsely to finely fibrous and netted. *Stem* repeatedly branched, compressed, 2- or 3-angled. *Leaves* 2 to 4, lowermost inserted at base, longest, reaching to at least middle, and sometimes shortly exceeding inflorescence, ± linear, 2–4(–5) mm wide,

remaining leaves decreasing in size above. *Inflorescence* a laxly branched, round-topped false panicle, larger ultimate branches (2)3- to 5-flowered; bracts 3–4 mm long, subequal, green below, membranous distally, becoming completely dry in fruit, inner ± as long as outer. *Flower* actinomorphic, ± rotate, blue to light purple with white, spear-shaped mark outlined in dark blue to purple on basal ½ of each tepal; perianth tube 1.5–2.0 mm long, narrowly funnel-shaped; tepals spreading below, curving upward distally, subequal, lanceolate, 7.0–9.5 × 3–5 mm. *Stamens* symmetrically arranged; filaments united basally for < 0.5 mm by an obscure corona-like ring, erect, ± 4 mm long, nearly contiguous around style; anthers diverging, 3.0–3.5 mm long, curving inward after anthesis; pollen pale blue-purple (white to yellow when dry). *Style* erect, 6–7 mm long, dividing near anther tips; style branches ± 1.2 mm long, shallowly notched apically. *Capsules* obovoid–globose, weakly 3-lobed, ± 4 mm long. *Seeds* dark brown, globose to weakly angled by pressure, 1.3–2.0 mm diam., tapering near attached funicle. *Chromosome number* 2*n* = 8. *Flowering time*: (January) February to April, occasionally in December.

Distribution and ecology: widespread throughout the summer-rainfall part of Namibia, extending locally into northwestern Botswana; in seeps, seasonal marshes, poorly drained grassland and shallow soil in rock outcrops where water accumulates in the wet season.

Pollination biology is unknown, but the flowers produce no detectable nectar and the only potential pollinators recorded are small bees (family unknown) nestling in the open flowers. Several collections are accompanied by notes indicating that the corms were in the past eaten by the indigenous population, particularly the Kung, for whom the corms may have been a staple, eaten after roasting in hot ash or sometimes raw.

Diagnosis: with its radially symmetric flower, short perianth tube 1.5–2.0 mm long, and undivided style branches, *Afrosolen coeruleus* is taxonomically isolated in the genus. It favours moist habitats. The chromosome number, 2*n* = 8, recorded in seven populations, and small corm with dark brown, fibrous tunics match other blue-flowered species including *A. erythranthus* (some populations 2*n* = 12) and *A. rivularis* (2*n* = 12), suggesting a relationship with this group of species, which have zygomorphic, bilaterally symmetric flowers, often of the same colour, although sometimes red in *A. erythranthus*. *Afrosolen avasmontanus*, also with radially symmetric flowers, is a more robust species from well-drained stony banks and hills with a different inflorescence in which the ultimate branches bear 1 or 2 larger flowers, and dark brown corm tunics that fragment into vertical strips, like those of *A. sandersonii*. Its chromosome number, 2*n* = 16, with a karyotype consisting of one long and seven short chromosome pairs, makes *A. avasmontanus* an unlikely close relative of *A. coeruleus*.



Distribution of ***Afrosolen coeruleus***.

7. **Afrosolen erythranthus** *(Klotzsch ex Klatt) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Ovieda erythrantha* Klotzsch ex Klatt in Peters: 516, t. 58 (1864). *Lapeirousia erythrantha* (Klotzsch ex Klatt) Baker: 155 (1877). *Psilosiphon erythranthus* (Klotzsch ex Klatt) Goldblatt & J.C.Manning: 123 (2015). Type: Mozambique, Boror, Caboceira, *Peters s.n.* (B, holo.).

Full synonymy in Goldblatt, 1990b.

Plants (150–)200–450 mm high. *Corm* ± bell-shaped, 8–16 mm diam.; tunics light to dark brown, of densely compacted fibres, outer layers becoming coarsely fibrous, ultimately forming a matted mass. *Stem* branched repeatedly, compressed, 2-angled below, 3-angled above. *Leaves* 3 or 4, lower 2 or 3 longest and ⅓–⅔ as long as stem, ± linear to lanceolate or ± falcate, (2–)4–8(–11) mm wide, main vein prominent when alive; upper leaves becoming progressively bract-like. *Inflorescence* a several- to many-branched false panicle, often ± flat-topped, ultimate branches mostly (2)3- to 6-flowered, flowers crowded terminally; bracts 3–6 mm long, green below, dry and membranous above, becoming entirely dry and transparent, brownish in upper ⅓, outer obtuse, inner acute or apically forked, usually slightly shorter than outer. *Flowers* zygomorphic, either blue-violet with spear-shaped white mark outlined in dark blue to purple on lower tepals or crimson red, then without markings or lower tepals each with white or dark red median streak; perianth tube (6–)7–11(–15) mm long, slender below, expanded and slightly curved near throat; tepals subequal, lanceolate-spathulate, acute to obtuse, (6–)7–11 × 2–3(–4) mm, dorsal held apart, reflexed to lie ± on same plane as lower tepals; lower 3 tepals narrowed at base thus ± clawed, set closely together and joined for ± 1 mm. *Stamens* unilateral, ± erect; filaments 4–6 mm long, exserted 3.5–5.5 from tube; anthers 2.5–4.0 mm long, pale bluish to white, purple or red; pollen ± white. *Style* arched to erect, adaxial to stamens, dividing opposite middle to apex of anthers, ± 15 mm long; branches 1.0–1.5 mm long, forked for ⅓–½ their length, recurved. *Capsules* ± globose in profile, 3-lobed, 3–4 mm



Distribution of ***Afrosolen erythranthus***.

long, showing outline of seeds. *Seeds* 2 to 5 per locule, ± globose, 1.6–1.9 mm diam., dark brown, ± smooth to rugulose. *Chromosome number* 2*n* = 14, 12 ± 0–3B (polyploids), 8 (diploids). *Flowering time*: late January to March, occasionally from mid-December.

Distribution and ecology: restricted in southern Africa to eastern Botswana, but widespread across tropical Africa, extending from eastern Angola and southern Democratic Republic of the Congo, through Zambia to Zimbabwe, Malawi, western and southern Tanzania, central Mozambique and in northeastern Nigeria; often in rocky outcrops or in open grassland or woodland.

The small flowers, conspicuous in the many-flowered inflorescences, are visited and presumably pollinated by a variety of bees, wasps and even butterflies, which forage in large numbers in warm weather for nectar and/or pollen. Annotations on two collections state that corms are edible and 'eaten in time of great famine', but there appears to be no record of the species being significant in the regular diet of human populations.

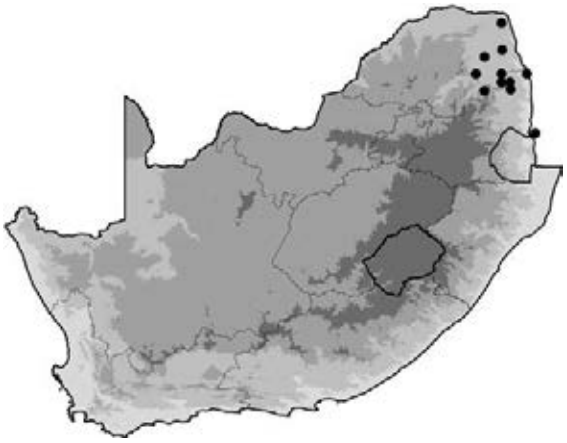
Diagnosis: one of the several species of *Afrosolen* with a strongly branched, ± round- or flat-topped inflorescence, *A. erythranthus* can be distinguished by its typically (but not always) soft-textured leaves with a conspicuous main vein, and relatively small flowers with a short perianth tube seldom exceeding 12 mm. The flowers are somewhat crowded at the branch tips, which are in effect spikes of up to 6 sessile flowers. The orientation of the tepals is also distinctive, lying ± in the same plane with the three lower tepals joined together for ± 1 mm and held closely together whereas the upper tepal is reflexed and held apart from the others. Similar flowers also characterise *A. sandersonii* and *A. masukuensis*, both of which have a longer perianth tube, mostly at least 15 mm long up to 30 mm long in some populations of *A. sandersonii*, which also has different corms tunics and an inflorescence with 1- or 2-flowered ultimate branches. Notably *A. sandersonii* subsp. *limpopoensis* has a perianth tube 8–12 mm long, thus comparable with that of *A. erythranthus*, but the subspecies can immediately be distinguished by the branching pattern and different corm tunics.

8. **Afrosolen masukuensis** *(Vaupel & Schltr.) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Lapeirousia masukuensis* Vaupel & Schltr. in Vaupel: 545 (1912). *Psilosiphon masukuensis* (Vaupel & Schltr.) Goldblatt & J.C.Manning: 126 (2015). Type: Mozambique, Inhambane: Masuku Forest [Insilva Maseku], 10 Feb. 1898, *Schlechter 12109* (B, holo.; BR, COI, G, K, P, PRE, SAM, iso.).

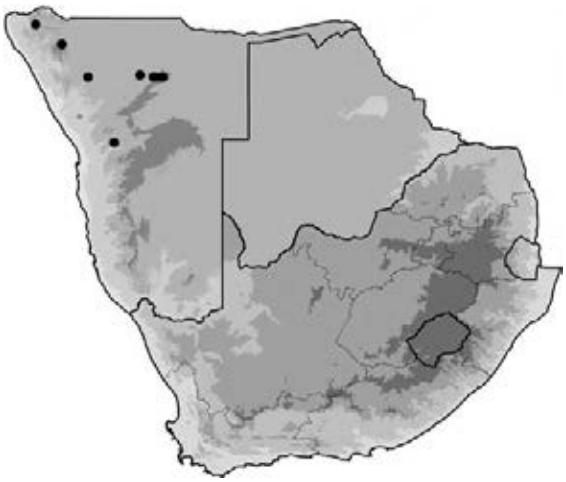
Plants 400–600 mm high. *Corm* bell-shaped, ± 15 mm diam.; tunics light brown, of ± leathery layers with reticulate surface, becoming loosely fibrous and netted with age. *Stem* usually several-branched, compressed and 2-angled to winged below, 3-angled and slightly winged above branches. *Leaves* 4 to 6, lowermost inserted close to ground and longest, usually shortly exceeding inflorescence, linear-lanceolate, central vein prominent, 3–5 mm wide, remaining leaves progressively shorter above. *Inflorescence* a branched spike or round-topped false panicle, main axis ± straight, dominant, major ultimate branches with 5 to 9 sessile flowers, often crowded distally with bracts overlapping and (1.0–)1.5–2.0 internodes long; bracts 5–7 mm long, green at anthesis, later dry and membranous, then either pale below or throughout or brownish above, streaked brown on veins, inner ± as long as outer or slightly shorter. *Flowers* zygomorphic, either dark blue to violet or greenish cream-coloured, lower tepals each with purple to red and white spear-shaped median streak in basal half; perianth tube cylindric, (15–)20–25 mm long, slightly expanded in upper 4 mm; tepals subequal with dorsal slightly larger, lanceolate, 8–10 × ± 3 mm, spreading at right angles to tube and lying in ± same plane with dorsal reflexed and held apart. *Stamens* unilateral, ± erect; filaments ± 5 mm long, exserted 2.5–3.0 mm; anthers 3.5 mm long, probably pale yellow when alive. *Style* unilateral, arching over stamens, dividing opposite middle to upper ⅓ of anthers; branches ± 2.2 mm long, divided for ± ½ their length. *Capsules* ± globose, slightly 3-lobed, 3.5–5.0 mm diam., showing outline of seeds. *Seeds* globose, ± 2 mm diam. *Flowering time*: February to April.

Distribution and ecology: restricted to southeastern Africa, extending from central and southern Mozambique and adjacent Malawi south and west into southeastern Zimbabwe and lowland Limpopo and Mpumalanga in South Africa; mainly in seasonally wet habitats, including vleis, the edge of marshes, and seasonally waterlogged flats. The Mozambique populations are all coastal and probably from sandy habitats.

Diagnosis: the comparatively tall stature, usually over 450 mm high, alternate branching pattern with the main axis dominant, ultimate inflorescence branches bearing 5 to 9 apically crowded flowers, and the long straight perianth tube, usually 20–25 mm long,



Distribution of ***Afrosolen masukuensis***.



Distribution of ***Afrosolen otaviensis***.

are diagnostic for *Afrosolen masukuensis*. Plants from the Mozambique Coast have greenish flowers with red markings, unusual in the genus, but elsewhere the flowers are blue-mauve or violet with white and dark blue markings. The long perianth tube and general appearance of the flowers, including their colour, suggest a relationship with *A. sandersonii* of eastern South Africa and Botswana, but that species is typically a shorter plant, rarely exceeding 350 mm, with a divaricate, often intricately branched habit, and the ultimate branches of the inflorescence bear 1 or 2, rarely 3 flowers. The corms of the two species also differ, those of *A. masukuensis* being relatively small with the outer tunic layers fibrous and reticulate whereas the larger corms of *A. sandersonii* have dark brown tunics that decay irregularly into vertical strips. The corm tunics of *A. masukuensis* resemble closely the brown, fibrous and reticulate tunics of *A. erythranthus*.

9. **Afrosolen otaviensis** *(R.C.Foster) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Lapeirousia otaviensis* R.C.Foster: 45–46 (1939). *Psilosiphon otaviensis* (R.C.Foster) Goldblatt & J.C.Manning: 128 (2015). Type: Namibia, Farm Auros near Otavi, 11 Feb. 1925, *Dinter 5577* (GH, holo.; B, G, PRE, SAM, Z [3 sheets], iso.).

Plants 300–550 mm high. *Corm* bell-shaped, 20–25 mm diam.; tunics light brown, firm-leathery at first, becoming coarsely fibrous with age, sometimes ultimately finely fibrous. *Stem* branched repeatedly above with main axis ± straight and dominant, lateral braches diverging at 45–80°, weakly compressed below, triangular in middle, ± rectangular above, angles lightly winged. *Leaves* 4 to 7, ± linear (–narrowly lanceolate), glaucous, main vein prominent, lower 2 to 4 basal and longest, 5–9 mm wide, exceeding inflorescence by 50–100 mm, upper leaves decreasing in size above, becoming ± bract-like. *Inflorescence* a rounded to ± flat-topped false panicle, main terminal branches with 3 to 5 sessile flower; bracts soft-textured, green, lanceolate, acute, often flushed red above, becoming dry from tips toward end of flowering, (7–)8–11 mm long, inner often slightly longer than outer. *Flowers* zygomorphic, white to cream-coloured, sometimes flushed pale lilac, lower three tepals with broad violet or purple median streak, with darker, paired purple to red lines near base, rarely upper 3 tepals with pale purple median line, unscented; perianth tube 40–45 mm long, straight, gradually flared from base, ± 1.2 mm diam. below, ± 2.2 mm diam. at mouth; tepals unequal, dorsal slightly larger than others, lanceolate, ± acute, margins straight, 15–19 × 4–5 mm, reflexed ± at right angles to tube. *Stamens* unilateral, ± erect; filaments 5–6 mm long, exserted for 2–4 mm, white; anthers 5–6 mm long, grey-purple; pollen light yellow-brown. *Style* nearly straight, adaxial to filaments, usually dividing between apex of anthers to 3 mm beyond apex; branches ± 2 mm long, forked for ⅓–½ their length, diverging but barely or not at all recurved. *Capsules* ± globose, 3-lobed, ± 7 mm long. *Seeds* not known. *Chromosome number* 2*n* = 10. *Flowering time*: February to April.

Distribution and ecology: restricted to northern Namibia, extending in a wide arc from the hills west and south of Etosha Pan to the Otavi Hills in the northeast and locally also in adjacent southern Angola; apparently confined to rocky sites, often in granite but on shale in the Otavi Hills.

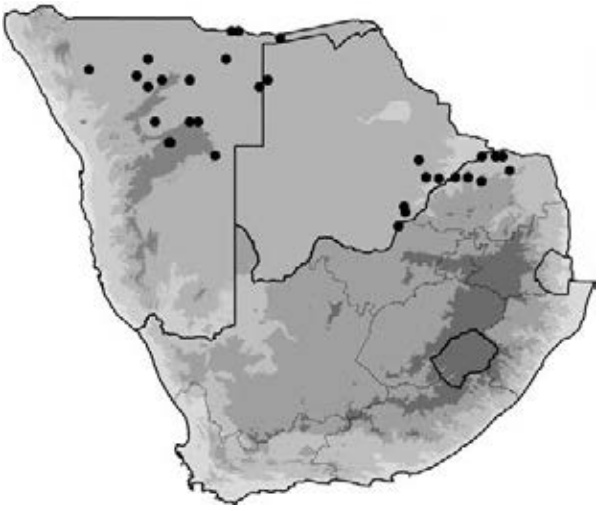
Diagnosis: the relatively large, white to lilac flowers with lanceolate tepals and a perianth tube 40–45 mm long, and ultimate branches of the inflorescence with up to 5 flowers (rarely less than 2) distinguish *Afrosolen otaviensis*. It has been confused with similarly long-tubed *A. bainesii*, which can be separated by a series of characters including a shorter perianth tube, 30–40 mm long, often flushed pink to red-purple outside, white to pale pink tepals with undulate margins and narrowed below into claws, and a divaricately branched inflorescence with ultimate branches bearing 1, rarely 2 flowers. *Afrosolen otaviensis* is evidently restricted to rocky sites, mostly granite or shale, whereas *A. bainesii* occurs in deep, hard sand in savanna or bushveld. Plants with

blue-violet flowers from the Erongo Mtns included in the past in *A. otaviensis* are a separate species, *A. erongoensis,* distinguished in addition to perianth colour by a shorter perianth tube ± 37 mm long and shorter, narrower tepals, ± 12 × 3 mm vs. 15–19 × 4–5 mm.

10. **Afrosolen bainesii** *(Baker) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Lapeirousia bainesii* Baker: 338 (1876). *Psilosiphon bainesii* (Baker) Goldblatt & J.C.Manning: 130 (2015). Type: Botswana, Kobe Pan [as 'inter Koobie et N Shaw valley'], *Baines s.n.* (K, lecto., effectively designated by N.E.Brown on specimen).

    Lapeirousia vaupeliana Dinter: 436 (1922). Sölch: 8 (1969). Type: Namibia, Gameros (cultivated at Okahandja), *Dinter 3087* [B, lecto., designated by Sölch: 8 (1969)].

Plants 300–600 mm high. *Corm* bell-shaped, 13–20 mm diam.; tunics mid- to dark brown, ± leathery internally with veins sharply outlined, becoming ± fibrous, fibres coarse and wiry. *Stem* usually repeatedly branched, compressed and 2-winged below, 3- or 4-angled and winged above, wings sometimes slightly crisped or finely serrated. *Foliage leaves* narrowly lanceolate to linear, main vein prominent and a pair of lateral veins on either side evident, 5–7 mm wide, usually slightly exceeding inflorescence. *Inflorescence* a rounded, divaricately branched false panicle, ultimate branches 1(2)-flowered, axes sharply 3-angled; bracts green below, becoming dry and membranous at anthesis, later dry and light brown, apices often darker brown, 7–10(–12) mm long, inner slightly larger than outer. *Flowers* zygomorphic, ± white, often flushed or fading pale pink, tube pale pink to purple outside, lower 3 tepals each usually marked with red to brown streak in basal ½ and with dark mark at base, top of throat red on abaxial side, sweetly scented; perianth tube cylindric, slightly expanded in upper 5 mm, (25–)32–40 mm long, usually inclined; tepals subequal or dorsal slightly larger, ± spathulate, ± clawed (rarely with a tooth-like ridge in lower midline of lower tepals, margins undulate, dorsal ± upright to reflexed at right angles to tube, 9–12(–15) × 3–4 mm, lower 3 tepals held close together, forming lip. *Stamens* unilateral, straight; filaments exserted 3.5–5.0 mm, white; anthers 4.5–6.2 mm long, pale purple; pollen ± white. *Style* arching over stamens, dividing between middle and apex of anthers or exceeding them, branches spreading, ± 2 mm long, ± undivided or notched apically. *Capsules* obovoid to globose, 5–6 mm long. *Seeds* globose, ± 2 mm diam. *Chromosome number* $2n = 10, 6$. *Flowering time*: January to April, rarely late November or December.



Distribution of ***Afrosolen bainesii***.

Distribution and ecology: occurring on the dry plains of central interior southern Africa, in Namibia from near Windhoek north into southern Angola and across the Kalahari to eastern Botswana and northwestern Limpopo in South Africa; in hard flat sandy ground where the corms may be lodged up to 300 mm below the surface.

The flowers open in the late afternoon and last through the night and into the following day but rapidly become wilted in the dry and hot daylight conditions. The freshly opened flowers have a strong sweet and pleasant odour and produce a fair quantity of nectar and this combined with the pale perianth colour suggest adaptation to pollination by hawk moths.

Diagnosis: the divaricately branched inflorescence with branches bearing 1 or rarely 2 flowers, long perianth tube 25–35(–45) mm long, and ± white perianth with pink to red markings near the base of the lower tepals are diagnostic for *Afrosolen bainesii*. The corm tunics are composed of light brown, densely compacted fibres, the outer layers becoming increasingly netted with age. These corm tunics, combined with the pale, long-tubed flower, and the basic chromosome number of $x = 5$ and similar karyotype, suggest a close relationship with *A. otaviensis* and *A. schimperi*. The resemblance in the size and general shape of the flowers of *A. bainesii* and *A. otaviensis* led to their confusion in the past, but field studies have shown that they are separate species with different ranges, habitat preferences and different floral and inflorescence morphology. Populations of *A. bainesii* from west-central Namibia have a derived chromosome number, $2n = 6$, and evidently represent a chromosomal race of the species but show no morphological differences.

Specimens from eastern Botswana near Macheng represent an unusual form of *Afrosolen bainesii* with a short tube, 14–20 mm vs. 25–40 mm in most other collections of the species. One of the few collections from Chibia in Angola consists of plants with a wine-red perianth tube and reverse of the outer tepals. These plants cannot be adequately assessed until more material from Angola becomes available.

11. **Afrosolen schimperi** *(Aschers. & Klatt) Goldblatt & J.C.Manning* in Bothalia 46: 4 (2016). *Tritonia schimperi* Aschers. & Klatt in Klatt: 697 (1866). *Acidanthera unicolor* Hochst. ex Baker: 160 (1877), illegitimate superfluous

name for *T. schimperi* Aschers. & Klatt. *Lapeirousia schimperi* (Aschers. & Klatt) Milne-Redh.: 307 (1934). *Acidanthera schimperi* (Aschers. & Klatt) R.C.Foster: 42 (1936). *Psilosiphon schimperi* (Aschers. & Klatt) Goldblatt & J.C.Manning: 133 (2015). Type: Ethiopia, Tigray: woods and thickets near Goelleb on the river Tacazze, 4 000 ft [1 220 m], *Schimper 2304* (B lecto. designated by Goldblatt: 472 (1990b); B, G, K, P, isolecto.).

Anomatheca angolensis Baker: 337 (1876). *Lapeirousia monteiroi* Baker: 355 (1898), illegitimate superfluous name for *A. angolensis* Baker (1876). *Freesia angolensis* (Baker) Klatt in Th.Durand & H.Schinz: 187 (1894). *Lapeirousia angolensis* (Baker) R.C.Foster: 48 (1936). Type: Angola, without precise locality, cult. Hort. Kew, *Monteiro s.n.* (K, holo.).

Lapeirousia fragrans Welw. ex Baker: 272 (1878). Type: Angola, Huila: ad Morro de Lopollo, 5 200 ft [1 585 m], stony and rocky places, Dec. 1859, *Welwitsch 1552* (K, holo.; BM, C, COI, G, P, iso.).

Lapeirousia cyanescens Welw. ex Baker: 272 (1878). Type: Angola, Huila: hills near Humpata, Apr. 1860, *Welwitsch 1553* (K, lecto. designated by Goldblatt: 472 (1990b); B, BM, COI, G, iso.).

Lapeirousia edulis Schinz: 49 (1896). Type: Namibia, Amboland, west of Olukonda, 5 Apr. 1893, *Rautanen 106* (Z, lecto., designated by Goldblatt: 472 (1990b); K, P [2 sheets], Z [3 sheets], isolecto.).

Lapeirousia porphyrosiphon Baker: 353 (1898). Type: Botswana, Ngamiland, Kalahari Desert near Mamunwe, 26 Feb. 1897, *Lugard 338* (K, holo.).

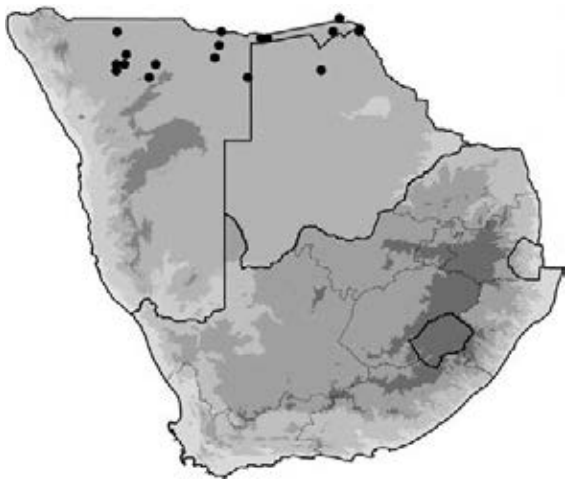
Lapeirousia erythreae Chiovenda: 139 (1911). Type: Eritrea, Accheli Guzai (Ocule Cusai) near Loggo Sarda, Deggahen, 2 600 m, 15 Sept. 1902, *Pappi 1414* (G, lecto., designated by Goldblatt: 472 (1990b); GH, MO, isolecto.).

Lapeirousia montaboniana Chiovenda: 140 (1911). Type: Eritrea, Bogos near Cheren, 24 Aug. 1906, *Pappi 7087* (? FI).

Lapeirousia dinteri Vaupel: 544–545 (1912). Type: Namibia, Damaraland, Aukos-Kreyfontein, 28 Dec. 1908, *Dinter 810* (B, holo.; B, SAM [2 sheets], iso.).

Lapeirousia uliginosa Dinter: 13, 14 (1912). Type: unknown, none cited.

Plants (200–)300–800 mm high. *Corm* bell-shaped, 18–22 mm diam.; tunics of compacted fibres, light to dark brown, outer layers becoming loosely fibrous and netted. *Stem* usually laxly few(several)-branched, rounded below becoming ± square and 4-angled to 4-winged above. *Leaves* 3 or more, lower 2 largest, usually slightly exceeding inflorescence, decreasing in size above, narrowly lanceolate to ± linear, 5–10(–15) mm wide, main vein slightly raised. *Inflorescence* a lax false panicle or branched spike, ultimate branches 1- to 3-flowered; bracts (10–)20–35(–45) mm long, green, becoming membranous to ± dry and papery above, then light to dark brown, tips dark brown. *Flowers* zygomorphic, white to cream-coloured, rarely pale violet, when whitish sometimes fading lilac on drying especially on tube; opening at sunset and then sometimes scented; perianth tube cylindric, slender, 100–140(–150) mm long; tepals lanceolate, extended ± at right angles to tube, 18–22(–25) × 6–8(–11) mm. *Stamens* unilateral, ± erect; filaments exserted 5–7 mm from tube; anthers 6–7 mm long, cream-coloured; pollen cream-coloured. *Style* filiform, arching over filaments, dividing opposite anther apices or to up to 3 mm beyond anthers; branches ± 2 mm long, forked for ± ⅓ their length. *Capsules* obovoid-oblong, 8–12 mm long, partly enclosed in bracts. *Seeds* globose to slightly angular, 2.0–2.5 mm in diam. *Chromosome number* 2*n* = 10. *Flowering time*: mid- to late summer, December to March, in central and south tropical Africa [north of the equator mostly in September and October but in Kenya and Ethiopia also April to June].



Distribution of ***Afrosolen schimperi***.

Distribution and ecology: widespread across Africa, extending from southwestern Angola and north-central Namibia across northern Botswana, southern Zambia and Zimbabwe in an almost continuous belt, then with a scattered distribution in northern Tanzania, eastern Kenya, southern Ethiopia and then again in northern Ethiopia, Eritrea, Somalia and the Jebel Marra and Jebel Gurgeil Highlands of NW Sudan, possibly also in Yemen; usually in local moist sites in otherwise largely arid country, typically in washes, the omurambas of Namibia, dambo margins, streambanks and seasonal marshes, as well as in damp grassland.

The flowers open in late afternoon and last through the night, but gradually wilt the next day. Some collections note a sweet odour when the flowers are open, but others are scentless during the day and early evening

hours, indicating variation for scent. The corms are edible, and eaten either raw or roasted by the Ovambo of northern Namibia (Rodin, 1985).

Diagnosis: *Afrosolen schimperi* is readily distinguished from related species by its large white flower with a perianth tube 100–150 mm long and laxly branched inflorescence. Its immediate relationships probably lie with the Namibian and Angolan long-tubed species, *A. bainesii* and *A. otaviensis*, with which it shares a diploid chromosome number of $2n = 10$. These two species also have pale flowers with relatively long perianth tubes, up to 45 mm long, but more compact inflorescences and are not likely to be confused with *A. schimperi*.

REFERENCES

ANDREWS, H.C. 1798. *Ixia crispifolia*. *The Botanist's Repository* 1: t. 35.

BAKER, J.G. 1876. New Gladioleae. *Journal of Botany, British and foreign* 14: 333–339.

BAKER, J.G. 1877 ['1878']. Systema Iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1878. Report on the Liliaceae, Iridaceae, Hypoxidaceae, and Haemodoraceae of Welwitsch's Angolan Herbarium. *Transactions of the Linnean Society of London, Botany,* ser. 2, 1: 245–273.

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell & Sons, London.

BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1897. Addenda. In W.T. Thiselton-Dyer, *Flora capensis* 6: 528–536. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1898. Irideae. In W.T. Thiselton-Dyer, *Flora of tropical Africa* 7: 337–376. Reeve & Co., London.

BAKER, J. G. 1906. Diagnoses Africanae. XIV. *Bulletin of Miscellaneous Information Kew* 1906: 15–30.

BROWN, N.E. 1928. The South African Iridaceae of Thunberg's herbarium. *Journal of the Linnean Society, Botany* 48: 15–55.

CHIOVENDA, E. 1911. Plantae novae vel minus notae e regione aethiopica. *Annali di Botanica* 9: 120–152.

DELAROCHE, D. 1766. *Descriptiones plantarum aliquot novarum*. J. & H. Verbeek, Leiden.

DIETRICH, A.G. 1833. *Species plantarum*. Nauck, Berlin.

DINTER, K. 1912. *Die vegetabilische Veldkost Deutsch-Südwest-Afrikas*. K. Dinter, Okahandja.

DINTER, K. 1922. Index der aus Deutsch-SüdwestAfrika bis zum Jahre 1917 bekannt gewordenen Pflanzenarten. XII. *Repertorium specierum novarum regni vegetabilis* 18: 423–444.

DINTER, K. 1931. Diagnosen neuer südwestafrikanischer Pflanzen. *Repertorium specierum novarum regni vegetabilis* 29: 253–256.

DURAND, T. & SCHINZ, H. 1894 ['1895']. *Conspectus florae africae*, vol. 5. Jardin botanique de l'Etat, Bruxelles etc.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C. F. Ecklon*. Reiseverein, Esslingen.

ENGLER, A. & PRANTL, K. 1930. *Die natürlichen Pflanzenfamilien*, edn. 2, vol. 15a. W. Engelman, Leipzig, Germany.

ENTWHISTLE, T.J. 1989. *Psilosiphon scoparium* gen. et sp. nov. (Lemaneaceae), a new red alga from south-eastern Australian streams. *Phycologia* 28: 469–475.

FOSTER, R.C. 1936. Notes on nomenclature in Iridaceae. *Contributions from the Gray Herbarium of Harvard University* 114: 37–50.

FOSTER, R.C. 1939. Studies in the Iridaceae 1. *Contributions from the Gray Herbarium of Harvard University* 127: 33–48.

GEERINCK, D., LISOWSKI, S., MALAISSE, F. & SYMOENS, J.J. 1972. Le genre *Lapeirousia* Pourr. (Iridaceae) au Zaïre. *Bulletin de la Societé Royale de Botanique de Belgique* 105: 333–351.

GMELIN, J.F. 1791. *Systema Naturae*, vol. 2. Emanuel Beer, Leipzig.

GOLDBLATT, P. 1972. A revision of the genera *Lapeirousia* Pourret and *Anomatheca* Ker in the winter rainfall region of South Africa. *Contributions from the Bolus Herbarium* 4: 1–111.

GOLDBLATT, P. 1973. *Lapeirousia oreogena* Schltr. ex Goldbl. *Flowering Plants of Africa* 42: t. 1670.

GOLDBLATT, P. 1990a. Cytological variability in the African genus *Lapeirousia* (Iridaceae: Ixioideae). *Annals of the Missouri Botanical Garden* 77: 375–382.

GOLDBLATT, P. 1990b. Systematics of *Lapeirousia* (Iridaceae–Ixioideae) in tropical Africa. *Annals of the Missouri Botanical Garden* 77: 430–484.

GOLDBLATT, P. & BARNARD, T.T. 1970. The Iridaceae of Daniel de la Roche. *Journal of South African Botany* 36: 291–318.

GOLDBLATT, P. & MANNING, J.C. 1990. Leaf and corm structure in *Lapeirousia* (Iridaceae-Ixioideae) in relation to phylogeny and infrageneric classification. *Annals of the Missouri Botanical Garden* 77: 365–374.

GOLDBLATT, P. & MANNING, J.C. 1992. Systematics of the southern African *Lapeirousia corymbosa* (Iridaceae–Ixioideae) complex (sect. *Fastigiata*) and a new species of sect. *Paniculata*. *South African Journal of Botany* 58: 326–336.

GOLDBLATT, P. & MANNING, J.C. 1994. New taxa and revisions to the taxonomy of southern African *Lapeirousia* subgenus *Lapeirousia* (Iridaceae subfamily Ixioideae). *Novon* 4: 339–346.

GOLDBLATT, P. & MANNING, J.C. 1996. Phylogeny and speciation in *Lapeirousia* subgenus *Lapeirousia* (Iridaceae subfamily Ixioideae). *Annals of the Missouri Botanical Garden* 83: 346–361.

GOLDBLATT, P. & MANNING, J.C. 2015. Systematics and biology of *Lapeirousia, Codonorhiza, Psilosiphon* and *Schizorhiza*. *Strelitzia* 35.

GOLDBLATT, P. & MANNING, J.C. 2016 (published online 2 Dec). *Afrosolen*, a new name for *Psilosiphon* Welw. ex Goldblatt & J.C.Manning (Iridaceae), with new combinations. In P. Goldblatt & J. Manning, Nomenclatural adjustments in African plants 2. *Bothalia* 46, a2024: 3–5.

GOLDBLATT, P., MANNING, J.C. & BERNHARDT, P. 1995. Pollination biology of *Lapeirousia* subgenus *Lapeirousia* (Iridacaeea) in southern Africa: floral divergence and adaptation for long-tongued fly-pollination. *Annals of the Missouri Botanical Garden* 82: 517–534.

HARMS, H. 1901. In A. Engler, Beiträge zur Flora von Afrika. XXII. *Botanische Jahrbücher für Systematik* 30: 239–288.

JACQUIN, N.J. 1791 ['1790']. *Collectanea*, vol. 4. C.F. Wappler, Vienna.

JACQUIN, N.J. 1788–1795 ['1786–1793']. *Icones plantarum rariorum*, vol. 2. C.F. Wappler, Vienna.

KER GAWLER, J.B. 1802. *Lapeyrousia corymbosa*. Level-topped Lapeirousia. *Curtis's Botanical Magazine* 16: t. 595.
KER GAWLER, J.B. 1804. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.
KER GAWLER, J.B. 1810. *Lapeyrousia fissifolia*. Leafy-spiked Lapeyrousia. *Curtis's Botanical Magazine* 31: sub t. 1246.
KLATT, F.W. 1864. Revisio Iridearum. *Linnaea* 32: 689–784.
KLATT, F.W. 1866. Revisio Iridearum (Addenda, Emendata et Corrigenda). *Linnaea* 34: 690–739.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
KLATT, F.W. 1885. Determination and description of Cape Irideae. *Transactions of the South African Philosophical Society* 3: 202–205.
KLATT, F.W. 1894 ['1895']. Iridaceae. In T. Durand & H. Schinz, *Conspectus florae africae* 5: 187–192. Jardin botanique de l'Etat, Bruxelles etc.
LAMARCK, J.P.B.A.P.M. de. 1786–1788. *Encyclopédie méthodique. Botanique*, vol. 2. Panckoucke, Paris.
LAMARCK, J.P.B.A.P.M. de. 1789–1792. *Encyclopédie méthodique. Botanique*, vol. 3. Panckoucke, Paris.
LAWRENCE, G.H.M. 1955. Notes on *Lapeirousia* in cultivation. *Baileya* 3: 131–136.
LEWIS, G.J. 1952. Plantae novae Africanae. *Annals of the South African Museum* 40(1): 1–9.
LINNAEUS, C. 1753. *Species plantarum*. Salvius, Stockholm.
LINNAEUS, C. 1756. *Centuria plantarum*, vol. 2. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.
MANNING, J.C. & GOLDBLATT, P. 1997. The *Moegistorhynchus longirostris* (Diptera: Nemestrinidae) pollination guild: long-tubed flowers and a specialized long-proboscid fly pollination system in southern Africa. *Plant Systematics and Evolution* 206: 51–69.
MARLOTH, R. 1915. *Flora of South Africa* 4: pl. 43. Juta, Cape Town.
MILNE-REDHEAD, E.W.B.H. 1934. Tropical African plants. XII. *Bulletin of Miscellaneous Information Kew* [1934]: 301–307.
NORDENSTAM, B. 1970. Notes on South African Iridaceae: *Lapeirousia* and *Babiana*. *Botaniska Notiser* 123: 433–443.
PERSOON, H. 1805. *Synopsis plantarum*, vol. 1. C.H. Cramer, Paris.
PETERS, W.C.H. 1864. *Naturwissenschaftliche reise nach Mossambique. Botanik*, vol. 6(2). Berlin.
PLUKENET, L. 1696. *Almagestum Botanicum (Phytographiae Pt. 4)* 87 & fig. 275, f. 1. London.
POIRET, J.L.M. 1826. In G.-F. Cuvier, *Dictionnaire des sciences naturelles*, vol. 39. Levrault, Strassbourg.
POURRET, P.A. 1788. Description de deux genres de la famille des Liliacées, désignés sous le nom de *Lomenia* et de *Lapeirousia*. *Histoire et Mémoires de l'Académie Royale des Sciences, Toulouse* 3: 73–82.
RENDLE, A.B. 1895. A contribution to the flora of eastern tropical Africa. *Journal of the Linnean Society, Botany* 30: 373–435.



Plate 19: ***Afrosolen coeruleus***, Steinhsausen, NAM.

RODIN, R. 1985. The ethnobotany of the Kwanyama Ovambos. *Monographs in Systematic Botany from the Missouri Botanical Garden* 9.

ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium*, vol. 1. J.G. Cotta, Stuttgart.

SCHINZ, H. 1890. Beiträge zur Kenntnis der Flora von Deutsch-Südwest-Afrika und der angrenzenden Gebiete. IV. *Verhandlungen des botanische Vereins der Provinz Brandenburg* 31: 179–230.

SCHINZ, H. 1896. Die Pflanzenwelt Deutsch-Südwest-Afrikas. *Bulletin de l'Herbier Boissier* 4, App. III: 1–57.

SCHINZ, H. 1900. Beiträge zur Kenntnis der Afrikanischen Flora. (Neue Folge). XII. *Mémoires de l'Herbier Boissier* 20: 1–36.

SCHLECHTER, R. 1897. Decades plantarum novarum austroafricanum. *Journal of Botany, British and foreign* 35: 428–433.

SCHLECHTER, R. 1900. Plantae schlechterianae novae vel minus cognitae describuntur II. *Botanische Jahrbücher für Systematik* 27: 86–220.

SÖLCH, A. 1969. Iridaceae. In H. Merxmüller, *Prodromus einer Flora von Südwestafrika* 155: 6–10. J. Cramer, Lehre.

SPRENGEL, K.P.J. 1817. *Anleitung zur Kenntnis der Gewächse*, edn. 2, vol. 2. Kummel, Halle.

SPRENGEL, K.P.J. 1824. *Systema vegetabilium*, vol. 1. Dieterich, Göttingen.

STEUDEL, E.G. 1841. *Nomenclator botanicus*, edn. 2, vol. 2. J.G. Cotta, Stuttgart & Tübingen.

SUESSENGUTH, K. & MERXMÜLLER, H. 1951. Species et varietates novae in Africa australis et centrali lectae. *Mitteilungen der Botanische Staatssammlung, Munchen* 1: 69–93.

SWEET, R. 1827. *Hortus britannicus*. Ridgeway, London.

SWEET, R. 1830a. *Hortus britannicus,* edn. 2. Ridgeway, London.

SWEET, R. 1830b. *Peyrousia aculeata*. *British Flower Garden*, ser. 2: t. 39.

THUNBERG, C.P. 1800. *Prodromus plantarum capensium*. Edman, Uppsala.

VAUPEL, F. 1912. Iridaceae Africanae novae. *Botanische Jahrbucher für Systematik* 48: 533–549.

WANNTORP, H.-E. 1971. *Lapeirousia rivularis*, a new species of Iridaceae from South West Africa. *Svensk Botanisk Tidskrift* 65: 53–56.

WILLDENOW. C.L. 1798. *Species plantarum*, vol. 1. Nauk, Berlin.

Tribe 3. **Ixieae**

Ixieae *Dumort.*, Commentationes botanicae: 58 (1822). Type: *Ixia* L.

Plants with corm development axial, rootstock rarely a slender rhizome; corm with rounded or flat base, tunics fibrous, papery or woody; flowering stem sometimes subterranean. *Leaves* with main vein, margins with columnar epidermal cells or with subepidermal sclerenchyma. *Inflorescence* a spike, sometimes contracted, or flowers solitary. *Flowers* actinomorphic or zygomorphic with stamens unilateral, arcuate or decumbent; style branches simple or deeply divided, sometimes extremely long; ovule campylotropous; seed epidermal cell outlines smooth or prominent; ovular vasculature intact or excluded; $x = 15$ (many other numbers).

Genera 20: tropical Africa, Madagascar and Eurasia, with 19 genera in southern Africa; ± 940 species with ± 760 in southern Africa.

Key to genera

1a Leaf blades pleated, lanceolate to ovate, sometimes ± linear to subterete and then with several longitudinal grooves; stems and/or leaves or bracts pubescent to pilose; style branches undivided, often expanded at tips. . . . . 22. *Babiana*
1b Leaf blades plane or elliptic to terete in section, rarely terete but then stem, leaves and bracts glabrous; style branches either undivided or forked to deeply divided:
2a Outer floral bracts green with narrow or broader, colourless or brown-flecked, membranous margins, inner bracts with broad membranous margins or ± entirely membranous; style branches shallowly to deeply divided; flowers solitary at branch tips, actinomorphic . . . . . .30. *Romulea*
2b Outer floral bracts either green without conspicuous membranous margins or ± membranous to dry, inner bracts similar to outer; style branches simple or divided; flowers solitary or in spikes, actinomorphic or zygomorphic:
3a Plants acaulescent; leaves usually entirely bifacial, mostly channelled to adaxially grooved, or terete distally; corm tunics woody or fibrous but then leaves always entirely bifacial; flowers actinomorphic, blue or mauve to white:
4a Corm strongly compressed laterally; leaf solitary, round in section distally; capsules splitting open when dry . . . . . 31. *Afrocrocus*
4b Corm globose; leaves usually more than one, channelled or round in section distally; capsules splitting open when wet. . . . . 32. *Syringodea*
3b Plants either with aerial stems or acaulescent but then leaves unifacial, oriented edgewise to stem, blades plane and linear to lanceolate or oval to terete in transverse section; corm tunics woody or papery to fibrous; flowers actinomorphic to zygomorphic, variously coloured:
5a Corm bell-shaped with a flat base, tunics splitting radially from middle of base, not forming a circular baseplate; flowering stem wiry and well-branched; ovary deeply 3-lobed; perianth tube vestigial . . . . . .15. *Melasphaerula*
5b Corm with round or flat base then ± bell-shaped and tunics fragmenting circumferentially to form circular baseplate; flowering stem not wiry; ovary not or only slightly 3-lobed; perianth tube variously short to long:
6a Style branches deeply divided:
7a Flowers solitary on branches; leaves prostrate . . . . . 16. *Xenoscapa*
7b Flowers in suberect or inclined, subsecund and scalloped spikes; leaves usually erect or prostrate . . . . . 17. *Freesia*
6b Style branches undivided or notched at tips, sometimes expanded at apex:
8a Leaves oval in section with 4 longitudinal grooves; flowers dusty pink, actinomorphic with stamens rotated anticlockwise . . . . . .19. *Devia*
8b Leaves plane or rarely oval to terete, then solid or with 4 longitudinal grooves; flowers variously coloured, zygomorphic with stamens unilateral, or actinomorphic but stamens never rotated anticlockwise:
9a Outer and inner floral bracts dry and papery or membranous, outer bracts often toothed or sometimes lacerate:
10a Bracts pale, dry, papery and crinkled or solid below, irregularly streaked with dark flecks or veins:
11a Flowers borne on wiry stems and usually nodding; leaves linear, narrow, tough and fibrotic, without an evident main vein when mature; perianth always radially symmetric . . . . . 26. *Dierama*
11b Flowers borne on firm somewhat succulent stems and held upright or facing to the side; leaves lanceolate to linear, relatively succulent and not tough and fibrotic, usually with an evident main vein; perianth radially symmetric or zygomorphic . . . . . 24. *Sparaxis*
10b Bracts pale or rust-brown, membranous or dry but not papery and crinkled, sometimes streaked with dark flecks or veins:
12a Flowers usually zygomorphic with stamens unilateral and arcuate or tepals actinomorphic but stamens irregularly spreading and style eccentric, rarely perfectly actinomorphic with stamens symmetrically arranged; lower tepals sometimes with median ridge, tooth or callus; stems firm and relatively thick, never wiry . . . . . .27. *Tritonia*
12b Flowers either actinomorphic with stamens symmetrically disposed around a central style, or perianth symmetrical but stamens unilateral and decumbent with anthers drooping and with a right-angled bend near base; lower tepals never with median ridge or tooth; stems often more-or-less wiry, or plants acaulescent:
13a Stem usually aerial and ± wiry, rarely plants acaulescent but then flowers not stalked below ovary; outer bract usually 3-lobed to 3-toothed; pollen grain apertures with a 1-banded operculum . . . . . 28. *Ixia*

13b Stem subterranean; flowers distinctly stalked below ovary; outer bract acute; pollen grain apertures with a 2-banded operculum . . . . . 25. *Duthieastrum*
9b Outer and inner floral bracts green or brown and firm-textured to leathery, sometimes dry distally, outer bracts never toothed or lacerate:
14a Style branches usually dividing near mouth or within perianth tube, with branches relatively long and laxly spreading to decumbent (rarely branches erect then included in tube, or when style dividing beyond mouth of tube then corms tunics woody); perianth usually actinomorphic . . . . . 21. *Hesperantha*
14b Style branches usually dividing well above mouth of perianth tube, branches relatively short and spreading to recurved, rarely style dividing within perianth tube but then corm tunics woody; corm tunics woody to papery or fibrous; perianth actinomorphic or zygomorphic:
15a Flowers perfectly actinomorphic (with eccentric style) or only perianth actinomorphic, but stamens and style unilateral and decumbent or declinate; corm tunics hard, brittle and woody, rarely fibrous in a few species; seeds globose to somewhat angular. . . . . .20. *Geissorhiza*
15b Flowers usually zygomorphic with tepals unequal and stamens and style arcuate, rarely perfectly actinomorphic in a few species but then flower either pendent or seeds broadly winged; corm tunics fibrous; seeds globose to angular or winged:
16a Floral bracts relatively short, firm and leathery, dry distally to entirely; flowers predominantly red to orange; seed testa smooth and waxy:
17a Flowers zygomorphic; perianth tube narrow and cylindric below, abruptly expanded into a broad upper cylindric part with pouch at base of upper part; seeds bright orange; leaves always plane 23. *Chasmanthe*
17b Flowers actinomorphic and pendent, or zygomorphic, but then perianth tube usually not abruptly expanded at top of lower cylindric portion and upper part not forming a pouch at base; seeds brown to blackish; leaves pleated or plane . . . . . 18. *Crocosmia*
16b Floral bracts relatively long, soft- to firm-textured but not leathery, sometimes becoming dry distally; flowers variously coloured; seed testa colliculate, not waxy
18a Style branches slender throughout; seeds globose; leaves soft-textured; stem lightly angled; flowers pink . . . . . 29. *Radinosiphon*
18b Style branches expanded and bilobed at tips; seeds usually with broad circumferential wing, occasionally wing obsolete and seed irregularly angled to subglobose; stem usually round in section, rarely angled to winged; flowers variously coloured. . . . . 14. *Gladiolus*

Subtribe 1. **Gladiolinae**

Gladiolinae *Goldblatt* in Journal of South African Botany 37: 440 (1971). Type: *Gladiolus* L.

Corm tunics fibrous or papery; flowering stem always well developed. *Leaf* margins with subepidermal sclerenchyma associated with a marginal vein. *Inflorescence* a spike; inner bracts shorter than outer, forked apically. *Flowers* usually zygomorphic; style branches well developed, undivided, expanded at tips; seeds mostly with prominent circumferential wing, epidermal cell outlines prominent; ovular vasculature intact; $x = 15$.

Genera 1, only *Gladiolus*; ± 270 species, 169 in southern Africa.

14. **Gladiolus**

Gladiolus *Tourn. ex L.*, Species plantarum: 36 (1753). Type: *G. communis* L.

Antholyza L.: 37 (1753). Type: *A. cunonia* L. = *Gladiolus cunonius* (L.) Gaertn., lecto. designated by Hitchcock & Green (1929).

Cunonia Buettner ex Mill.: 75 (1756), name rejected in favour of *Cunonia* L. (1759) (Cunoniaceae). Type: *C. antholyza* Miller = *Gladiolus cunonius* (L.) Gaertn.

Hebea (Pers.) Eckl.: 42 (1827), illegitimate homonym, not *Hebea* R.Hedw. Type: not designated.

Anisanthus Sweet: 396 (1826). Type: *A. splendens* Sweet = *Gladiolus splendens* (Sweet) Herb.

Sphaerospora Sweet ex J.W.Loudon: 66, t. 14 (1841). Type: *S. imbricata* (Jacq.) Sweet ex J.W.Loudon = *Gladiolus italicus* Mill.

Petamenes Salisb. ex J.W.Loudon: 42, t. 8 (1841). *Petamenes* Salisb. ex N.E.Br.: 276 (1932a), illegitimate superfluous name. Type: *P. quadrangularis* (Burm.f.) Salisb. ex J.W.Loudon = *Gladiolus quadrangularis* (Burm.f.). Ker Gawl.

Acidanthera Hochst.: 25 (1844). Type: *A. bicolor* Hochst. = *Gladiolus murielae* Kelway

Homoglossum Salisb.: 143 (1866). Type: *H. watsonium* (Thunb.) N.E.Br. = *Gladiolus watsonius* Thunb., lecto., effectively designated by De Vos: 301 (1976).

Hyptissa Salisb.: 142 (1866). Type: *H. rosea* Salisb., name without description, identity uncertain.

Ophiolyza Salisb.: 142 (1866). Type: *Gladiolus alatus* L., lecto., designated by Goldblatt: 78 (1996).

Ranisia Salisb.: 143 (1866). Type: *Gladiolus tristis* L.

Symphydolon Salisb.: 142 (1866). Type: *Gladiolus floribundus* Jacq.

Oenostachys Bullock: 465 (1930). Type: *O. dichroa* Bullock = *Gladiolus dichrous* (Bullock) Goldblatt

Anomalesia N.E.Br.: 270 (1932a). Type: *A. cunonia* (L.) N.E.Br. = *Gladiolus cunonius* (L.) Gaertn.

Kentrosiphon N.E.Br.: 271 (1932a). Type: *K. saccatus* (Klatt) N.E.Br. = *Gladiolus saccatus* (Klatt) Goldblatt & M.P.de Vos

Dortania A.Chev.: 402 (1938). Type: *D. amoena* A. Chev. = *Gladiolus chevalieranus* Marais

[*Sphaerospora* Sweet: 398 (1826), invalid name without description].

Revisionary accounts: Lewis et al. (1972); Goldblatt (1996 for tropical Africa); Goldblatt & Manning (1998).

From the Latin, *gladiolus,* diminutive of *gladius*, sword, for the sword-shaped leaves.

Deciduous (rarely evergreen) geophytes. *Corm* globose to depressed-globose, axial in origin, tunics of fine or coarse fibres, leathery or woody, rarely papery. *Cataphylls* 3, pale and membranous. *Stem* well developed, usually terete or rarely angled or slightly winged, simple or branched, often flexuose, rarely scabrid to velvety. *Leaves* solitary to several, mostly basal and forming a 2-ranked fan or some cauline, rarely borne on a separate shoot, sometimes dry at flowering, blade sometimes reduced or lacking and leaves thus entirely sheathing, unifacial, usually with a definite midrib, plane and linear to lanceolate, rarely round to oval in section, occasionally the margins or midrib raised or winged and leaves thus X- or H-shaped in section, sometimes terete and longitudinally 4-grooved, cauline leaves usually few and reduced, rarely scabrid to velvety or pubescent; margin with vascular bundle and epidermal cells unspecialised. *Inflorescence* a spike, usually secund or in two ranks; bracts green and soft or firm, sometimes dry above, usually large, inner smaller than outer and 2-toothed or notched apically. *Flowers* usually zygomorphic, rarely radially symmetric, long-lived, bilabiate and funnel–salver-shaped or rarely rotate, variously coloured but often pink to mauve, lower tepals usually with contrasting nectar guides, unscented or variously scented, often closing at night, with nectar from septal nectaries; perianth tube funnel-shaped or cylindric, short or long; tepals subequal or unequal with dorsal largest and arched to hooded over the stamens, the lower three narrower and forming a lip, sometimes clawed and shortly united. *Stamens* usually unilateral and arcuate, rarely symmetrically disposed; filaments inserted well below top of perianth tube, included or exserted. *Ovary* globose; *style* filiform, usually unilateral and arcuate, 3-branched distally, branches oblanceolate-conduplicate, and expanded above, often bilobed. *Capsules* leathery, usually slightly inflated and relatively large, ovoid to ellipsoid, segments recurving strongly after dehiscence. *Seeds* discoid with a broadly circumferential papery wing, rarely wing obsolete, then subglobose or angled, domed on seed body and concave on wing. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number x* = 15, other numbers 14, 12, 11.

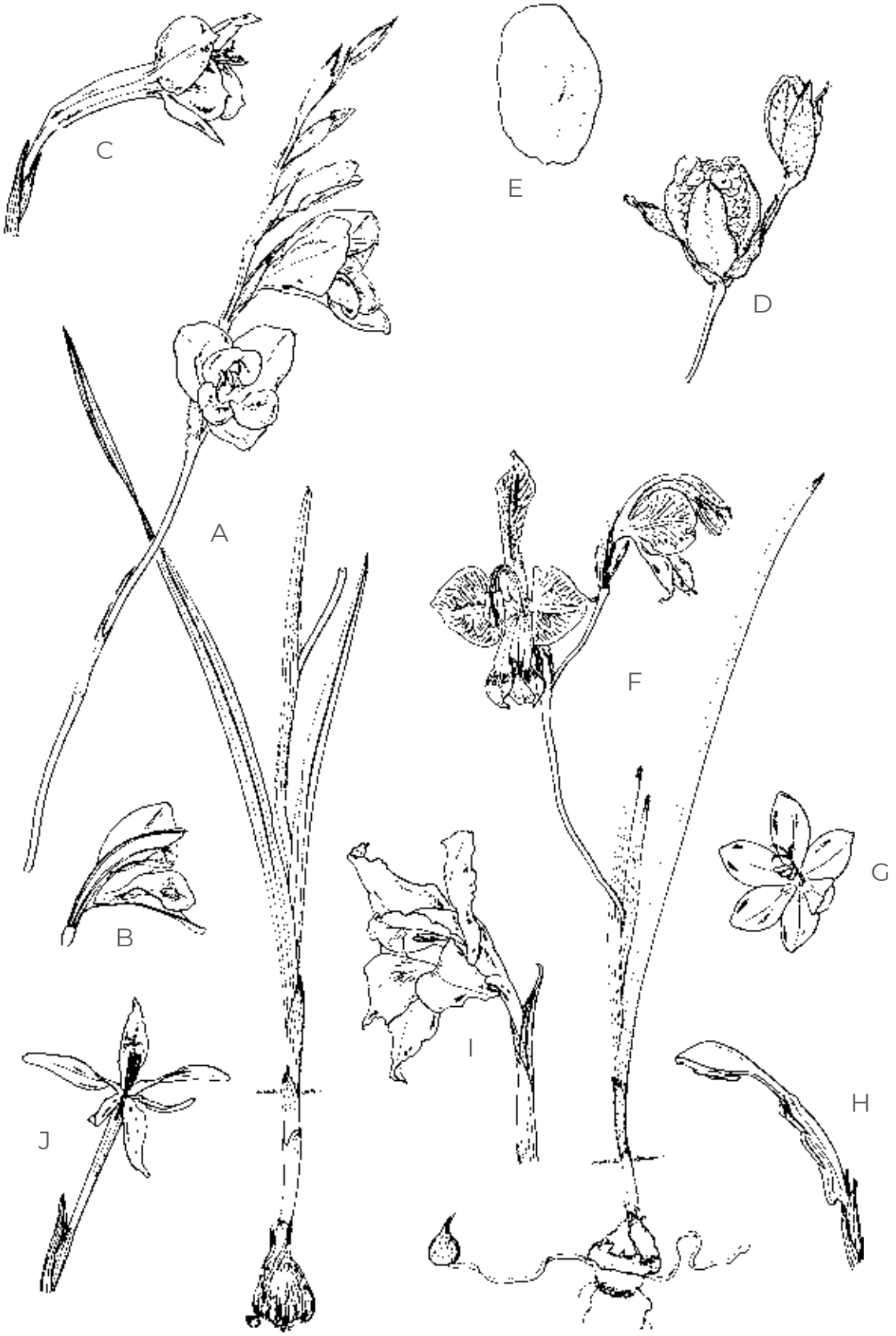
Species ± 270, mainly sub-Saharan Africa and Madagascar, also Europe and the Middle East, 169 in southern Africa, centred in the winter-rainfall zone of southwestern Western Cape, with secondary centres of diversity in the eastern African highlands and in Shaba Province of Congo. As in most genera of Iridaceae with a significant representation of species in both summer- and winter-rainfall southern Africa there is minimal overlap among the species from the two rainfall regimes. *Gladiolus* species are most common in temperate habitats, mainly grasslands and open savanna in areas of summer rainfall and fynbos and other shrublands in the winter-rainfall region.

Gladiolus is highly variable in both floral and vegetative morphology, but most species have characteristic ovoid, leathery, somewhat inflated capsules and distinctive seeds with a broad circumferential wing. The style is also diagnostic, with oblanceolate-conduplicate branches that are expanded distally into broad, bilobed tips. The basic chromosome number, $x = 15$, indicates that the genus is palaeopolyploid. Most species are diploid, $2n = 30$, but the almost pan-African *G. dalenii* is heteroploid, with tetraploid, hexaploid, and occasionally diploid populations.

The affinities of *Gladiolus* have long been uncertain, but molecular phylogenetic analyses suggest that the genus is most closely allied to the monospecific *Melasphaerula* of the southern African winter-rainfall zone. The two genera have little morphological similarity.

A molecular phylogenetic analysis of *Gladiolus*, with an emphasis on the southern African and Mediterranean species, proposes an origin for the genus in southern Africa during the Miocene, followed by range extensions into tropical Africa, Madagascar and the Mediterranean (Valente et al. 2011). The high diversity in the southern African winter-rainfall region is interpreted as a result of the long history of the genus in the region, combined with comparatively low rates of extinction and higher rates of ecological speciation.

The large number of generic synonyms reflects the floral diversity in the genus, much of which is now



GLADIOLUS. G. paludosus: A, flowering plant; B, half-flower. ***G. merianellus***: C, flower. ***G. carneus***: D, dehiscing and undehisced capsules; E. seed. ***G. uysiae***: F, flowering plant. ***G. brevitubus***: G, flower. ***G. saccatus***: H, flower. ***G. oppositiflorus***: I, flower. ***G. lapeirousioides***: J, flower.

understood to represent adaptation to various specialised pollination systems. Pollination by large anthophorine bees foraging for nectar is the most common system in the genus but many southern African species have long-tubed white to pink flowers adapted for pollination by long-proboscid flies. Bird pollination is frequent in southern and tropical African species, as is moth pollination by large settling moths or hovering sphinx moths. Other species are pollinated by large butterflies, notably in southern Africa, where red-flowered species are pollinated largely or exclusively by the satyrid butterfly *Aeropetes tulbaghia*. Radial symmetry has evolved in a handful of species in both southern and tropical Africa, and these species appear mostly to be pollinated by female bees foraging for pollen.

The floral diversity is matched by numerous vegetative adaptations, notably reduction in leaf number and the development of winged midribs and/or margins, or reduction of the entire leaf blade. In some species flowering occurs before the leaves are produced or after they have dried, thereby separating the growth and reproductive phases of the life cycle.

The current classification of *Gladiolus* in southern Africa recognises seven sections, distinguished by the insertion of the foliage leaves on the stem, the shape and thickening of the blades, the shape and number of the flowers, and the shape and size of the capsules (Goldblatt & Manning, 1998). The molecular phylogenetic analysis of the genus by Valente et al. (2011) is only partially congruent with this classification and some marked anomalies make it difficult to interpret. However, many of the series or species groups recognised by Goldblatt & Manning (1998) are retrieved by Valente et al. (2011) in their phylogeny, providing independent support for species relationships at these lower taxonomic levels. Provisionally, therefore, we follow the slightly modified version of Goldblatt & Manning's (1998) classification proposed by Goldblatt & Manning (2009).

Synoptic key to sections

1a Leaves broadly to narrowly lanceolate, usually at least 4 mm wide, often with well-developed secondary veins, these sometimes finely and closely set; flowers mostly slightly bilabiate with the lower tepals not clawed but sometimes strongly clawed:
  2a Leaves usually superposed, blades often reduced, sheaths and sometimes blades pubescent or villous, rarely scabrid; corm tunics of flattened fibres . . . . . 4. sect. *Linearifolii*
  2b Leaves in a 2-ranked fan, glabrous or puberulous; corm tunics often papery:
    3a Flowers usually small; capsules less than 15 mm long; seeds smaller, usually less than 6 mm long, with wings often reduced or unevenly developed . . . . . .1. sect. *Densiflori*
    3b Flowers usually larger; capsules usually more than 20 mm long; seeds larger, usually more than 8 mm long, with well-developed wings:
      4a Flowers rarely white to pink, sometimes red but then lower tepals with white transverse bands or base . . . . . 2. sect. *Ophiolyza*
      4b Flowers usually cream-coloured to pale or deep pink or salmon-orange, lower tepals usually with red spade-, diamond- or spear-shaped markings, often with white centre, or median red streak, flowers sometimes red but then with longitudinal markings . . . . . .3. sect. *Blandi*
1b Leaves linear, usually less than 5 mm wide, usually without well-developed secondary veins, if broader then without well-developed midrib; flowers usually strongly bilabiate with lower tepals narrow and clawed:
  5a Leaves (2)3(4), one or two basal and others superposed and inserted serially up stem; stems unbranched; spike usually often strongly flexuose or sometimes stiffly erect; nectar guides on lower tepals usually of fine, longitudinal dark streaks and spots over a pale area or transverse bands of pale colour; capsules usually ellipsoid to ovoid and acute; flowers often fragrant, except when long-tubed and pink or orange to red, sometimes nocturnal . . . . . 7. sect. *Homoglossum*
  5b Leaves usually several, at least three basal:
    6a Leaf midrib and margins usually heavily thickened, the blades sometimes centric and cross-shaped in section or terete and with four longitudinal furrows or grooves; corm tunics fibrous, often accumulating in a neck around base of stem; flowers rarely lightly scented; capsules usually oblong and slightly 3-lobed above; seeds often with wings reduced, vestigial or sometimes lacking . . . . . 5. sect. *Heterocolon*
    6b Leaf midrib lightly thickened and raised but margins usually unthickened, rarely ridged or corrugated; corm tunics membranous, papery, woody or fibrous but rarely accumulating in a neck around base of stem; flowers often highly fragrant except red-flowered species; capsules usually ellipsoid and acute, rarely obovoid and 3-lobed above; seeds broadly and evenly winged . . . . . .6. sect. *Hebea*

1. Sect. *Densiflori* and 2. sect. *Ophiolyza*

1a Anthers with locules drawn into sterile basal tails at least 1.5 mm long:
  2a Perianth tube 40–45 mm long, at least one and a half times as long as dorsal tepal; tepals attenuate; flowers whitish to pale salmon-pink, lower tepals with median red streak . . . . . 13. *G. macneilii*
  2b Perianth tube 15–32(–40) mm long, shorter than to ± as long as dorsal tepal; tepals ± obtuse; flowers white to pink without median streak on lower tepals:
    3a Floral bracts 18–27 mm long; flowers white to pink; perianth tube 16–22 mm long . . . . . .11. *G. appendiculatus*

3a Floral bracts 35–55 mm long; flowers white with yellow throat; perianth tube 16–40 mm long . . . . . 12. *G. calcaratus*
1b Anthers without sterile basal tails:
4a Inner bracts with margins united below into a tube around ovary, or spikes 2-ranked and erect; bracts usually somewhat inflated below and pleated, the apices dry and light brown, attenuate and deflexed; plants usually with a fan of rigid, erect leaves often puberulous or scabridulous:
5a Perianth tube (28–)40–55 mm long; flowers bright mauve or pink to salmon pink; plants from Eastern Cape to southern KwaZulu-Natal . . . . . 24. *G. oppositiflorus*
5b Perianth tube 10–35 mm long; flowers pale pink to blue, cream-coloured or greenish, often minutely speckled; KwaZulu-Natal to Limpopo and Botswana:
6a Perianth tube 33–35 mm long; lower tepals streaked with red and base of filaments dull red . . . . . 20. *G. reginae*
6b Perianth tube 10–27 mm long; lower tepals not streaked and filaments pale:
7a Leaves in a tight basal fan usually shorter than spike, with numerous fine parallel veins and without a prominent midrib; plants never hairy . . . . . 26. *G. elliotii*
7b Leaves in a lax fan usually arising some distance above ground with a pseudostem formed by the sheaths, narrow and usually exceeding the spike, always with a prominent midrib and sometimes also secondary veins; plants usually hairy:
8a Perianth tube 18–27 mm long; tepals elliptic-attenuate; bracts 26–30 mm long, attenuate. . . . . 22. *G. dolomiticus*
8b Perianth tube 10–16 mm long; tepals lanceolate-acute; bracts 15–30 mm long, ± acute:
9a Filaments 10–12 mm long; bracts ± two internodes long . . . . . 25. *G. sericeovillosus*
9b Filaments 18–20 mm long, reaching almost to tepal apices; bracts one to one and a half internodes long . . . . . 23. *G. pole-evansii*
4b Inner bracts with margins free to the base and spikes never 2-ranked, usually inclined; bracts not normally inflated below, green or dry but then apices not attenuate and deflexed; plant habit varied:
10a Flowers carmine to red, lower tepals either with white markings or much reduced:
11a Dorsal tepal ± twice as long as upper laterals; lower tepals ± ⅔ as long as upper laterals, ± 10 mm long, marked with yellow . . . . . 33. *G. magnificus*
11b Dorsal tepal ± as long as upper laterals; lower tepals slightly shorter than upper laterals, 30–48 mm long, marked with white:
12a Perianth sigmoid, flowers obliquely tulip-shaped with lower tepals forming a shallow bowl; tepals 30–42 mm long, thick and succulent in texture, lower tepals with median white streak . . . . . 34. *G. flanaganii*
12b Perianth ± straight or curved apically, flowers flaring with lower tepals straight or recurved; tepals 45–67 mm long, moderately thin and delicate, lower tepals white in lower half speckled with red:
13a Stems erect; leaves firm-textured, in an erect basal fan shorter than stem, drooping; tepals ± recurved distally; plants from Drakensberg and Lesotho . . . . . 35. *G. saundersii*
13b Stems inclined or drooping; leaves soft-textured, as long as or longer than stem, drooping; tepals suberect or spreading; plants from coastal KwaZulu-Natal . . . . . 36. *G. cruentus*
10b Flowers never carmine to red, lower tepals variously coloured and marked:
14a Flowers pink to mauve, lower tepals with longitudinal reddish streaks; perianth tube 20–50 mm long:
15a Leaves and/or stems scabridulous to puberulous:
16a Stem, rachis and bracts glabrous; dorsal tepal 35–40 mm long; plants drooping from cliffs . . . 16. *G. microcarpus*
16b Stem, rachis and bracts scabridulous; dorsal tepal 40–45 mm long; plants erect on stony slopes and outcrops . . . . . 17. *G. scabridus*
15b Leaves and stems glabrous:
17a Leaves 3–9 mm wide, with prominently thickened midrib and margins, with fine, closely set veins between; dorsal tepal 26–32 mm long; bracts rusty brown above or entirely . . . . . 10. *G. varius*
17b Leaves broader, with prominent secondary veins between margins and midrib; dorsal tepal 35–48 mm long; bracts green throughout or dry above:
18a Leaves leathery with prominently thickened margins and veins; plants from Eastern Cape. . . . 15. *G. mortonius*
18b Leaves softer textured, with lightly thickened margins and other veins; plants from eastern Mpumalanga:
19a Bracts 50–70 mm long, green; perianth tube 40–50 mm long; dorsal tepal 40–48 mm long; lower tepals with prominent median red streak . . . . . 18. *G. cataractarum*
19b Bracts 38–48 mm long, rusty brown above; perianth tube 30–40 mm long; dorsal tepal 35–37 mm long; lower tepals with obscure median mark . . . . . 9. *G. saxatilis*
14b Flowers variously coloured but if pink then perianth tube less than 20 mm long:
20a Perianth tube 25–70 mm long; filaments 20–40 mm long:
21a Leaves superposed along stem, with blades shorter than to ± as long as sheaths . . . . . 31. *G. aurantiacus*
21b Leaves clustered at base of stem forming a 2-ranked fan, blades well-developed:
22a Dorsal tepal 25–30 × 14–16 mm, ascending and not hooded over stamens; anthers 9–11 mm long . . . . . 30. *G. antholyzoides*
22b Dorsal tepal 35–50 × 22–30 mm, horizontal and hooded over stamens; anthers 12–16 mm long . . . . . 32. *G. dalenii*
20b Perianth tube 10–35 mm long; filaments usually 7–18 mm long, rarely up to 22 mm long but then flowers nodding and bell-shaped with perianth tube 18–20 mm long:
23a Floral bracts imbricate, two to five internodes long, somewhat inflated and folded on the midline, mostly 40–100 mm long; flowers often speckled or spotted over a pale ground, rarely pure white or pale mauve:
24a Leaves lanceolate, in a tight basal fan, rarely reaching base of spike; filaments 12–15 mm long. . . . 27. *G. ecklonii*
24b Leaves linear-lanceolate, reaching at least to base of spike; filaments 7–12 mm long:

25a Flowers speckled or spotted with lilac to dark purple; anthers 10–13 mm long; style branches 3–4 mm long . . . . . 28. *G. vinosomaculatus*
25b Flowers uniformly white or pale mauve; anthers ±10 mm long; style branches 6–8 mm long . . . . . 29. *G. rehmannii*
23b Floral bracts not or shortly imbricate, up to two internodes long, hardly or not inflated or folded on the midline, mostly 20–40 mm long; flowers mostly uniformly coloured, rarely minutely speckled:
26a Flowers 40–55 mm long:
27a Leaves of flowering stem reduced with short or vestigial blades . . . . . 21. *G. brachyphyllus*
27b Leaves of flowering stem with well-developed blades:
28a Perianth tube 18–30 mm long and ± as long as or slightly longer than dorsal tepal . . . . . 4. *G. hollandii*
28b Perianth tube 10–20 mm long and ½ to ± ⅔ as long as dorsal tepal:
29a Bracts dry and rusty brown above; leaves mostly less than 10 mm wide, with thickened midrib and margins, and remaining veins fine and closely set . . . . . 8. *G. ferrugineus*
29b Bracts green; leaves with secondary veins conspicuous or inconspicuous but not closely set:
30a Leaves in a tight basal fan; flowers spreading on a slightly inclined spike; filaments 10–12 mm long . . . . . 14. *G. ochroleucus*
30b Leaves superposed, not forming a tight basal fan; flowers nodding on a strongly inclined spike; filaments 20–22 mm long . . . . . 2. *G. papilio*
26b Flowers 23–40 mm long:
31a Leaves with only midrib and margins thickened, sometimes strongly so, remaining veins fine and closely set:
32a Leaves several in a tight basal fan shorter than spike; upper stem and spike strongly inclined; filaments ± 15 mm long . . . . . 6. *G. exiguus*
32b Plants not as above:
33a Bracts green or flushed dull purple; spike usually with 20–45 flowers; filaments 10–12 mm long . . . . . 7. *G. densiflorus*
33b Bracts dry and rusty brown above or entirely; spike usually with 12–15 flowers; filaments 12–15 mm long . . . . . 8. *G. ferrugineus*
31b Leaves with midrib and main veins thickened and at least one pair of secondary veins thickened, or secondary veins obscure and not closely set:
34a Leaves soft-textured, secondary veins obscure; lower median tepal strongly streaked with red, mouth of tube also red; plants producing long stolons . . . . . 19. *G. pavonia*
34b Leaves firm-textured, secondary veins evident; tepal markings obscure or best developed on lower laterals; plants not stoloniferous:
35a Floral bracts 12–16 mm long, narrow and attenuate, dry and twisted above at flowering; flowers pale pink, lower tepals usually with median yellow streak surrounded by broad pink blotch. . . . . 5. *G. serpenticola*
35b Floral bracts 17–40 mm long, acute to attenuate, green; flowers variously coloured, lower lateral tepals often with broad transverse blotch:
36a Flowers larger, dorsal tepal 20–25 mm long; filaments ± 14 mm long; plants mostly 40–50 mm high; leaves without conspicuous secondary veins; flowering October to November . . . . . 1. *G. paludosus*
36a Flowers smaller, dorsal tepal 18–22 mm long; filaments 12–14 mm long; plants mostly 50–120 mm high; leaves fibrous with conspicuous secondary veins; flowering mainly February to March. . . . . 3. *G. crassifolius*

3. Sect. *Blandi*

1a Flowers carmine to red, sometimes with white markings on lower tepals:
2a Flowers pure red, tulip-shaped; tepals broadly obovate, 27–30 mm long; filaments ± 20 mm long . . . . . 50. *G. insolens*
2b Flowers with white markings on lower tepals, funnel-shaped; tepals lanceolate to elliptic, 35–67 mm long; filaments 21–50 mm long:
3a Leaves on flowering stem with blades reduced or vestigial:
4a Flowers large, dorsal tepal 53–58 mm long and perianth tube 35–45 mm long; filaments 30–42 mm long, exserted 20–32 mm from tube; lower 3 tepals smaller than dorsal; anthers purplish or yellow with purple lines . . . . . 53. *G. stefaniae*
4b Flowers medium-sized, dorsal tepal 35–45 mm long and perianth tube 30–35 mm long; filaments 21–26 mm long, exserted 10–15 mm from tube; lower 3 tepals scarcely smaller than dorsal; anthers yellow. . . . 54. *G. carmineus*
3b Leaves on flowering stem with well-developed blades:
5a Stems erect or inclined; corm vestigial, producing scaly stolons; plants from Outeniqua and Tsitsikamma Mtns, flowering mainly February to April . . . . . 52. *G. sempervirens*
5a Stems inclined to drooping; corm small but well-formed, without stolons; plants from Hex River to Franschhoek Mtns, flowering December to January . . . . . 51. *G. cardinalis*
1b Flowers white or pale to deep pink or mauve, with various markings on lower tepals:
6a Leaves somewhat succulent, without evident veins and margins unthickened; flowers blue-mauve, tepals subequal, lower marked with white streaks edged in red; strand plants growing down to the high-tide mark . . . . . 40. *G. gueinzii*
6b Leaves not succulent, secondary veins usually evident and margins usually prominent; flowers white to pink or salmon-pink, lower tepals often smaller, variously marked:

7a Leaves in a tight basal fan; blades firm-textured with strongly thickened margins and midrib; corm tunics coarsely fibrous, accumulating in a dense mass and forming a neck around base of stem:
8a Perianth tube 18–21 mm long; filaments 12–14 mm long; lower lateral tepals with pale yellow, spear-shaped marks outlined with purple; base of leaves heavily marked with raised white speckles . . . . . 55. *G. rudis*
8b Perianth tube 22–55 mm long; filaments 14–37 mm long; lower lateral tepals with dark median streak; base of leaves lightly marked but not textured with white or green speckles:
9a Perianth tube 22–35(–55) mm long; lower tepals ¾ to ± as long as dorsal . . . . . 56. *G. grandiflorus*
9b Perianth tube 40–70 mm long, if less than 50 mm long then lower tepals ½–¾ as long as dorsal:
10a Flowers white to creamy yellow or greenish; perianth tube slender in lower 20–55 mm and flaring above; filaments 20–23 mm long. . . . . 57. *G. floribundus*
10b Flowers salmon to orange-red; perianth tube slender in lower 20–35 mm and cylindric above; filaments 35–37 mm long . . . . . 58. *G. miniatus*
7b Leaves in a loose fan or superposed; blades soft-textured with often lightly thickened margins and midrib; corm tunics papery to medium-textured fibres, not accumulating in a dense mass and forming a neck around base of stem:
11a Corms scarcely developed, tunics not accumulating; plants with inclined to drooping stems, growing on wet rocks:
12a Spike usually 15- to 20-flowered; flowers ivory-coloured to greenish cream-coloured, lower tepals less than half as long as dorsal; perianth tube 45–50 mm long, completely enclosed within the bracts; plants from Cederberg . . . . . 47. *G. buckerveldii*
12b Spike usually less than 15-flowered; flowers pale mauve-pink, lower tepals ⅔ to nearly as long as dorsal; perianth tube 25–40 mm long, exceeding the bracts; plants from Swartberg . . . . . 44. *G. aquamontanus*
11b Corms well developed, tunics accumulating or not; plants with erect to inclined stems, not growing on wet rocks:
13a Perianth tube longer than dorsal tepal, (30–)40–100 mm long:
14a Tepals attenuate and strongly undulate; lower tepals slightly shorter than upper . . . . . 45. *G. undulatus*
14b Tepals obtuse to acute, not attenuate, weakly undulate; lower tepals usually about ⅔ as long as upper:
15a Leaves 4 or 5; flowers cream-coloured to yellowish with prominent red, spear-shaped marks on lower tepals; flowering October to November; plants from West Coast and near interior . . . . . 46. *G. angustus*
15b Leaves 3 to 7; flowers salmon-pink with red linear marks on lower tepals; flowering February to April; plants from southern coast and interior:
16a Leaves 6 or 7, with blades 1.5–6.5 mm wide; perianth tube 30–55 mm long; flowering February; plants from Little Karoo mountains . . . . . 48. *G. dolichosiphon*
16b Leaves 3, with blades 6–8 mm wide; perianth tube 50–70 mm long; flowering March to April; plants from southern foothills of Langeberg . . . . . 49. *G. bilineatus*
13b Perianth tube shorter than to as long as dorsal tepal, (15–)20–50 mm long:
17a Flowers large, dorsal tepal 40–55 mm long; plants from Plettenberg Bay to Uniondale . . . . . 43. *G. geardii*
17b Flowers smaller, dorsal tepal 18–40(–50) mm long; plants from west of Knysna:
18a Leaf blades with two prominently thickened veins on some or all leaves, 1–6 mm wide; tunics finely fibrous:
19a Flowers 33–46 mm long; leaves 2– 6 mm wide; bracts mostly 13–20 mm long; lower tepals with white to yellow, spear-shaped marking outlined with red . . . . . 37. *G. oreocharis*
19b Flowers 48–60 mm long; leaves 1–3 mm wide; bracts mostly 25–33 mm long; lower tepals with red chevron-shaped marking in middle and red-spotted toward base and in throat . . . . . 38. *G. crispulatus*
18b Leaf blades with only midrib prominently thickened, sometimes additional pairs of veins also evident, 1.6–20.0 mm wide; tunics usually accumulating, fibrous or firm-papery:
20a Floral bracts 13–16 mm long; perianth tube 18–20 mm long; lower tepals narrowed below into claws . . . . . 39. *G. phoenix*
20a Floral bracts 25–65 mm long; perianth tube (15–)25–45 mm long; lower tepals not narrowed below into claws:
21a Leaves (2–)6–19 mm wide; flowers usually at least 5 per spike; corm tunics fibrous to firm-papery, usually accumulating. . . . . 41. *G. carneus*
21b Leaves 1.5–3.0 mm wide; flowers 1 or 2(3) per spike; corm tunics membranous, not accumulating . . . . . 42. *G. pappei*

4. Sect. *Linearifolii*

1a Plants from summer-rainfall region; perianth tube 4–12 mm long; capsules oblong to globose, 3-lobed above and retuse; leaf blades reduced, shorter than sheaths or vestigial; lower tepals sometimes clawed:
2a Leaves 2 or 3, uppermost bract- or scale-like; perianth subactinomorphic with subequal tepals; tepals elliptic to lanceolate, not clawed:
3a Flowers greenish or pale mauve with attenuate tepals 17–23 mm long; uppermost leaf bract-like and inserted some distance below first flower; stem rigid. . . . . 62. *G. pubiger*
3b Flowers pale pink with acute to obtuse tepals 12–17 mm long; uppermost leaf a small scale inserted just below first flower; stem wiry . . . . . 63. *G. parvulus*
2b Leaves (2)3 or 4; perianth obviously zygomorphic with lower tepals smaller; lower lateral tepals obviously clawed:
4a Flowers pale yellow; outer whorl of tepals constricted below into claws; lower tepals strongly auriculate at base of limb; vegetative plants with 3 leaves . . . . . 61. *G. pardalinus*
4b Not as above:

5a Flowers pale lilac to cream-coloured, yellow or maroon, the lower lateral tepals with dark purple median streak; flowers smaller, dorsal tepal 17–24(–27) mm long; foliage usually densely villous . . . . . 59. *G. woodii*
5b Flowers pale mauve, the lower lateral tepals shading to purple basally; flowers larger, dorsal tepal 28–30 mm long; foliage sparsely hairy to subglabrous . . . . . 60. *G. malvinus*
1a Plants from winter-rainfall region; perianth tube 11–55 mm long; capsules ovoid to ellipsoid, acute; leaf blades well-developed, reduced or vestigial; lower tepals never clawed:
6a Leaves entirely sheathing and lacking blades, glabrous:
7a Flowers uniformly red to orange red:
8a Flowers congested, funnel-shaped with spreading tepals; tepals oblong-elliptic, 7–9 mm wide; filaments 8–10 mm long, included in tube . . . . . 74. *G. nerineoides*
8b Flowers laxly spaced, tulip-shaped with cupped tepals; tepals obovate to suborbicular, 22–28 mm wide; filaments ± 20 mm long, exserted ± 10 mm from tube . . . . . 75. *G. stokoei*
7b Flowers pink, mauve, white or cream-coloured to yellow, or mottled brown:
9a Perianth tube 11–13 mm long, obliquely funnel-shaped . . . . . 72. *G. brevifolius*
9a Perianth tube 22–45 mm long, cylindric and expanded only near apex:
10a Flowers cream-coloured to pale pink or pale apricot, lower tepals with red to yellow median streak, unscented; perianth tube 22–30 mm long; plants from Cape Peninsula . . . . . 73. *G. monticola*
10b Flowers mottled brownish or plain yellow, strongly scented; perianth tube 32–45 mm long; plants from Riviersonderend to Mossel Bay . . . . . 68. *G. emiliae*
6b Leaves with well-developed blades, the lowermost at least as long as the sheath, scabridulous or pubescent:
11a Flowers yellow to orange or scarlet; perianth tube longer than bracts, slender below and abruptly expanded above into flared or broadly cylindric upper part:
12a Flowers bright yellow; upper part of perianth tube flared; filaments 9–12 mm long . . . . . 71. *G. aureus*
12b Flowers orange to scarlet, rarely yellow; upper part of perianth tube subcylindric; filaments 28–32 mm long:
13a Leaves pubescent; tepals subequal, broadly obovate to suborbicular; plants from Cape Peninsula . . . . . 70. *G. merianellus*
13b Leaves scabridulous; tepals unequal, lower three smaller and elliptic; plants from Overberg . . . 69. *G. overbergensis*
11b Flowers pink, cream-coloured, purple or dull red to brownish; upper part of perianth tube gradually expanded and flared toward mouth:
14a Perianth tube cylindric for most of its length and expanded only in upper ⅕; tepals lanceolate, acute, not crisped or undulate . . . . . 66. *G. rhodanthus*
14b Perianth tube obliquely funnel-shaped and expanded only in upper ⅓–½; tepals ovate, obtuse, margins crisped or undulate:
15a Flowers brownish purple or dull pink to dull reddish brown, the lower tepals yellowish or ochre and mottled with brown; flowering April to July . . . . . 67. *G. guthriei*
15b Flowers cream-coloured to pink or purple, the lower tepals streaked with dark red or purple; flowering mainly July to October:
16a Perianth 34–58(–75) mm long; dorsal tepal 19–27(–35) mm long; flowers unscented or lightly sweet-scented; leaf margins and midrib lightly or rarely moderately thickened . . . . . 64. *G. hirsutus*
16b Perianth (67–)75–85 mm long; dorsal tepal 37–45 mm long; flowers usually strongly clove-scented; leaf margins and midrib strongly thickened . . . . . 65. *G. caryophyllaceus*

5. Sect. *Heterocolon*

1a Leaves hairy:
2a Leaf blades cross-shaped in section; flowers pale bluish, 33–40 mm long . . . . . 83. *G. marlothii*
2b Leaf blades plane; flowers pink with lower tepals marked pale green, ± 30 mm long . . . . . 84. *G. mostertiae*
1b Leaves smooth:
3a Leaf blades lanceolate, relatively short, plane with margins and midrib moderately thickened but blades never with two narrow grooves on each surface . . . . . 76. *G. oatesii*
3b Leaf blades linear, relatively long, margins and midrib heavily thickened, thus with two narrow grooves on each surface:
4a Floral bracts rusty brown on margins; flowers cream-coloured densely speckled with red; flowering mainly March and April . . . . . 80. *G. rufomarginatus*
4b Floral bracts and flowers not as above:
5a Lower tepals spathulate:
6a Leaves dry and withered at flowering; flowers pink; flowering July and August; plants from KwaZulu-Natal to Limpopo . . . . . 81. *G. vernus*
6b Leaves green at flowering; flowers pale greyish blue; flowering October; plants from Kamiesberg in Namaqualand . . . . . 82. *G. kamiesbergensis*
5b Lower tepals oblanceolate:
7a Flowers orange-red with conspicuous yellow transverse band on lower tepals; leaves linear with two grooves on each surface . . . . . 77. *G. rubellus*
7b Flowers pink to mauve; leaves terete to subterete with four narrow grooves:
8a Perianth tube 11–14 mm long . . . . . 78. *G. pretoriensis*
8b Perianth tube 25–40 mm long . . . . . 79. *G. filiformis*

6. Sect. *Hebea*

1a Flowers strongly zygomorphic with upper lateral and lower median tepals cordate at base and shortly stalked; filaments long and strongly arched, rarely shorter but then pilose; sutures between tepals raised into iridescent, papillate ridges ('*kalkoentjies*'):
2a Flowers orange to scarlet or salmon-pink; stems angled or winged; floral bracts sharply folded or keeled along midline:
3a Basal leaf plane, broadly lanceolate, 20–40 mm wide, margins thickened and often reddish, lower leaves often obtuse and apiculate. . . . . 113. *G. equitans*
3b Basal leaf plane or ridged, ± 2–12 mm wide, margins not or lightly thickened and never reddish, lower leaves acute or attenuate:
4a Leaf blades plane, midrib and other veins barely evident and not raised; stamens and style sparsely pilose or glabrous distally:
5a Dorsal tepal strongly hooded and concave; upper lateral tepals weakly spreading distally, limbs virtually sessile, often with large yellow blotch on reverse; stamens and style glabrous distally . . . . . 114. *G. speciosus*
5b Dorsal tepal inclined or suberect, ± plane; upper lateral tepals spreading with claws 3–4 mm long, uniformly salmon-orange on reverse; stamens and style sparsely pilose . . . . . 115. *G. pulcherrimus*
4b Leaf blades ribbed, midrib and sometimes other veins thickened and raised; stamens and style sparsely pilose:
6a Flowers orange to scarlet, lower tepals predominantly yellowish green with orange tips; filaments 20–26 mm long . . . . . 116. *G. alatus*
6b Flowers salmon-pink to brick-red, lower lateral tepals with small yellow mark edged reddish black distally; filaments ± 15 mm long . . . . . 117. *G. meliusculus*
2b Flowers green or grey to purple or brownish or pale yellow, rarely pale pink but then strongly veined with dark colour; stems terete; floral bracts not folded or keeled:
7a Leaf blades plane, midrib and other veins barely evident and not raised:
8a Dorsal tepal arched in a semi-circle over stamens, margins not recurved; leaves (4)5 to 8(10); corm producing small cormlets at base . . . . . 108. *G. orchidiflorus*
8b Dorsal tepal erect, margins recurved; leaves 3; corm producing long stolons terminating in a large cormlet . . . . . 112. *G. uysiae*
7b Leaf blades ribbed or terete, midrib and sometimes other veins thickened and raised:
9a Dorsal tepal boat-shaped and horizontal thus concealing stamens, partly translucent; leaf blades with several equal ribs, thus corrugate . . . . . 109. *G. watermeyeri*
9b Dorsal tepal erect to slightly inclined exposing stamens, not partly translucent; leaf blades with midrib more prominent than veins, thus not corrugate:
10a Leaves not completely imbricate, exposing the stem below the uppermost leaf, sometimes only very slightly; corm tunics pale and soft, almost membranous; plants from Breede River Valley to Long Kloof 110. *G. virescens*
10b Leaves imbricate and completely sheathing lower part of stem; corm tunics dark and firm-textured, almost woody; plants from Knersvlakte, Cold Bokkeveld and Roggeveld . . . . . 111. *G. ceresianus*
1b Flowers actinomorphic or weakly to strongly zygomorphic but upper lateral and lower median tepals not or obscurely cordate and stalked; filaments short to long, horizontal, ascending or strongly arched but always glabrous; sutures between tepals never raised into papillate ridges:
11a Flowers red to carmine, the lower tepals sometimes much reduced and marked with yellow or green:
12a Dorsal and upper lateral tepals subequal in size and lanceolate; upper part of perianth tube above stamen insertion 20–23 mm long . . . . . 88. *G. vandermerwei*
12b Dorsal tepal ± twice or more as long as upper laterals, spathulate; upper part of perianth tube above stamen insertion 2–10 mm long:
13a Upper part of perianth tube forming a short spur; upper lateral tepals reduced, scale-like, 2–5 mm long. . . . . 91. *G. saccatus*
13b Upper part of perianth tube not spurred; upper lateral tepals ovate and flexed upward, ear-like, 10–17 mm long:
14a Lower tepals subequal, scale-like, 1–4 mm long; spike inclined to nearly horizontal; plants from southwestern coast. . . . . 89. *G. cunonius*
14b Lower median tepal much larger than lower laterals and flexed sharply downward, boat-shaped, 8–11 mm long; spike stiffly erect; plants from Bokkeveld and Roggeveld . . . . . 90. *G. splendens*
11b Flowers variously coloured but never red to carmine:
15a Corm tunics hard, woody and somewhat gnarled, rarely membranous but then leaf sheaths hairy:
16a Upper cataphyll purple mottled with white:
17a Perianth strongly zygomorphic, greenish to brownish purple with yellow markings on lower tepals; flowering May to July . . . . . 102. *G. viridiflorus*
17b Perianth ± actinomorphic, blue with dark blue and white markings; flowering (July) August to September . . . . . 103. *G. deserticola*
16a Upper cataphyll not mottled:
18a Corm tunics softly membranous, not accumulating; sheaths and blades of lower leaves shortly hairy; capsules ellipsoid, acute . . . . . 101. *G. arcuatus*
18b Corm tunics hard, woody and gnarled, accumulating; leaves glabrous; capsules ovoid to subglobose, 3-lobed above and retuse:
19a Flowers yellowish to greenish or purple with basal half of lower tepals greenish yellow; lower tepals conspicuously narrowed below and flexed sharply downwards; perianth tube 12–17 mm long:

20a Lower tepals curved ± sharply downward at base of limb with upper margins of claws not or only weakly auriculate; perianth windowed in profile, with gap between upper lateral and dorsal tepals; plants north of Vanrhynsdorp–Calvinia axis ..... 104. *G. scullyi*
20b Lower tepals geniculately flexed downward at base of limb with upper margins of claws conspicuously auriculately lobed; perianth not windowed in profile, with upper lateral tepals suberect on either side of dorsal tepals; plants south of Vanrhynsdorp–Calvinia axis ..... 105. *G. venustus*
19b Flowers cream-coloured to pale pink with red and yellow chevron-shaped markings on lower tepals; lower tepals not conspicuously narrowed below; perianth tube 18–40 mm long:
21a Perianth tube narrowly funnel-shaped, 18–22 mm long; filaments ± 25 mm long ..... 106. *G. salteri*
21b Perianth tube cylindric, 35–40 mm long; filaments ± 8 mm long ..... 107. *G. lapeirousioides*
15b Corm tunics leathery, fibrous or papery to membranous:
22a Lower lateral tepals much shorter than median; upper lateral tepals flexed upward to overlap dorsal tepal on either side:
23a Leaves narrowly lanceolate, 4–8 mm wide, soft-textured; flowers lilac with purple feathering on lower tepals; perianth tube ± 5 mm long; plants from KwaZulu-Natal Drakensberg ..... 86. *G. loteniensis*
23b Leaves linear, 2–3 mm wide, firm-textured; flower white to pale yellow, lower tepals not feathered; perianth tube 16–50 mm long; plants from Western and Eastern Cape:
24a Perianth tube 45–50 mm long; upper three tepals subequal, 25–35 mm long; lower lateral tepals with red median streak ..... 85. *G. leptosiphon*
24b Perianth tube 16–18 mm long; dorsal tepal much shorter than upper laterals, 25–35 mm long; lower lateral tepals greenish yellow in lower half ..... 87. *G. involutus*
22b Lower lateral tepals ± as long as median or only slightly shorter; perianth often windowed in profile with gap between upper lateral and dorsal tepals; leaves always linear, 1–2 mm wide or terete to oval in section:
25a Flowers actinomorphic and unmarked, the perianth stellate with symmetrically disposed stamens ..... 97. *G. stellatus*
25b Flowers zygomorphic with lower tepals usually marked, the perianth bilabiate with arcuate stamens:
26a Perianth tube at least 1.5 times as long as dorsal tepal, 28–44 mm long; flowers white with ovate, acute tepals ..... 100. *G. robertsoniae*
26b Perianth tube less than 1.5 times as long as dorsal tepal; flowers variously coloured, often with lanceolate, attenuate tepals:
27a Tepals subequal, all recurved; perianth tube 16–30 mm long; filaments 6–10 mm long, included in tube or shortly exserted up to 2 mm; flowers greenish yellow, often flushed brown to purple on reverse, lower tepals unmarked ..... 96. *G. acuminatus*
27b Not as above:
28a Perianth not windowed in profile, not gaping between base of upper lateral and dorsal tepals; flowers usually unscented:
29a Leaves linear, green and evident at flowering ..... 98. *G. wilsonii*
29b Leaves terete or oval in section, dry and dead at flowering or those of new season emergent ..... 99. *G. inandensis*
28b Perianth windowed in profile, tepals ± clawed thus with a gap between base of upper lateral and dorsal tepals; flowers often scented:
30a Perianth tube shorter than dorsal tepal, 9–15 mm long:
31a Flowers whitish to dull grey, purple or brownish yellow; lower lateral tepals channelled and clawed below but not lobed ..... 92. *G. permeabilis*
31b Flowers bright yellow; lower lateral tepals with basal half of blade involute-tubular and auriculately lobed ..... 95. *G. karooicus*
30b Perianth tube longer than dorsal tepal, 22–35 mm long:
32a Perianth tube obliquely funnel-shaped; filaments ± 15 mm long; tepals acute; plants from Eastern Cape ..... 93. *G. uitenhagensis*
32b Perianth tube cylindric; filaments 11–12 mm long; tepals with ribbon-like apices; plants from Limpopo ..... 94. *G. sekukuniensis*

7. Sect. *Homoglossum*

1a Plants with only 3 leaves (including partly to entirely sheathing cauline leaves), lowermost longest with well-developed blade terete or cross-shaped in section or at least with midrib and margins heavily thickened; corm tunics often cartilaginous or woody, splitting from the base into claw-like sections:
2a Floral bracts 14–30 mm long, or if longer then perianth tube less than 25 mm long; perianth tube usually shorter than bracts but if longer then flowers pink with reddish markings on lower tepals:
3a Perianth almost actinomorphic with subequal tepals or only weakly zygomorphic and then white or yellow; markings confined to base of tepals:
4a Flowers white to yellow flushed dull purplish on reverse, sometimes with dark markings in throat, often scented; perianth tube 16–20 mm long; plants from seasonally wet habitats in Western Cape ..... 154. *G. trichonemifolius*
4b Flowers pink to mauve; perianth tube 8–12 mm long; plants from KwaZulu-Natal Drakensberg ..... 163. *G. symonsii*
3b Perianth zygomorphic and white to pink or purple; lower tepals marked near middle:

5a Lower lateral tepals with transverse yellow band or chevron outlined with purple; perianth tube strongly geniculate, up to half as long as dorsal tepal; corm tunics forming fibrous neck around base of stem . . . . . 150. *G. patersoniae*

5b Lower lateral tepals with median streak or diamond-shaped marking in red or yellow outlined with red; perianth tube usually curved, half as long as dorsal tepal or longer; corm tunics not forming fibrous neck around base of stem:

6a Flowers pale pink to whitish with red median streak on lower tepals; anthers purple; plants from Swartberg . . . . . 148. *G. nigromontanus*

6b Flowers purple or mauve to pink or whitish with diamond- or chevron-shaped markings on lower tepals; anthers grey to purple; plants from Cederberg to Langeberg:

7a Perianth tube 12–18(–30) mm long; flowers bell–trumpet-shaped with dorsal tepal ascending to hooded; filaments 12–18 mm long; flowering September to November, rarely into December . . . . . 146. *G. inflatus*

7b Perianth tube (25–)35–52 mm long; flowers salver-shaped with tepals spreading ± at right angles to tube; filaments 7–8 mm long; flowering December to January . . . . . 147. *G. cylindraceus*

2a Floral bracts (25–)30–80(–115) mm long; perianth tube at least 25 mm long, often as long as the bracts or longer:

8a Flowers white, cream-coloured, mauve, brown to dull purple or dull reddish orange, often scented in evening; perianth tube widening gradually from base to apex; filaments included in perianth tube or shortly exserted up to 5 mm:

9a Flowers mainly brown, dull purplish green or reddish orange; leaf blade oval in section with midrib and margins thickened, with 2 grooves on each surface:

10a Bracts short and not normally attenuate, 36–50 mm long; tepals obtuse to acute, upper 22–30 mm long; perianth tube 25–36 mm long; flowers not changing colour at night . . . . . 158. *G. hyalinus*

10b Bracts long and attenuate, 55–115 mm long; tepals attenuate, (31–)40–45 mm long; perianth tube 40–53 mm long; flowers changing colour at night . . . . . 159. *G. liliaceus*

9b Flowers white to cream-coloured or pale mauve, sometimes streaked or spotted with brown; leaves centric, terete or cross-shaped in section with 4 grooves or furrows:

11a Flowers pale mauve or opalescent, each lasting 1 day; bracts 22–25 mm long; plants from southern Namibia . . . . . 161. *G. diluvialis*

11b Flowers white to pale yellow, sometimes mottled brown, each lasting several days; bracts (25–)40–110 mm long; plants from South Africa:

12a Perianth tube up to 1.5 times as long as bracts; filaments (15–)18–25 mm long; plants from Bokkeveld Mtns to Port Elizabeth . . . . . 160. *G. tristis*

12b Perianth tube 1.3–3.0 times as long as bracts; filaments 5–13 mm long; plants from Swartberg to Limpopo . . . . . 162. *G. longicollis*

8b Flowers red to deep orange, the tepals sometimes marked with yellow or green, unscented; perianth tube narrow below stamen insertion, widening abruptly into a long, cylindric, horizontal upper portion; filaments exserted 4–15 mm from perianth tube:

13a Upper lateral tepals ±as long as to slightly longer than dorsal; leaf blades oblong to oval in section with midrib and margins thickened, with 2 grooves on each surface; corm tunics hard and ± woody, splitting below into claw-like segments:

14a Upper and lower lateral tepals lanceolate, more than twice as long as wide; lower leaf blade linear, oblong in section, (1.5–)3.0–5.0 mm wide; plants west of Hottentots Holland–Worcester axis . . . . 164. *G. watsonius*

14b Upper and lower lateral tepals ovate, up to twice as long as wide; lower leaf blade subterete, oval in section, 1–2 mm wide; plants east of Hottentots Holland–Worcester axis . . . . . 165. *G. teretifolius*

13b Upper lateral tepals half as long to slightly shorter than dorsal; leaves centric, terete or cross-shaped in section with 4 grooves or furrows; corm tunics cartilaginous to papery, splitting below into fibres:

15a Tepals lanceolate, upper laterals more than twice as long as wide; lower tepals uniformly red or orange; plants from Cold and Warm Bokkeveld . . . . . 166. *G. quadrangularis*

15b Tepals ovate to elliptic, upper laterals less than twice as long as wide; lower tepals with yellow to greenish markings; plants from Bot River to Grahamstown:

16a Dorsal tepal horizontal, boat-shaped, two to three times as long as upper laterals; lower tepals mostly dark green to reddish black, median shorter than laterals, 3–6 mm long . . . . . 169. *G. abbreviatus*

16b Dorsal tepal erect to inclined, less than 1.5 times as long as upper laterals; lower tepals mostly yellow, median as long as or slightly longer than laterals, 9–22 mm long:

17a Flowers larger, dorsal tepal 25–40 mm long; filaments 32–45 mm long; flowers mostly orange, upper part of tube with dark red longitudinal lines below sinuses on each sides of upper lateral tepals . . . . . 167. *G. huttonii*

17b Flowers smaller, dorsal tepal 15–20 mm long; filaments 26–32 mm long; flowers dull reddish or greenish, upper tepals veined with red to grey, and tube without longitudinal lines . . . . . 168. *G. fourcadei*

1b Plants with 2 to many leaves, if only 3 leaves then blade of the lowermost vestigial (much shorter than the sheathing part or lacking) or the blade with midrib and margins not or only lightly thickened; corm tunics various, woody or fibrous to papery or membranous:

18a Leaf sheaths and sometimes blades hairy:

19a Leaf blades centric and cross-shaped in section; flowers greenish to pale yellow without conspicuous dark markings on lower tepals . . . . . 155. *G. sufflavus*

19b Leaf blades linear with 1 or 2 raised veins, margins not thickened; flowers yellow with transverse brown to reddish markings on lower tepals . . . . . 156. *G. pritzelii*

18b Leaf sheaths and blades glabrous or scabridulous:

20a Leaf blades vestigial, lacking or less than 10 mm long:
21a Perianth tube cylindric, (22–)30–60 mm long. . . . . 149. *G. engysiphon*
21b Perianth tube funnel-shaped, 6–20 mm long:
22a Leaves 2, lowermost sheathing lower ⅔ of stem . . . . . 127. *G. vaginatus*
22b Leaves 2 to 4, all rather short:
23a Corm tunics fibrous; flowers blue, without a strong scent; leaves of non-flowering plants hairy . . . . . 151. *G. subcaeruleus*
23b Corm tunics softly membranous, not accumulating; flowers cream-coloured or pink to lilac, usually strongly scented; leaves on non-flowering plants glabrous:
24a Flowers mauve or pink; lower lateral tepals joined to upper laterals for 2–5 mm; flowering February to May; leaves of non-flowering plants 1(2) . . . . . 152. *G. martleyi*
24b Flowers cream-coloured, pale yellow or pale lilac; lower lateral tepals not joined to upper laterals; flowering November to January; leaves of non-flowering plants 2 or 3 . . . . . 153. *G. jonquilliodorus*
20b Leaf blades usually well-developed or short but always present:
25a Leaves linear, smooth and fleshy, midrib and margins not thickened:
26a Perianth tube shorter than bracts, 11–17 mm long; flowers pale blue or mauve to brown; filaments 10–15 mm long:
27a Leaves 4; tepals acute to obtuse; plants from Albertinia to Grahamstown . . . . . 125. *G. mutabilis*
27b Leaves 3; tepals acute to acuminate; plants from Ceres to Wellington . . . . . 126. *G. exilis*
26b Perianth tube slightly shorter than bracts to twice as long, 23–48 mm long; flowers red, pink, brownish or cream-coloured to yellow:
28a Perianth tube slender below, abruptly expanded at filament insertion into a cylindric upper part; flowers cream-coloured, pink or red, unscented; filaments 25–40 mm long:
29a Leaves 3; tepals ovate, laterals 15–17 mm wide; flowers yellow or pale to deep pink, not yellow in throat but lower tepals often darkly speckled basally. . . . . 130. *G. meridionalis*
29b Leaves (3)4; tepals lanceolate, laterals 10–12 mm wide; flowers red with yellow throat . . . . . 131. *G. priorii*
28b Perianth tube gradually expanding from base to apex; flowers cream-coloured to yellowish or brown to dull lilac or purple, scented; filaments 12–16 mm long:
30a Flowers dull yellow to lilac conspicuously mottled with brown to purple; perianth tube 23–37(–48) mm long, not or barely exserted from bracts. . . . . 128. *G. maculatus*
30b Flowers cream-coloured or white; perianth tube 37–65 mm long, well exserted from bracts . . . . . 129. *G. albens*
25b Leaves with midrib or margins thickened and raised:
31a Lower leaf blade H-shaped in section, with margins raised into wings of flanges extended at right angles to blade:
32a Perianth tube slightly shorter than to longer than bracts, 27–36 mm long; tepals attenuate and recurved, mostly pearl-grey to yellowish. . . . . 145. *G. recurvus*
32b Perianth tube shorter than bracts, 12–18 mm long; tepals ± acute, mostly blue (sometimes pink or grey to yellowish brown):
33a Leaves firm and narrow with marginal flanges arching over and almost concealing blade; lower tepals acute and streaked; flowers 2 to 7 per spike; mainly clay and granite soils in southwestern Western Cape . . . . . 143. *G. gracilis*
33b Leaves soft and broad with marginal flanges at right angles to blade; lower tepals obtuse and spotted; flowers (4)8 to 14 per spike; plants form West Coast limestone . . . . . 144. *G. caeruleus*
31b Lower leaf blade with margins weakly to strongly thickened but not raised into wings or flanges, or leaves reduced and clasping:
34a Upper cataphyll purple mottled with white:
35a Perianth actinomorphic and stellate, with subequal and spreading tepals. . . . . 124. *G. quadrangulus*
35b Perianth zygomorphic and bilabiate, with arched dorsal tepal and smaller lower tepals:
36a Flowers inflated and bell-like with sharply bent tube, lower tepals with transverse or median white or yellow mark; leaves (3)4; corm tunics firm-textured to almost woody, splitting into narrow strips below . . . . . 133. *G. rogersii*
36b Flowers funnel-shaped with curved tube, lower tepals pale yellow lightly streaked with lines or dots; leaves 3(4); corm tunics soft-textured and irregularly fragmented or somewhat fibrous:
37a Flowers larger, 37–54 mm long; perianth tube 13–16 mm long; flowering mainly late July to September. . . . . 122. *G. carinatus*
37b Flowers smaller, 22–36 mm long; perianth tube 6–10 mm long; flowering May to July . . . . . 123. *G. griseus*
34b Upper cataphyll uniformly coloured:
38a Flowers white to pink or pale blue-mauve with red to purple spots, streaks or diamond-shaped markings on lower tepals; leaves linear and usually with thickened margins:
39a Corm tunics membranous or papery to leathery, becoming fibrous with age:
40a Flowers whitish to pale pink, lower tepals feathered with deep red basally; perianth tube 36–44 mm long; corm tunics firm-papery to leathery, becoming fibrous; plants from Outeniqua Mtns . . . . . 121. *G. roseovenosus*
40b Flowers deep pink, lower tepals with pale median streak edged in darker pink; perianth tube 18–2 mm long; corm tunics soft-textured, membranous; plants from Cape Peninsula and nearby . . . . . 140. *G. ornatus*
39b Corm tunics woody, splitting below into claw-like segments:
41a Perianth tube 35–40 mm long, usually ± 1.5 times as long as bracts . . . . . 139. *G. vigilans*
41b Perianth tube 10–24 mm long, slightly shorter than to ± 1.5 times as long as bracts:

42a Leaves 3(4); floral bracts smooth, not ridged along veins; dorsal tepal 25–30 mm long; lower tepals with large red spots unevenly spread across basal half . . . . . 138. *G. variegatus*
42b Leaves 4; floral ridged along veins:
43a Filaments 4–10 mm long; dorsal tepal 17–27 mm long; flowers white (rarely pale pink) with red markings on lower tepals . . . . . .137. *G. debilis*
43b Filaments 12–16 mm long; dorsal tepal 28–44 mm long; flowers pale to deep pink or blue-mauve:
44a Perianth tube obliquely funnel-shaped, 13–24 mm long; lower tepals cream-coloured to pale yellow with dark longitudinal lines or spots . . . . . 135. *G. blommesteinii*
44b Perianth tube narrowly funnel-shaped to cylindric, 22–27 mm long; lower tepals with darker V-shaped markings . . . . . 136. *G. virgatus*
38b Flowers blue, yellow or orange to salmon or scarlet; leaves various:
45a Flowers yellow or orange to salmon or scarlet:
46a Perianth almost actinomorphic, orange; perianth tube 2.4–4.0 mm long . . . . . .132. *G. brevitubus*
46b Perianth zygomorphic and bilabiate, pale to bright yellow; perianth tube 8–14 mm long:
47a Flowers bright yellow; upper tepals lanceolate-attenuate; perianth tube 11–14 mm long; plants from Heerenlogement Mtn, flowering June and July . . . . . 120. *G. comptonii*
47b Flowers pale creamy yellow; upper tepals ovate; perianth tube ± 8 mm long; plants from Cederberg, flowering December and January . . . . . .157. *G. delpierrei*
45b Flowers blue to mauve:
48a Leaves 3:
49a Flowers irregularly mottled with purple, without transverse yellow or white markings on lower tepals; tepals lanceolate . . . . . 141. *G. inflexus*
49b Flowers veined with purple, with transverse yellow or white markings on lower tepals; tepals ovate . . . . . .142. *G. taubertianus*
48b Leaves 4 or 5:
50a Flowers obliquely funnel-shaped; tepals lanceolate-attenuate; perianth tube curved:
51a Leaf blade plane and identical on both surfaces; tepals violet and not darkly veined; plants from Riviersonderend Mtns . . . . . 118. *G. atropictus*
51b Leaf blade with midrib raised as a wing on one side, blade thus triangular in section; tepals pale blue with violet veins; plants from Gifberg to Cederberg . . . . . .119. *G. violaceolineatus*
50b Flowers inflated and bell-shaped; tepals lanceolate to ovate, obtuse to acute; perianth tube sharply bent:
52a Flowers usually 3 or more per spike; floral bracts smooth, not attenuate, 15–22 mm long . . . . . .133. *G. rogersii*
52b Flowers 1 or 2 per spike; floral bracts ridged and attenuate, mostly 30–50 mm long . . . . 134. *G. bullatus*

Regional Keys

A. Species from northern Namibia, Botswana, Eswatini and the northern provinces of South Africa (Northwest, Gauteng, Mpumalanga and Limpopo)

1a Upper lateral tepals much reduced, less than half as long as dorsal; flowers red:
2a Perianth tube 11–20 mm long, upper part shortly spurred; dorsal tepal spoon-shaped . . . . . 91. *G. saccatus*
2b Perianth tube 25–30 mm long, upper part cylindric; dorsal tepal oblanceolate and boat-shaped . . . . . .33. *G. magnificus*
1b Upper lateral tepals not reduced, slightly shorter to slightly longer than dorsal; flowers never red:
3a Leaf blades terete or oval in section and narrowly 4-grooved with midrib and margins strongly thickened:
4a Perianth tube cylindric, expanded only near apex, 25–150 mm long:
5a Flowers mauve to pink; perianth tube 25– 40 mm long; plants from near Zeerust . . . . . 79. *G. filiformis*
5b Flowers white to cream-coloured; perianth tube 100– 150 mm long; plants from Gauteng eastward . . . . 162. *G. longicollis*
4b Perianth tube obliquely funnel-shaped, 11–14 mm long:
6a Floral bracts rusty brown on margins; flowers cream-coloured densely speckled with red; flowering mainly March and April . . . . . .80. *G. rufomarginatus*
6b Floral bracts and flowers not as above:
7a Leaves dry and withered at flowering; lower tepals spathulate . . . . . 81. *G. vernus*
7b Leaves green at flowering; lower tepals oblanceolate:
8a Flowers orange-red with conspicuous yellow transverse band on lower tepals; leaves linear with two grooves on each surface . . . . . 77. *G. rubellus*
8b Flowers pink to mauve; leaves terete to subterete with four narrow grooves . . . . . 78. *G. pretoriensis*
3b Leaf blades plane with midrib and margins variously thickened:
9a Margins of inner bracts united below into a short tube enclosing ovary:
10a Perianth tube 33–35 mm long; lower tepals streaked with red and base of filaments dull red . . . . . 20. *G. reginae*
10b Perianth tube 10–27 mm long; lower tepals not streaked and filaments pale:
11a Leaves in a tight basal fan usually shorter than spike, with numerous fine parallel veins and without a prominent midrib; plants never hairy . . . . . .26. *G. elliotii*
11b Leaves in a lax fan usually arising some distance above ground with a pseudostem formed by the sheaths, narrow and usually exceeding the spike, always with a prominent midrib and sometimes also secondary veins; plants usually hairy:
12a Perianth tube 18–27 mm long; tepals elliptic-attenuate; bracts 26–30 mm long, attenuate . . . . *22. G. dolomiticus*

12b Perianth tube 10–16 mm long; tepals lanceolate-acute; bracts 15–30 mm long, ± acute:
13a Filaments 10–12 mm long; bracts ± two internodes long . . . . . 25. *G. sericeovillosus*
13b Filaments 18–20 mm long, reaching almost to tepal apices; bracts one to one and a half internodes long . . . . . 23. *G. pole-evansii*
9b Margins of inner bracts free to base:
14a Leaves superposed along stem with blades reduced or shorter than sheaths:
15a Plants robust, stem 3–4 mm diam. below base of spike; flowers 70–100 mm long, orange usually with reddish flecks; foliage leaves superposed along stem, blades variously developed . . . . . 31. *G. aurantiacus*
15b Plants not as above:
16a Cataphylls and leaves smooth:
17a Flowers small, 28–30 mm long, cream-coloured to mauve or purple; perianth tube 10–11 mm long . . . . . 76. *G. oatesii*
17a Flowers larger, 48–50 mm long, pink with white markings; perianth tube ± 20 mm long . . . 21. *G. brachyphyllus*
16a Upper cataphyll and sometimes leaf sheaths and blades distinctly hairy:
18a Leaves 2 or 3, uppermost bract- or scale-like; perianth subactinomorphic with subequal tepals; tepals lanceolate-attenuate, not clawed . . . . . 62. *G. pubiger*
18b Leaves (2)3 or 4; perianth obviously zygomorphic with lower tepals smaller; lower lateral tepals obviously clawed:
19a Flowers pale yellow; outer whorl of tepals constricted below into claws; lower tepals strongly auriculate at base of limb; vegetative plants with 3 leaves . . . . . 61. *G. pardalinus*
19b Not as above:
20a Flowers pale lilac to cream-coloured, yellow or maroon, the lower lateral tepals with dark purple median streak; flowers smaller, dorsal tepal 17–24(–27) mm long; foliage usually densely villous . . . . 59. *G. woodii*
20b Flowers pale mauve, the lower lateral tepals shading to purple basally; flowers larger, dorsal tepal 28–30 mm long; foliage sparsely hairy to nearly smooth . . . . . 60. *G. malvinus*
14b Leaves clustered at base of stem, with well-developed blades much longer than sheaths:
21a Anthers with locules drawn into sterile basal tails at least 1.5 mm long:
22a Perianth tube 40–45 mm long, at least one and a half times as long as dorsal tepal; tepals attenuate; flowers whitish to pale salmon-pink, lower tepals with median red streak . . . . . 13. *G. macneilii*
22b Perianth tube 15–32(–40) mm long, shorter than to ± as long as dorsal tepal; tepals ± obtuse; flowers white to pink without median streak on lower tepals:
23a Floral bracts 18–27 mm long; flowers white to pink; perianth tube 16–22 mm long. . . . . 11. *G. appendiculatus*
23a Floral bracts 35–55 mm long; flowers white with yellow throat; perianth tube 16–40 mm long . . . 12. *G. calcaratus*
21b Anthers without sterile basal tails:
24a Leaves linear, blades 2–4 mm wide, margins only lightly thickened:
25a Perianth not windowed in profile, not gaping between base of upper lateral and dorsal tepals; flowers with ovate, acute tepals and cylindric perianth tube 28–44 mm long . . . . . 100. *G. robertsoniae*
25b Perianth windowed in profile, tepals ± clawed thus with a gap between base of upper lateral and dorsal tepals; tepals lanceolate with attenuate, ribbon-like apices:
26a Perianth tube shorter than dorsal tepal, 9–15 mm long . . . . . 92. *G. permeabilis*
26b Perianth tube longer than dorsal tepal, 22–35 mm long . . . . . 94. *G. sekukuniensis*
24b Leaves narrowly lanceolate to lanceolate or rarely linear but margins always thickened, usually more than 5 mm wide:
27a Flowers pink to mauve, lower tepals with longitudinal reddish streaks; perianth tube 20–50 mm long:
28a Stem, rachis and bracts scabrid . . . . . 17. *G. scabridus*
28b Stem rachis and bracts smooth:
29a Leaves 3–9 mm wide, with prominently thickened midrib and margins, with fine, closely set veins between; dorsal tepal 26–32 mm long; bracts rusty brown above or entirely . . . . . 10. *G. varius*
29b Leaves broader, with prominent secondary veins between margins and midrib; dorsal tepal 35–48 mm long; bracts green throughout or dry above:
30a Bracts 50–70 mm long, green; perianth tube 40–50 mm long; dorsal tepal 40–48 mm long; lower tepals with prominent median red streak . . . . . 18. *G. cataractarum*
30b Bracts 38–48 mm long, rusty brown above; perianth tube 30–40 mm long; dorsal tepal 35–37 mm long; lower tepals with obscure median mark . . . . . 9. *G. saxatilis*
27b Flowers variously coloured but if pink then perianth tube less than 20 mm long:
31a Perianth tube 25–70 mm long; filaments 20–40 mm long:
32a Dorsal tepal 25–30 × 14–16 mm, ascending and not hooded over stamens; anthers 9–11 mm long . . . . . 30. *G. antholyzoides*
32b Dorsal tepal 35–50 × 22–30 mm, horizontal and hooded over stamens; anthers 12–16 mm long . . . . . 32. *G. dalenii*
31b Perianth tube 10–35 mm long; filaments usually 7–18 mm long, rarely up to 22 mm long but then flowers nodding and bell-shaped with perianth tube 18–20 mm long:
33a Floral bracts overlapping, 2 to 5 internodes long, somewhat inflated and folded on the midline, mostly 40–100 mm long; flowers often speckled or spotted over a pale ground, rarely pure white or pale mauve:
34a Leaves lanceolate, in a tight basal fan, rarely reaching base of spike; filaments 12–15 mm long . . . . . 27. *G. ecklonii*
34b Leaves linear-lanceolate, reaching at least to base of spike; filaments 7–12 mm long:

35a Flowers speckled or spotted with lilac to dark purple; anthers 10–13 mm long; style branches 3–4 mm long . . . . . 28. *G. vinosomaculatus*
35b Flowers uniformly white to pale mauve; anthers ±10 mm long; style branches 6–8 mm long . . . . . 29. *G. rehmannii*
33b Floral bracts not or shortly imbricate, up to two internodes long, hardly or not inflated or folded on the midline, mostly 20–40 mm long; flowers mostly uniformly coloured, rarely minutely speckled:
36a Flowers 40–55 mm long:
37a Perianth tube 18–30 mm long and ± as long as or slightly longer than dorsal tepal . . . . 4. *G. hollandii*
37b Perianth tube 10–20 mm long and ½ to ± ⅔ as long as dorsal tepal:
38a Bracts dry and rusty brown above; leaves mostly less than 10 mm wide, with thickened midrib and margins, and remaining veins fine and closely set . . . . . 8. *G. ferrugineus*
38b Bracts green; leaves with secondary veins conspicuous or inconspicuous but not closely set:
39a Flowers not nodding on a strongly inclined spike, flaring, pink with red streaks on lower tepals and red throat; filaments ± 16 mm long; plants usually of marshy sites . . . . . 19. *G. pavonia*
39b Flowers nodding on a strongly inclined spike, bell-shaped, cream-coloured to dull purple or greenish, usually with large dark blotch on lower tepals; filaments 20–22 mm long; plants usually of marshy sites . . . . . 2. *G. papilio*
36b Flowers 23–40 mm long:
40a Leaves with only midrib and margins thickened, sometimes strongly so, remaining veins fine and closely set:
41a Leaves several in a tight basal fan shorter than spike; upper stem and spike strongly inclined; filaments ± 15 mm long . . . . . 6. *G. exiguus*
41b Plants not as above:
42a Bracts green or flushed dull purple; spike usually with 20–45 flowers; filaments 10–12 mm long . . . . . 7. *G. densiflorus*
42b Bracts dry and rusty brown above or entirely; spike usually with 12–15 flowers; filaments 12–15 mm long . . . . . 8. *G. ferrugineus*
40b Leaves with midrib and margins thickened and at least one pair of secondary veins thickened, or secondary veins obscure and not closely set:
43a Floral bracts 12–16 mm long, narrow and attenuate, dry and twisted above at flowering; flowers pale pink, lower tepals usually with median yellow streak surrounded by broad pink blotch . . . . . 5. *G. serpenticola*
43b Floral bracts 17–40 mm long, acute to attenuate, green; flowers variously coloured, lower lateral tepals often with broad transverse blotch:
44a Flowers larger, dorsal tepal 20–25 mm long; filaments ± 14 mm long; plants mostly 40–50 mm high; leaves without conspicuous secondary veins; flowering October to November . . . . . 1. *G. paludosus*
44a Flowers smaller, dorsal tepal 18–22 mm long; filaments 12–14 mm long; plants mostly 50–120 mm high; leaves fibrous with conspicuous secondary veins; flowering mainly February to March . . . . . 3. *G. crassifolius*

B. Species from Lesotho, Eswatini and the southeastern South Africa (east of Port Elizabeth)

1a Leaf blades terete or oval in section and narrowly 4-grooved with midrib and margins strongly thickened:
2a Leaves several, dry and withered at flowering; lower tepals spathulate . . . . . 81. *G. vernus*
2b Leaves 3, upper 2 sheathing the stem, green at flowering:
3a Perianth almost actinomorphic with subequal tepals, pink to lilac; perianth tube less than 15 mm long . . . . . 163. *G. symonsii*
3b Perianth ± zygomorphic with lower tepals usually smaller than upper; perianth tube more than 40 mm long:
4a Flowers white to cream-coloured or yellow with brown markings, scented at night; perianth tube widening gradually from base; filaments less than 10 mm long . . . . . 162. *G. longicollis*
4b Flowers orange, unscented; perianth tube slender below widening abruptly into cylindrical upper part; filaments more than 20 mm long . . . . . 167. *G. huttonii*
1b Leaf blades plane with midrib and margins variously thickened or reduced and shorter than sheaths:
5a Leaves 2 to 4, superposed, with distinctly hairy sheaths and reduced blades shorter than sheaths or vestigial; perianth tube up to 1.5 times as long as bracts:
6a Leaves (2)3 or 4; perianth obviously zygomorphic with lower tepals smaller and lower lateral tepals obviously clawed . . . . . 59. *G. woodii*
6b Leaves 2 or 3, uppermost bract- or scale-like; perianth subactinomorphic with subequal tepals, elliptic to lanceolate, not clawed:
7a Flowers greenish or pale mauve with attenuate tepals 17–23 mm long; uppermost leaf bract-like and inserted some distance below first flower; stem rigid . . . . . 62. *G. pubiger*
7b Flowers pale pink with acute to obtuse tepals 12–17 mm long; uppermost leaf a small scale inserted just below first flower; stem wiry . . . . . 63. *G. parvulus*
5b Leaves and flowers not as above:
8a Flowers red to carmine with white markings on lower tepals:
9a Perianth sigmoid, flowers obliquely tulip-shaped with lower tepals forming a shallow bowl; tepals 30–42 mm long, thick and succulent in texture, lower tepals with median white streak . . . . . 34. *G. flanaganii*

9b Perianth ± straight or curved apically, flowers flaring with lower tepals straight or recurved; tepals 45–67 mm long, moderately thin and delicate, lower tepals white in lower half speckled with red:
10a Stems erect; leaves firm-textured, in an erect basal fan shorter than stem, drooping; tepals ± recurved distally; plants of the Drakensberg and Lesotho ..... 35. *G. saundersii*
10b Stems inclined or drooping; leaves soft-textured, as long as or longer than stem, drooping; tepals suberect or spreading; plants from coastal KwaZulu-Natal ..... 36. *G. cruentus*
8b Flowers never carmine to red, lower tepals variously coloured and marked:
11a Leaves 3 or 4, superposed or inserted serially up stem; blades without thickened midrib or margins, firm-textured, linear and rather short, up to 3 mm wide:
12a Perianth tube shorter than bracts, widely 11–17 mm long; flowers pale blue or mauve to brown; filaments 10–15 mm long ..... 125. *G. mutabilis*
12b Perianth tube slightly shorter than bracts to twice as long, 23–48 mm long; flowers brownish or cream-coloured to yellow:
13a Perianth tube slender below, abruptly expanded at filament insertion into a cylindric upper part; flowers cream-coloured, pink or red, unscented; filaments 25–40 mm long ..... 130. *G. meridionalis*
13b Perianth tube gradually expanding from base to apex; flowers cream-coloured to yellowish or brown to dull lilac or purple, scented; filaments 12–16 mm long:
14a Flowers dull yellow to lilac conspicuously mottled with brown to purple; perianth tube 23–37(–48) mm long, not or barely exserted from bracts ..... 128. *G. maculatus*
14b Flowers cream-coloured or white; perianth tube 37–65 mm long, well exserted from bracts ..... 129. *G. albens*
11b Leaves various but midrib and sometimes margins thickened:
15a Flowers uniformly pink to mauve, lower tepals with longitudinal reddish streaks; perianth tube 25–50 mm long:
16a Margins of inner bracts united below in a short tube around ovary ..... 24. *G. oppositiflorus*
16b Margins of inner bracts free to base:
17a Leaves and stems glabrous ..... 15. *G. mortonius*
17b Leaves and/or stems scabrid to puberulous:
18a Stem, rachis and bracts glabrous; dorsal tepal 35–40 mm long; plants drooping from cliffs ..... 16. *G. microcarpus*
18b Stem, rachis and bracts scabrid: dorsal tepal 40–45 mm long; plants erect on stony slopes and outcrops ..... 17. *G. scabridus*
15b Not as above, long-tubed species white or speckled but never pink:
19a Leaves linear or narrowly lanceolate, up to 10 mm wide, margins not thickened or raised (rarely lightly thickened but then tepals markedly attenuate):
20a Perianth tube 28–44 mm long, at least 1.5 times as long as dorsal tepal; dorsal tepal shorter than upper laterals ..... 100. *G. robertsoniae*
20b Perianth tube 9–28 mm long, less than 1.5 times as long as dorsal tepal; dorsal tepal shorter or longer than upper laterals:
21a Tepals equal or subequal, mauve; leaves subsucculent, without evident veins; strand plants growing above high-tide zone ..... 40. *G. gueinzii*
21b Tepals unequal, flowers ± zygomorphic; plants otherwise not as above:
22a Filaments strongly arched, 20–25 mm long; dorsal tepal narrowly oblanceolate ..... 108. *G. orchidiflorus*
22b Filaments ascending to slightly curved, 7–16 mm long; dorsal tepal oblanceolate to obovate:
23a Perianth windowed in profile, gaping between dorsal and upper lateral tepals; tepals ± clawed ..... 92. *G. permeabilis*
23b Perianth not windowed in profile, not gaping between dorsal and upper lateral tepals; tepals not clawed:
24a Lower lateral tepals much shorter than median; upper lateral tepals flexed upward to overlap dorsal on either side:
25a Leaves narrowly lanceolate, 4–8 mm wide, soft-textured; flowers lilac with purple feathering on lower tepals; dorsal tepal slightly longer than upper laterals; perianth tube ± 5 mm long; plants from KwaZulu-Natal Drakensberg ..... 86. *G. loteniensis*
25b Leaves linear, 2–3 mm wide, firm-textured; flowers white or flushed pink, lower lateral tepals greenish yellow in lower half; dorsal tepal much shorter than upper laterals; perianth tube 16–18 mm long; plants from Western and Eastern Cape ..... 87. *G. involutus*
24b Lower lateral tepals ± as long as median or only slightly shorter; upper lateral tepals not flexed upward to overlap dorsal on either side:
26a Leaves linear, green and evident at flowering ..... 98. *G. wilsonii*
26b Leaves terete or oval in section, dry and dead at flowering or those of new season emergent ..... 99. *G. inandensis*
19b Leaves narrowly lanceolate to lanceolate, more than 10 mm wide, margins thickened or raised:
27a Perianth tube 25–70 mm long; filaments 20–40 mm long:
28a Spike strongly inclined; flowers funnel-shaped, cream-coloured to greenish with dark median streak on tepals ..... 57. *G. floribundus*
28b Spike erect; flowers pale yellow, orange to red, or brownish green, lower tepals often yellowish below, without dark median streak:
29a Leaves superposed along stem, with blades shorter than to ± as long as sheaths ..... 31. *G. aurantiacus*
29b Leaves clustered at base of stem forming a 2-ranked fan, blades well-developed:
30a Dorsal tepal 25–30 × 14–16 mm, ascending and not hooded over stamens; anthers 9–11 mm long ..... 30. *G. antholyzoides*

30b Dorsal tepal 35–50 × 22–30 mm, horizontal and hooded over stamens; anthers 12–16 mm long . . . . . 32. *G. dalenii*
27b Perianth tube 10–35 mm long; filaments 10–18(–22) mm long:
31a Spike 2-ranked and erect; margins of inner bracts united below and tubular around ovary:
32a Leaves in a lax fan usually arising some distance above ground with a pseudostem formed by the sheaths, narrow and usually exceeding the spike, always with a prominent midrib and sometimes also secondary veins; plants usually hairy . . . . . 25. *G. sericeovillosus*
32b Leaves in a tight basal fan usually shorter than spike, with numerous fine parallel veins and without a prominent midrib; plants never hairy . . . . . 26. *G. elliotii*
31b Spike ± secund and inclined; margins of inner bracts free to base:
33a Floral bracts imbricate, 2 to 3 internodes long, somewhat inflated and folded along midline, 40–80 mm long; flowers entirely dotted or blotched . . . . . 27. *G. ecklonii*
33b Floral bracts weakly imbricate, 1 to 2 internodes long, not or hardly inflated or folded along midline, 12–40 mm long; flowers unspotted or rarely minutely speckled:
34a Anther locules drawn into sterile basal tails or spurs 3–4 mm long . . . . . 11. *G. appendiculatus*
34b Anther locules acute or obtuse:
35a Flowers 40–55 mm long:
36a Leaves ± superposed and not forming a tight basal fan; flowers nodding on a sharply inflexed spike; filaments 20–22 mm long . . . . . 2. *G. papilio*
36b Leaves in a tight basal fan; flowers secund on a lightly inclined spike; filaments 10–12 mm long . . . . . 14. *G. ochroleucus*
35b Flowers 23–38(–40) mm long:
37a Leaves with midrib and margins plus one or more pairs of secondary veins thickened . 3. *G. crassifolius*
37b Leaves with only midrib and margins thickened, secondary veins fine and closely spaced . . . . . 7. *G. densiflorus*

C. Species from the winter and adjacent aseasonal rainfall regions of southwestern Namibia and South Africa (western parts of Northern Cape and Western Cape, and southwestern part of Eastern Cape west of Port Elizabeth)

1a Flowers strongly zygomorphic with upper lateral and lower median tepals cordate at base and shortly stalked; filaments long and strongly arched, rarely shorter but then pilose; sutures between tepals raised into iridescent, papillate ridges ('*kalkoentjies*'):
2a Flowers orange to scarlet or salmon-pink; stems angled or winged; floral bracts sharply folded or keeled along midline:
3a Basal leaf plane, broadly lanceolate, 20–40 mm wide, margins thickened and often reddish, lower leaves often obtuse and apiculate. . . . . 113. *G. equitans*
3b Basal leaf plane or ridged, ± 2–12 mm wide, margins not or lightly thickened and never reddish, lower leaves acute or attenuate:
4a Leaf blades plane, midrib and other veins barely evident and not raised; stamens and style sparsely pilose or glabrous distally:
5a Dorsal tepal strongly hooded and concave; upper lateral tepals weakly spreading distally, limbs virtually sessile, often with large yellow blotch on reverse; stamens and style glabrous distally . . . . . 114. *G. speciosus*
5b Dorsal tepal inclined or suberect, ± plane; upper lateral tepals spreading with claws 3–4 mm long;, uniformly salmon-orange on reverse; stamens and style sparsely pilose . . . . . 115. *G. pulcherrimus*
4b Leaf blades ribbed, midrib and sometimes other veins thickened and raised; stamens and style sparsely pilose:
6a Flowers orange to scarlet, lower tepals predominantly yellowish green with orange tips; filaments 20–26 mm long . . . . . 116. *G. alatus*
6b Flowers salmon-pink to brick-red, lower lateral tepals with small yellow mark edged reddish black distally; filaments ± 15 mm long . . . . . 117. *G. meliusculus*
2b Flowers green or grey to purple or brownish or pale yellow, rarely pale pink but then strongly veined with dark colour; stems terete; floral bracts not folded or keeled:
7a Leaf blades plane, midrib and other veins barely evident and not raised:
8a Dorsal tepal arched in a semi-circle over stamens, margins not recurved; leaves (4)5 to 8(10); corm producing small cormlets at base . . . . . 108. *G. orchidiflorus*
8b Dorsal tepal erect, margins recurved; leaves 3; corm producing long stolons terminating in a large cormlet . . . . . 112. *G. uysiae*
7b Leaf blades ribbed or terete, midrib and sometimes other veins thickened and raised:
9a Dorsal tepal boat-shaped and horizontal thus concealing stamens, partly translucent; leaf blades with several equal ribs, thus corrugate . . . . . 109. *G. watermeyeri*
9b Dorsal tepal erect to slightly inclined exposing stamens, not partly translucent; leaf blades with midrib more prominent than veins, thus not corrugate:
10a Leaves not completely imbricate, exposing the stem below the uppermost leaf, sometimes only very slightly; corm tunics pale and soft, almost membranous; plants from Breede River Valley to Long Kloof . . . . . 110. *G. virescens*
10b Leaves imbricate and completely sheathing lower part of stem; corm tunics dark and firm-textured, almost woody; plants from Knersvlakte, Cold Bokkeveld and Roggeveld . . . . . 111. *G. ceresianus*
1b Flowers actinomorphic or weakly to strongly zygomorphic but upper lateral and lower median tepals not or obscurely cordate and stalked; filaments short to long, horizontal, ascending or strongly arched but always glabrous; sutures between tepals never raised into papillate ridges:

11a Plants with only 3 leaves (including partly to entirely sheathing cauline leaves), lowermost longest and with well-developed blade, linear with main vein and margins strongly thickened or terete to cross-shaped in section; corm tunics coarsely fibrous or hard and woody, splitting below into segments:
12a Floral bracts 14–30 mm long, or if longer then perianth tube less than 25 mm long; perianth tube usually shorter than bracts but if longer then flowers pink with red markings on lower tepals:
13a Perianth actinomorphic or only weakly zygomorphic, white to yellow with purple on reverse and purple markings at base of tepals; flowers often scented; plants of seasonally marshy flats ..... 154. *G. trichonemifolius*
13b Perianth zygomorphic and white to pink or purple, with markings near middle of lower tepals:
14a Lower lateral tepals with transverse yellow band or chevron outlined with purple; perianth tube strongly geniculate, up to half as long as dorsal tepal; corm tunics forming fibrous neck around base of stem ..... 150. *G. patersoniae*
14b Lower lateral tepals with median streak or diamond-shaped marking in red or yellow outlined with red; perianth tube usually curved, half as long as dorsal tepal or longer; corm tunics not forming fibrous neck around base of stem:
15a Flowers pale pink to whitish with red median streak on lower tepals; anthers purple; plants of the Swartberg. ..... 148. *G. nigromontanus*
15b Flowers purple or mauve to pink or whitish with diamond- or chevron-shaped markings on lower tepals; anthers grey to purple; plants from Cederberg to Langeberg:
16a Perianth tube 12–18(–30) mm long; flowers bell–trumpet-shaped with dorsal tepal ascending to hooded; filaments 12–18 mm long; flowering September to November, rarely into December ..... 146. *G. inflatus*
16b Perianth tube (25–)35–52 mm long; flowers salver-shaped with tepals spreading ± at right angles to tube; filaments 7–8 mm long; flowering December to January ..... 147. *G. cylindraceus*
12b Floral bracts (25–)30–115 mm long; perianth tube at least 25 mm long and often ± as long as bracts or longer:
17a Flowers white, cream-coloured, mauve, brown to dull purple or dull reddish orange, often scented in evening; perianth tube widening gradually from base to apex; filaments included in perianth tube or shortly exserted up to 5 mm:
18a Flowers mainly brown, dull purplish green or reddish orange; leaf blade oval in section with midrib and margins thickened, with 2 grooves on each surface:
19a Bracts short and not normally attenuate, 36–50 mm long; tepals obtuse to acute, upper 22–30 mm long; perianth tube 25–36 mm long; flowers not changing colour at night ..... 158. *G. hyalinus*
19b Bracts long and attenuate, 55–115 mm long; tepals attenuate, (31–)40–45 mm long; perianth tube 40–53 mm long; flowers changing colour at night ..... 159. *G. liliaceus*
18b Flowers white to cream-coloured or pale mauve, sometimes streaked or spotted with brown; leaves centric, terete or cross-shaped in section with 4 grooves or furrows:
20a Flowers pale mauve or opalescent, each lasting 1 day; bracts 22–25 mm long; plants from southern Namibia ..... 161. *G. diluvialis*
20b Flowers white to pale yellow, sometimes mottled brown, each lasting several days; bracts (25–)40–110 mm long; plants from South Africa:
21a Perianth tube up to 1.5 times as long as bracts; filaments (15–)18–25 mm long; plants from Bokkeveld Mtns to Port Elizabeth. ..... 160. *G. tristis*
21b Perianth tube 1.3–3.0 times as long as bracts; filaments 5–13 mm long; plants from Swartberg to Limpopo. ..... 162. *G. longicollis*
17b Flowers red to deep orange, the tepals sometimes marked with yellow or green, unscented; perianth tube narrow below stamen insertion, widening abruptly into a long, cylindric, horizontal upper portion; filaments exserted 4–15 mm from perianth tube:
22a Upper lateral tepals ±as long as to slightly longer than dorsal; leaf blades oblong to oval in section with midrib and margins thickened, with 2 grooves on each surface; corm tunics hard and ± woody, splitting below into claw-like segments:
23a Upper and lower lateral tepals lanceolate, more than twice as long as wide; lower leaf blade linear, oblong in section, (1.5–)3.0–5.0 mm wide; plants west of Hottentots Holland–Worcester axis ..... 164. *G. watsonius*
23b Upper and lower lateral tepals ovate, up to twice as long as wide; lower leaf blade subterete, oval in section, 1–2 mm wide; plants east of Hottentots Holland–Worcester axis ..... 165. *G. teretifolius*
22b Upper lateral tepals half as long to slightly shorter than dorsal; leaves centric, terete or cross-shaped in section with 4 grooves or furrows; corm tunics cartilaginous to papery, splitting below into fibres:
24a Tepals lanceolate, upper laterals more than twice as long as wide; lower tepals uniformly red or orange; plants from Cold and Warm Bokkeveld ..... 166. *G. quadrangularis*
24b Tepals ovate to elliptic, upper laterals less than twice as long as wide; lower tepals with yellow to greenish markings; plants from Bot River to Grahamstown:
25a Dorsal tepal horizontal, boat-shaped, two to three times as long as upper laterals; lower tepals mostly dark green to reddish black, median shorter than laterals, 3–6 mm long ..... 169. *G. abbreviatus*
25b Dorsal tepal erect to inclined, less than 1.5 times as long as upper laterals; lower tepals mostly yellow, median as long as or slightly longer than laterals, 9–22 mm long:
26a Flowers larger, dorsal tepal 25–40 mm long; filaments 32–45 mm long; flowers mostly orange, upper part of tube with dark red longitudinal lines below sinuses on each side of upper lateral tepals ..... 167. *G. huttonii*
26b Flowers smaller, dorsal tepal 15–20 mm long; filaments 26–32 mm long; flowers dull reddish or greenish, upper tepals veined with red to grey, and tube without longitudinal lines ..... 168. *G. fourcadei*

11b Plants with 2 to several leaves, if only 3 then lowermost either bladeless or with vestigial blade shorter than sheath, or if blade well developed then with midrib and margins not or only lightly thickened; corm tunics various:
27a Upper cataphyll, usually leaf sheaths and sometimes blades distinctly pubescent; perianth tube up to 1.5 times as long as bracts; leaves 2 to 4, not in a basal fan:
28a Leaf blades glabrous; flowers yellow or greenish:
29a Leaf blades centric and cross-shaped in section; flowers greenish to pale yellow without conspicuous dark markings on lower tepals. . . . . 155. *G. sufflavus*
29b Leaf blades linear with 1 or 2 raised veins, margins not thickened; flowers yellow with transverse brown to reddish markings on lower tepals . . . . . .156. *G. pritzelii*
28b Leaf blades hairy; flowers variously coloured:
30a Lower tepals spathulate, clawed below and abruptly expanded into limbs:
31a Leaf blades cross-shaped in section; flowers pale bluish, 33–40 mm long . . . . . 83. *G. marlothii*
31b Leaf blades plane; flowers pink with lower tepals marked pale green, ± 30 mm long. . . . . 84. *G. mostertiae*
30b Lower tepals not obviously clawed below:
32a Flowers yellow to orange or scarlet; perianth tube longer than bracts, slender below and abruptly expanded above into flared or broadly cylindric upper part:
33a Flowers bright yellow; upper part of perianth tube flared; filaments 9–12 mm long . . . . . .71. *G. aureus*
33b Flowers orange to scarlet, rarely yellow; upper part of perianth tube subcylindric; filaments 28–32 mm long:
34a Leaves pubescent; tepals subequal, broadly obovate to suborbicular; plants of the Cape Peninsula. . . . . .70. *G. merianellus*
34b Leaves scabrid; tepals unequal, lower 3 smaller and elliptic; plants from Overberg . . . . . 69. *G. overbergensis*
32b Flowers pink, cream-coloured, purple or dull red to brownish; upper part of perianth tube gradually expanded and flared toward mouth:
35a Perianth tube cylindric for most of its length and expanded only in upper ⅕; tepals lanceolate, acute, not crisped or undulate . . . . . 66. *G. rhodanthus*
35b Perianth tube obliquely funnel-shaped and expanded only in upper ⅓–½; tepals ovate, obtuse, margins crisped or undulate:
36a Flowers brownish purple or dull pink to dull reddish brown, the lower tepals yellowish or ochre and mottled with brown; flowering April to July. . . . . 67. *G. guthriei*
36b Flowers cream-coloured to pink or purple, the lower tepals streaked with dark red or purple; flowering mainly July to October:
37a Perianth 34–58(–75) mm long; dorsal tepal 19–27(–35) mm long; flowers unscented or lightly sweet-scented; leaf margins and midrib lightly or rarely moderately thickened . . . . . 64. *G. hirsutus*
37b Perianth (67–)75–85 mm long; dorsal tepal 37–45 mm long; flowers usually strongly clove-scented; leaf margins and midrib strongly thickened . . . . . 65. *G. caryophyllaceus*
27b Cataphylls, leaf sheaths and blades hairless or at most puberulous or scabridulous; perianth tube long or short; leaves various:
38a Flowers carmine to red, lower tepals sometimes with white marks or sometimes much reduced and with yellow or green markings:
39a Lower tepals much reduced, less than half as long as dorsal and sometimes scale-like, marked with yellow or green:
40a Dorsal and upper lateral tepals subequal in size and lanceolate; upper part of perianth tube above stamen insertion 20–23 mm long . . . . . .88. *G. vandermerwei*
40b Dorsal tepal ± twice or more as long as upper laterals, spathulate; upper part of perianth tube above stamen insertion 2–10 mm long:
41a Upper part of perianth tube forming a short spur; upper lateral tepals reduced, scale-like, 2–5 mm long 91. *G. saccatus*
41b Upper part of perianth tube not spurred; upper lateral tepals ovate and flexed upward, ear-like, 10–17 mm long:
42a Lower tepals subequal, scale-like, 1–4 mm long; spike inclined to nearly horizontal; plants from south-western coast . . . . . 89. *G. cunonius*
42b Lower median tepal much larger than lower laterals and flexed sharply downward, boat-shaped, 8–11 mm long; spike stiffly erect; plants from Bokkeveld and Roggeveld . . . . . 90. *G. splendens*
39b Lower tepals ± half as long as or as long as dorsal tepal and similar in shape:
43a Perianth tube slender below abruptly expanded into a long, horizontal, cylindric upper part, sometimes yellow in mouth:
44a Leaves narrowly lanceolate to linear, scabridulous on veins with midrib raised; tepals unequal, ovate, lower 3 ± half as long as dorsal . . . . . 69. *G. overbergensis*
44b Leaves linear, smooth, midrib and margins not thickened; tepals subequal, lanceolate to ovate:
45a Leaves 3; tepals ovate, laterals 15–17 mm wide; flowers yellow or pale to deep pink, not yellow in throat but lower tepals often darkly speckled basally . . . . . 130. *G. meridionalis*
45b Leaves (3)4; tepals lanceolate, laterals 10–12 mm wide; flowers red with yellow throat . . . . . 131. *G. priorii*
43b Perianth tube gradually expanded from base to apex, never yellow in mouth:
46a Flowers unicoloured; tepals obtuse, 26–30 mm long; filaments 8–20 mm long:
47a Leaves with well-developed blades at flowering; plants from Piketberg. . . . . 50. *G. insolens*
47b Leaves entirely sheathing, without blades; plants from Hottentots Holland to Riviersonderend Mtns:
48a Flowers congested, funnel-shaped with spreading tepals; tepals oblong-elliptic, 7–9 mm wide; filaments 8–10 mm long, included in tube . . . . . 74. *G. nerineoides*

48b Flowers laxly spaced, tulip-shaped with cupped tepals; tepals obovate to suborbicular, 22–28 mm wide; filaments ± 20 mm long, exserted ± 10 mm from tube . . . . . 75. *G. stokoei*
46b Flowers with large white markings on lower tepals; tepals acute, 35–67 mm long; filaments 21–50 mm long:
49a Leaves on flowering stem with blades reduced or vestigial:
50a Flowers large, dorsal tepal 53–58 mm long and perianth tube 35–45 mm long; filaments 30–42 mm long, exserted 20–32 mm from tube; lower 3 tepals smaller than dorsal; anthers purplish or yellow with purple lines . . . . . 53. *G. stefaniae*
50b Flowers medium-sized, dorsal tepal 35–45 mm long and perianth tube 30–35 mm long; filaments 21–26 mm long, exserted 10–15 mm from tube; lower 3 tepals scarcely smaller than dorsal; anthers yellow . . . . . 54. *G. carmineus*
49b Leaves on flowering stem with well-developed blades:
51a Stems erect or inclined; corm vestigial, producing scaly stolons; plants from Outeniqua and Tsitsikamma Mtns, flowering mainly February to April . . . . . 52. *G. sempervirens*
51a Stems inclined to drooping; corm small but well-formed, without stolons; plants from Hex River to Franschhoek Mtns, flowering December to January. . . . . 51. *G. cardinalis*
38b Flowers never carmine to red, lower tepals variously marked:
52a Leaves 2 to 4(5), superposed and inserted serially up stem, not forming a fan at base of stem:
53a Lower leaf blade H-shaped in section, with margins raised into wings of flanges extended at right angles to blade:
54a Perianth tube slightly shorter than to longer than bracts, 27–36 mm long; tepals attenuate and recurved, mostly pearl-grey to yellowish . . . . . 145. *G. recurvus*
54b Perianth tube shorter than bracts, 12–18 mm long; tepals ± acute, mostly blue (sometimes pink or grey to yellowish brown):
55a Leaves firm and narrow with marginal flanges arching over and almost concealing blade; lower tepals acute and streaked; flowers 2 to 7 per spike; mainly clay and granite soils in southwestern Western Cape . . . . . 143. *G. gracilis*
55b Leaves soft and broad with marginal flanges at right angles to blade; lower tepals obtuse and spotted; flowers (4)8 to 14 per spike; plants from West Coast limestone. . . . . 144. *G. caeruleus*
53b Lower leaf blade with margins weakly to strongly thickened but not raised into wings or flanges, or leaves reduced and clasping:
56a Leaves linear, smooth and fleshy, midrib and margins not thickened:
57a Perianth tube shorter than bracts, 11–17 mm long; flowers pale blue or mauve to brown; filaments 10–15 mm long:
58a Leaves 4; tepals acute to obtuse; plants from Albertinia to Grahamstown . . . . . 125. *G. mutabilis*
58b Leaves 3; tepals acute to acuminate; plants from Ceres to Wellington. . . . . 126. *G. exilis*
57b Perianth tube slightly shorter than bracts to twice as long, 23–48 mm long; flowers pink, brownish or cream-coloured to yellow:
59a Perianth tube slender below, abruptly expanded at filament insertion into a cylindric upper part; flowers cream-coloured or pink, unscented; filaments 25–40 mm long . . . . . 130. *G. meridionalis*
59b Perianth tube gradually expanding from base to apex; flowers cream-coloured to yellowish or brown to dull lilac or purple, scented; filaments 12–16 mm long:
60a Flowers dull yellow to lilac conspicuously mottled with brown to purple; perianth tube 23–37 (–48) mm long, not or barely exserted from bracts. . . . . 128. *G. maculatus*
60b Flowers cream-coloured or white; perianth tube 37–65 mm long, well exserted from bracts 129. *G. albens*
56b Leaves centric with midrib or margins thickened and raised:
61a Leaves on flowering stem with vestigial blades, either barely developed or up to 25 mm long; plants flowering December to May:
62a Perianth tube cylindric, expanded only near apex, 22–45 mm long:
63a Flowers yellow mottled brownish or plain yellow, strongly scented; perianth tube sharply bent near apex. . . . . 68. *G. emiliae*
63b Flowers cream-coloured to pale pink, lilac or apricot, lower tepals with median red streak, unscented; perianth tube straight or slightly curved:
64a Lowermost leaf not basal; perianth tube 22–30 mm long; plants from Cape Peninsula . . . . 73. *G. monticola*
64b Lowermost leaf basal and sheathing for some distance; perianth tube (22–)30–60 mm long; plants from Langeberg foothills. . . . . 149. *G. engysiphon*
62b Perianth tube obliquely funnel-shaped, 6.5–17.0 mm long, or rarely up to 20 mm long but then leaves only 2:
65a Leaves 2, lowermost sheathing lower ⅔ of stem . . . . . 127. *G. vaginatus*
65b Leaves 2 to 4, all rather short:
66a Corm tunics fibrous; flowers usually not strongly scented; leaves of non-flowering plants hairy:
67a Flowers pink or greyish brown; leaf of non-flowering plants narrowly lanceolate; plants from West Coast to Overberg. . . . . 72. *G. brevifolius*
67b Flowers pale blue; leaf of non-flowering plants terete with 4 longitudinal grooves (lowest leaf on flowering stem sometimes with a very short blade of this type); plants from Overberg . . . . . 151. *G. subcaeruleus*
66b Corm tunics soft-textured, membranous and not accumulating; flowers usually strongly sweetly scented; leaves of non-flowering plants glabrous, terete and 4-grooved:

68a Flowers mauve or pink; lower lateral tepals joined to upper laterals for 2–5 mm; flowering February to May; leaves of non-flowering plants 1(2) . . . . . 152. *G. martleyi*
68b Flowers cream-coloured, pale yellow or pale lilac; lower lateral tepals not joined to upper laterals; flowering November to January; leaves of non-flowering plants 2 or 3 . . . . . 153. *G. jonquilliodorus*
61b Leaves on flowering stem with blade usually well-developed, sometimes short but always present:
69a Flowers white or cream-coloured to pale or deep pink, lower tepals with red median streak or spade-, diamond- or spear-shaped mark (rarely without markings); leaves with well-developed secondary veins. . . . . couplet 107
69b Flowers not as above; leaves without well-developed secondary veins:
70a Uppermost cataphyll purple mottled with white:
71a Flowers greenish or brownish with yellow markings on lower tepals; spike strongly inclined and flexuose with upper leaf diverging from stem; corm tunics tough and woody, clawed below; plants flowering May to July. . . . . 102. *G. viridiflorus*
71b Flowers blue, mauve, pink, yellow, cream-coloured or greenish grey; spike weakly inclined with upper leaf clasping stem; corm tunics fibrous, rarely woody and clawed but then flowers blue; flowering June to September:
72a Perianth actinomorphic or almost so, ± rotate; flowers unscented:
73a Flowers deep blue with darker blue and white markings on lower tepals; spike inclined and flexuose; plants from Richtersveld . . . . . 103. *G. deserticola*
73b Flowers mauve, without conspicuous markings; stem erect; corm tunics softly fibrous; plants from seasonally marshy flats on West Coast and Cape Flats near Cape Town. . . . . 124. *G. quadrangulus*
72b Perianth zygomorphic and bilabiate; flowers often scented:
74a Flowers inflated and bell-like with sharply bent tube, lower tepals with transverse or median white or yellow mark; leaves (3)4; corm tunics firm-textured to almost woody, splitting into narrow strips below. . . . . 133. *G. rogersii*
74b Flowers funnel-shaped with curved tube, lower tepals pale yellow lightly streaked with lines or dots; leaves 3(4); corm tunics soft-textured and irregularly fragmented or somewhat fibrous:
75a Flowers larger, 37–54 mm long; perianth tube 13–16 mm long; flowering mainly late July to September. . . . . 122. *G. carinatus*
75b Flowers smaller, 22–36 mm long; perianth tube 6–10 mm long; flowering May to July 123. *G. griseus*
70b Uppermost cataphyll unicoloured:
76a Flowers predominantly blue, lower tepals usually yellow toward base and with purple streaks:
77a Leaves terete or oval in section with midrib and margins strongly thickened; flowers pale blue with spathulate lower tepals; plants from Kamiesberg. . . . . 82. *G. kamiesbergensis*
77b Leaves ± plane with midrib and margins not or lightly thickened; flowers usually mid to deep blue; plants from Western Cape:
78a Leaves 3:
79a Flowers ± irregularly blotched with purple, lower tepals without transverse yellow to cream-coloured band; plants from Worcester to Bredasdorp. . . . . 141. *G. inflexus*
79b Flowers blue with darker veins, lower tepals with transverse yellow to cream-coloured band; plants from Cederberg. . . . . 142. *G. taubertianus*
78b Leaves 4:
80a Upper tepals narrowly elliptic-attenuate; lower tepals finely streaked and spotted with purple:
81a Leaf blade plane and identical on both surfaces; tepals violet and not darkly veined; plants from Riviersonderend Mtns . . . . . 118. *G. atropictus*
81b Leaf blade with midrib raised as a wing on one side, blade thus triangular in section; tepals pale blue with violet veins; plants from Gifberg to Cederberg . . . . . 119. *G. violaceolineatus*
80b Upper tepals ovate to lanceolate, obtuse to acute:
82a Flowers usually 3 or more per spike; floral bracts smooth, not attenuate, 15–22 mm long . . . . . 133. *G. rogersii*
82b Flowers 1 or 2 per spike; floral bracts ridged and attenuate, mostly 30–50 mm long 134. *G. bullatus*
76b Flowers white to pink, yellow or orange:
83a Corm tunics woody, splitting below into claw-like segments:
84a Perianth tube 35–40 mm long, usually ± 1.5 times as long as bracts. . . . . 139. *G. vigilans*
84b Perianth tube 10–24 mm long, slightly shorter than to ± 1.5 times as long as bracts:
85a Leaves 3(4); floral bracts smooth, not ridged along veins; dorsal tepal 25–30 mm long; lower tepals with large red spots unevenly spread across basal half. . . . . 138. *G. variegatus*
85b Leaves (3)4; floral bracts ridged along veins:
86a Filaments 4–10 mm long; dorsal tepal 17–27 mm long; flowers white (rarely pale pink) with red markings on lower tepals . . . . . 137. *G. debilis*
86b Filaments 12–16 mm long; dorsal tepal 28–44 mm long; flowers pale to deep pink or blue-mauve:
87a Perianth tube obliquely funnel-shaped, 13–24 mm long; lower tepals cream-coloured to pale yellow with dark longitudinal lines or spots . . . . . 135. *G. blommesteinii*
87b Perianth tube narrowly funnel-shaped to cylindric, 22–27 mm long; lower tepals with darker V-shaped markings . . . . . 136. *G. virgatus*
83b Corm tunics leathery to fibrous or membranous:
88a Perianth ± actinomorphic, rotate, orange or salmon- to brick-red; perianth tube up to 4 mm long . . . . . 132. *G. brevitubus*

88b Perianth zygomorphic, bilabiate, never orange to red; perianth tube at least 8 mm long:
89a Flowers pale creamy yellow to bright yellow:
90a Flowers bright yellow; upper tepals lanceolate-attenuate; perianth tube 11–14 mm long; plants from Heerenlogement Mtn, flowering June and July . . . . . 120. *G. comptonii*
90b Flowers pale creamy yellow; upper tepals ovate; perianth tube ± 8 mm long; plants from Cederberg, flowering December and January . . . . . 157. *G. delpierrei*
89b Flowers pale to deep pink:
91a Lower tepals with lozenge-shaped pale median mark outlined with red; corm tunics softly membranous, not accumulating:
92a Leaf blades with margins not or lightly thickened; perianth tube ± 35 mm long. . . . . 42. *G. pappei*
92b Leaf blades with margins moderately to strongly thickened; perianth tube 18–20 mm long. . . . . 140. *G. ornatus*
91b Lower tepals blotched or streaked; corm tunics leathery to firm-papery, becoming fibrous and accumulating:
93a Flowers mottled with brown and yellow, strongly clove-scented; perianth tube 20–27 mm long; plants from Bokkeveld to Potberg. . . . . 67. *G. guthriei*
93b Flowers pale pink, lower tepals feathered with red below, unscented; perianth tube 36–44 mm long; plants from Outeniqua Mtns near Mossel Bay . . . . . 121. *G. roseovenosus*

52b Leaves 4 or more, at least lower 3 basal, either lanceolate and forming a fan, or linear and overlapping only near base:
94a Leaves linear, rarely more than 2 mm wide, margins not thickened (see also *G. venustus*):
95a Lower lateral tepals much shorter than median; upper lateral tepals flexed upward to overlap dorsal tepal on either side:
96a Perianth tube 45–50 mm long; upper three tepals sub equal, 25–35 mm long; lower lateral tepals with red median streak . . . . . 85. *G. leptosiphon*
96b Perianth tube 16–18 mm long; dorsal tepal much shorter than upper laterals, 25–35 mm long; lower lateral tepals greenish yellow in lower half. . . . . 87. *G. involutus*
95b Lower lateral tepals ± as long as median or only slightly shorter; perianth often windowed in profile with gap between upper lateral and dorsal tepals:
97a Flowers actinomorphic and unmarked, the perianth stellate with symmetrically disposed stamens . . . . . 97. *G. stellatus*
97b Flowers zygomorphic with lower tepals marked, the perianth bilabiate with arcuate stamens:
98a Tepals subequal, all recurved; perianth tube 16–30 mm long; filaments 6–10 mm long, included in tube or shortly exserted up to 2 mm; flowers greenish yellow, often flushed brown to purple on reverse, lower tepals unmarked . . . . . 96. *G. acuminatus*
98b Not as above:
99a Perianth not windowed in profile, not gaping between base of upper lateral and dorsal tepals; flowers usually unscented . . . . . 98. *G. wilsonii*
99b Perianth windowed in profile, tepals ± clawed thus with a gap between base of upper lateral and dorsal tepals; flowers often scented:
100a Perianth tube longer than dorsal tepal, 22–35 mm long; plants from Eastern Cape . . . 93. *G. uitenhagensis*
100b Perianth tube shorter than dorsal tepal, 9–15 mm long; plants from Western and Eastern Cape:
101a Flowers whitish to dull grey, purple or brownish yellow; lower lateral tepals channelled and clawed below but not lobed. . . . . 92. *G. permeabilis*
101b Flowers bright yellow; lower lateral tepals with basal half of blade involute-tubular and auriculately lobed . . . . . 95. *G. karooicus*
94b Leaves narrowly lanceolate to lanceolate, usually at least 3 mm wide, margins unthickened or thickened:
102a Corm tunics usually hard, woody and gnarled, accumulating, rarely membranous or papery but then lower leaf sheaths puberulous; perianth often windowed between dorsal and upper lateral tepals:
103a Flowers cream-coloured to pale pink with red and yellow chevron-shaped markings on lower tepals; lower tepals not conspicuously narrowed below; perianth tube 18–40 mm long:
104a Perianth tube narrowly funnel-shaped, 18–22 mm long; filaments ± 25 mm long . . . . . 106. *G. salteri*
104b Perianth tube cylindric, 35–40 mm long; filaments ± 8 mm long. . . . . 107. *G. lapeirousioides*
103b Flowers yellowish to greenish or purple with basal half of lower tepals greenish yellow; lower tepals conspicuously narrowed below and flexed downwards; perianth tube 12–17 mm long:
105a Corm tunics softly membranous; sheaths and blades of lower leaves puberulous; capsules ellipsoid, acute . . . . . 101. *G. arcuatus*
105b Corm tunics hard and woody; leaves glabrous; capsules ovoid to subglobose, 3-lobed above and retuse:
106a Lower tepals curved ± sharply downward at base of limb with upper margins of claws not or only weakly auriculate; perianth windowed in profile, with gap between upper lateral and dorsal tepals; plants north of Vanrhynsdorp–Calvinia axis . . . . . 104. *G. scullyi*
106b Lower tepals geniculately flexed downward at base of limb with upper margins of claws conspicuously auriculately lobed; perianth not windowed in profile, with upper lateral tepals suberect on either side of dorsal tepals; plants south of Vanrhynsdorp–Calvinia axis . . . . . 105. *G. venustus*
102b Corm tunics leathery, fibrous or papery to membranous; perianth never windowed:
107a Lower lateral tepals much shorter than median; upper lateral tepals flexed upward to overlap dorsal tepal on either side; dorsal tepal much shorter than upper laterals, 25–35 mm long; lower lateral tepals greenish yellow in lower half . . . . . 87. *G. involutus*

107b Not as above:
108a Leaves somewhat succulent, without evident veins and margins unthickened; flowers blue-mauve, tepals subequal, lower marked with white streaks edged in red; strand plants growing down to the high-tide mark. . . . . .40. *G. gueinzii*
108b Leaves not succulent, secondary veins usually evident and margins usually prominent; flowers white to pink or salmon-pink, lower tepals often smaller, variously marked:
109a Leaves in a tight basal fan; blades firm-textured with strongly thickened margins and midrib; corm tunics coarsely fibrous, accumulating in a densely mass and forming a neck around base of stem:
110a Perianth tube 18–21 mm long; filaments 12–14 mm long; lower lateral tepals with pale yellow, spear-shaped marks outlined with purple; base of leaves heavily marked with raised white speckles . . . . 55. *G. rudis*
110b Perianth tube 22–55 mm long; filaments 14–37 mm long; lower lateral tepals with dark median streak; base of leaves lightly marked but not textured with white or green speckles:
111a Perianth tube 22–35(–55) mm long; lower tepals ¾ to ± as long as dorsal . . . . .56. *G. grandiflorus*
111b Perianth tube 40–70 mm long, if less than 50 mm long, then lower tepals ½–¾ as long as dorsal:
112a Flowers white to creamy yellow or greenish; perianth tube slender in lower 20–55 mm and flaring above; filaments 20–23 mm long. . . . . 57. *G. floribundus*
112b Flowers salmon- to orange-red; perianth tube slender in lower 20–35 mm and cylindric above; filaments 35–37 mm long . . . . .58. *G. miniatus*
109b Leaves in a loose fan or superposed; blades soft-textured with often lightly thickened margins and midrib; corm tunics papery to medium-textured fibres, not accumulating in a densely mass and forming a neck around base of stem:
113a Corms scarcely developed, tunics not accumulating; plants with inclined to drooping stems, growing on wet rocks:
114a Spike usually 15- to 20-flowered; flowers ivory-coloured to greenish cream-coloured, lower tepals less than half as long as dorsal; perianth tube 45–50 mm long, completely enclosed within the bracts; plants from Cederberg . . . . 47. *G. buckerveldii*
114b Spike usually less than 15-flowered; flowers pale mauve-pink, lower tepals ⅔ to nearly as long as dorsal; perianth tube 25–40 mm long, exceeding the bracts; plants from Swartberg . . . . 44. *G. aquamontanus*
113b Corms well developed, tunics accumulating or not; plants with erect to inclined stems, not growing on wet rocks:
115a Perianth tube longer than dorsal tepal, (30–)40–100 mm long:
116a Tepals attenuate and strongly undulate; lower tepals slightly shorter than upper . . . . .45. *G. undulatus*
116b Tepals obtuse to acute, not attenuate, weakly undulate; lower tepals usually about ⅔ as long as upper:
117a Leaves 4 or 5; flowers cream-coloured to yellowish with prominent red, spear-shaped marks on lower tepals; flowering October to November; plants from West Coast and near interior . . . . 46. *G. angustus*
117b Leaves 3 to 7; flowers salmon-pink with red linear marks on lower tepals; flowering February to April; plants from southern coast and interior:
118a Leaves 6 or 7, with blades 1.5–6.5 mm wide; perianth tube 30–55 mm long; flowering February; plants from Little Karoo mountains . . . . .48. *G. dolichosiphon*
118b Leaves 3, with blades 6–8 mm wide; perianth tube 50–70 mm long; flowering March to April; plants from southern foothills of Langeberg. . . . . .49. *G. bilineatus*
115b Perianth tube shorter than to as long as dorsal tepal, (15–)20–50 mm long:
119a Flowers large, dorsal tepal 40–55 mm long; plants from Plettenberg Bay to Uniondale . . .43. *G. geardii*
119b Flowers smaller, dorsal tepal 18–40(–50) mm long; plants from west of Knysna:
120a Leaf blades with two prominently thickened veins on some or all leaves, 1–6 mm wide; tunics finely fibrous:
121a Flowers 33–46 mm long; leaves 2– 6 mm wide; bracts mostly 13–20 mm long; lower tepals with white to yellow, spear-shaped marking outlined with red . . . . 37. *G. oreocharis*
121b Flowers 48–60 mm long; leaves 1–3 mm wide; bracts mostly 25–33 mm long; lower tepals with red chevron-shaped marking in middle and red-spotted toward base and in throat . . . . .38. *G. crispulatus*
120b Leaf blades with only midrib prominently thickened, sometimes additional pairs of veins also evident, 1.6–20.0 mm wide; tunics usually accumulating, fibrous or firm-papery:
122a Floral bracts 13–16 mm long; perianth tube 18–20 mm long; lower tepals narrowed below into claws . . . . 39. *G. phoenix*
122a Floral bracts 25–65 mm long; perianth tube (15–)25–45 mm long; lower tepals not narrowed below into claws:
123a Leaves (2–)6–19 mm wide; flowers usually at least 5 per spike; corm tunics fibrous to firm-papery, usually accumulating. . . . . 41. *G. carneus*
123b Leaves 1.5–3.0 mm wide; flowers 1 or 2(3) per spike; corm tunics membranous, not accumulating . . . . .42. *G. pappei*

Sect. 1. **Densiflori** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 70 (1998) [as Sect. *Densiflorus*]. Type species: *Gladiolus densiflorus* Baker

Plants medium-sized to large. *Stem* branched or unbranched. *Corm* tunics papery or leathery to fibrous. *Leaves* several, mostly basal in a fan, sometimes with a pseudostem formed by clasping sheaths, narrowly lanceolate, firm-textured, plane with thickened midrib and margins, usually at least 4 mm wide. *Spike* often many-flowered, usually crowded. *Flowers* usually small, mostly only weakly bilabiate, nectar guides sometimes present, unscented; perianth tube usually obliquely funnel-shaped and shorter than dorsal tepal, sometimes longer; lower tepals narrower but usually ± as long as upper. *Anthers* sometimes tailed basally. *Capsules* obovoid to subglobose, usually less than 15 mm long. *Seeds* usually less than 6 mm long, wings often reduced or unevenly developed.

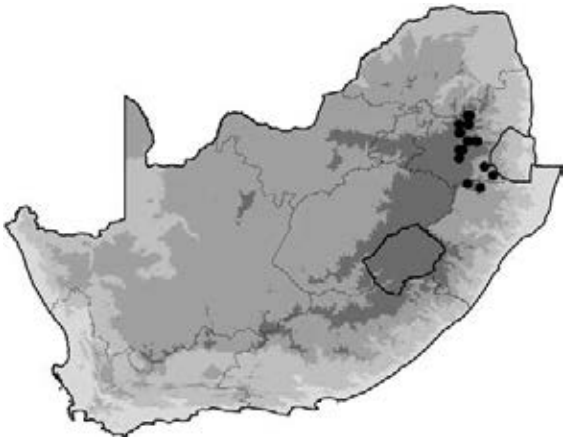
Defined by the basal fan of lanceolate leaves and the dense spike of mostly relatively small, weakly bilabiate flowers without floral fragrance, sect. *Densifloris* is restricted to grasslands and savannas in the summer-rainfall region. The section includes 13 southern African species, as well as some from tropical Africa.

Ser. **Paludosi** *Goldblatt & J.C.Manning*, new series. Type species: *G. paludosus* Baker

Corm small or poorly developed and rhizome-like, producing short or long stolons from the base; tunics membranous or papery, sometimes fibrous. *Leaves* with moderately thickened margins and midribs; bracts green, 17–35 mm long. *Flowers* moderately large. Anthers not tailed.

1. **Gladiolus paludosus** *Baker* in Journal of Botany, British and foreign 29: 70 (1891). Type: South Africa, [Mpumalanga], Ermelo District, Lake Chrissie, marshy places, Nov. 1888, *Elliot 1588* (K, holo. [drawing at BOL]).

Plants 360–540 mm high. *Corm* globose, 10–12 mm diam.; tunics papery becoming fibrous, with one or two cormlets on short stolons. *Stem* erect, flexed outward above sheathing part of uppermost leaf then erect again, occasionally with one branch. *Leaves* 4 to 6, lower 2 to 4 basal and longest, reaching between middle of stem and base of spike, relatively short, lanceolate, 7–10 mm wide, margins moderately thickened and hyaline, main vein lightly raised, cauline leaves smaller, uppermost without blade. *Spike* erect, 5- to 9(–20)-flowered; bracts pale to grey-green, often flushed grey-purple, outer 17–20 mm long, inner slightly shorter than outer and bifid. *Flowers* zygomorphic, mauve to pink or reddish, lower lateral tepals with broad diamond-shaped to semi-circular band of dark mauve or purple across midline, unscented; perianth tube obliquely funnel-shaped, 10–14 mm long, lower cylindric part ± 6 mm long; tepals ovate, dorsal largest, extending ± horizontally over stamens, 20–25 × 14–19 mm, upper laterals directed forward in lower ½, gradually curving outward in upper half, 20–25 × 14–17 mm, lower 3 tepals sometimes joined to upper laterals for ± 1 mm, joined together for 1–2 mm, lower laterals 18–20 × 7–10 mm, lower median ± 20 × 14 mm. *Filaments* ± 14 mm long, exserted ± 10 mm from tube; anthers 7–8 mm long, yellow or light mauve with dark lines on ventral side; pollen cream-coloured to yellow. *Style* dividing near anther apices, branches 4–5 mm long. *Capsules* obovoid, 8–10 mm long, 3-lobed above and retuse. *Seeds* elliptic, broadly winged, ± 6 × 4 mm, rust-brown. *Flowering time*: mid-October to mid-November.



Distribution of ***Gladiolus paludosus***.

Distribution and ecology: endemic to Mpumalanga, South Africa, from Dullstroom to Wakkerstroom and Piet Retief; in marshy or vlei habitats, flowering in spring before the surrounding grass flora has grown up.

Diagnosis: recognised by its relatively short, soft-textured leaves with lightly thickened margins and midrib, and the moderately sized flowers, in combination with its wetland habitat and early flowering. *Gladiolus paludosus* is most likely to be confused with *G. crassifolius*, a summer-flowering species of drier, often stony habitats, that has longer leaves with thickened margins and prominent secondary veins, and longer spikes of smaller flowers.

2. **Gladiolus papilio** *Hook.f.* in Curtis's Botanical Magazine 92: t. 5565 (1866). Type: South Africa, without precise locality, cultivated at Kew Gardens, 1863, *Cooper s.n.* (K, lecto., designated by Goldblatt & Manning: 72 (1998) [photo at PRE]).

Gladiolus purpureo-auratus Hook.f.: t. 5944 (1872). Type: South Africa, [KwaZulu-Natal], without precise locality or collector, cultivated at Bull's

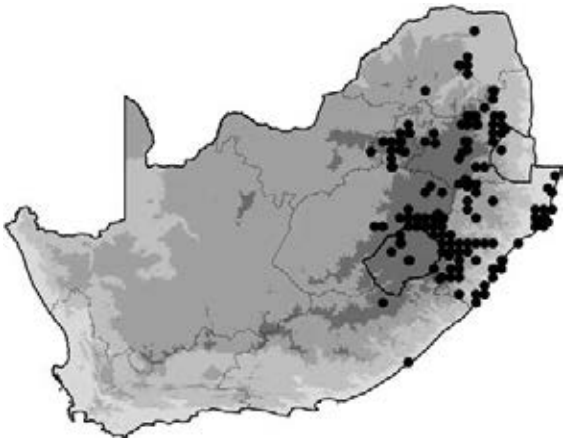
Nursery, London, illustration in Hook.f.: t. 5944 (1872).

Gladiolus brachyscyphus Baker: 210 (1892). Type: South Africa, [KwaZulu-Natal], Mt Currie, Kokstad, Feb. 1883, *Tyson 1427* (K, holo.; BOL, GRA, iso.).

Gladiolus spathulatus Baker: 223 (1892). Type: South Africa, [Limpopo], Waterberg Mtns, Zacharias de Beer's farm, near Nylstroom River, Aug. 1880, *Nelson 295* (K, holo.).

Gladiolus schlechteri Baker: 1006 (1904a). Type: South Africa, [Gauteng], Donkerhoek east of Pretoria, 4 Jan. 1894, *Schlechter 4132* (Z, presumed holo.; BOL, Z, iso.).

Plants (400–)500–750(–1 000) mm high. *Corm* hardly developed at flowering time, rhizome-like, producing slender stolons terminating in a single cormlet; tunics papery-membranous, fragmenting with age. *Stem* erect or slightly inclined, flexed outward above sheath of uppermost leaf, then inclined, unbranched. *Leaves* 6 or 7(9), lower 4 to 6 ± basal, reaching to ± middle of stem or above, narrowly lanceolate, 9–14(–19) mm wide, margins and main vein lightly thickened, cauline leaves smaller, largely to entirely sheathing. *Spike* inclined, usually strongly flexed at base, 4- to 8(–13)-flowered; bracts often flushed grey-purple, outer 20–35 mm long, inner slightly shorter, acute. *Flowers* nodding, cream-coloured to greenish or yellowish, flushed translucent pink or light purple on inside of upper tepals and greenish to grey or purple on reverse, lower lateral tepals with elongate, dark green or light to dark purple blotches extending into upper part of tube, and with obscure to well-defined crescent-shaped yellow to cream-coloured bands below apices, unscented; perianth tube obliquely funnel-shaped, curving outward at base of upper part, 18–20 mm long, emerging from just above middle of bracts; tepals obovoid, unequal, dorsal largest, 25–35 × 23–30 mm, hooded over stamens, horizontal or tilted toward ground, upper laterals directed forward and contiguous with dorsal and lower tepals to form a wide-mouthed bell, 24–35 × 17–24 mm, lower tepals joined together for ± 2 mm, narrowed below, 22–32 × 14–21 mm, lower median, 20–26 × 13–20 mm. *Filaments* 20–22 mm long, exserted 7–10 mm from tube; anthers 8–10 mm long, purplish on dorsal surface, cream-coloured below; pollen cream-coloured. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches 4.0–6.5 mm long. *Capsules* ovate-oblong, 3-lobed above and retuse, 18–24 mm long. *Seeds* oblong, broadly winged, 8–9 × 4–5 mm, rust-brown. *Flowering time*: November to February, occasionally later.



Distribution of ***Gladiolus papilio***.

Distribution and ecology: occurring across eastern South Africa, from Limpopo and Mpumalanga through Eswatini, Gauteng, eastern Free State, Lesotho and KwaZulu-Natal to Butterworth in Eastern Cape; mostly in marshes, seeps or streambanks, also damp grassland.

Green-flowered plants occur through the central Drakensberg, and the yellow-flowered form in the eastern Free State and northern KwaZulu-Natal.

Diagnosis: readily recognised by the markedly inclined spike of relatively large, nodding, bell-like flowers with prominent nectar guides on the lower tepals and sharply curved perianth tube 18–20 mm long. The relatively small corm has papery tunics. Plants spread vegetatively by means of long stolons.

Ser. **Densiflori** *Goldblatt & J.C.Manning*, new series. Type species: *G. densiflorus* Baker

Corm globose to depressed-globose; tunics leathery or coarsely fibrous. *Leaves* with moderately thickened margins and midribs and sometimes secondary veins; bracts often dry and papery or membranous and brown above, 15–50(–70) mm long. *Flowers* small to moderately large. Anthers not tailed.

3. **Gladiolus crassifolius** *Baker* in Journal of Botany, British and foreign 14: 334 (1876b). Type: South Africa, [Eastern Cape], without precise locality, 1861, *Cooper 3185* (K, lecto., designated by Lewis et al.: 60 (1972), G, PRE, isolecto.).

Gladiolus rachidiflorus Klatt: 339 (1882). Type: South Africa, [KwaZulu-Natal], Port Natal [Durban], around the bay, Mar. 1832, *Drège 4537* (B†, holo.; P, [fide Lewis et al. (1972) but not located there], S [floral fragment without leaves], iso.).

Gladiolus tritoniiformis Kuntze: 308 (1898). Type: South Africa, [KwaZulu-Natal], Estcourt District, Highlands Station, 1 600 m, 15 Mar. 1894, *Kuntze s.n.* (NY, holo. [photo at PRE]; K, Z, iso.).

Gladiolus junodii Baker: 866 (1901). Type: South Africa, [KwaZulu-Natal], Lions River District, Howick, 1893, *Junod 320* (Z, holo. [photo at PRE]; G, Z, iso.).

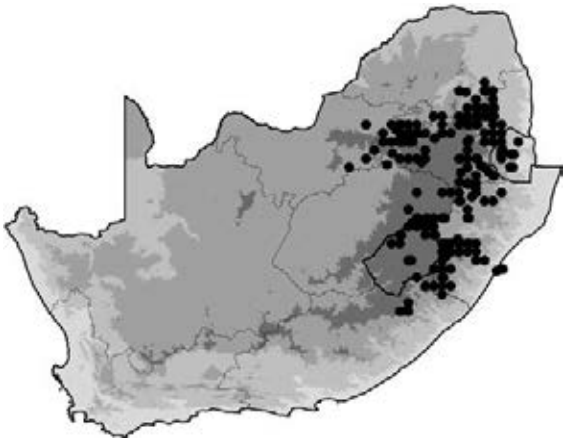
Gladiolus conrathii Baker: 1005 (1904a). Type: South Africa, [Gauteng], Modderfontein, Feb. 1898, *Conrath 582* (Z, holo. [photo at PRE]; GZU, iso.).

Gladiolus dieterlenii E.Phillips: 282 (1917). Type: Lesotho, Leribe, 5 000–6 000 ft [1 500–1 800], Mar. 1913, *Dieterlen 445* (SAM, holo.; GRA, K, P, PRE, iso.).

Plants (250–)350–900(–1 200) mm high. *Corm* subglobose to depressed-globose, 18–30 mm diam.; tunics leathery to ± coarsely fibrous. *Stem* erect below, usually flexed outward above sheath of uppermost leaf, simple or 1- to 3-branched. *Leaves* 4 to 8, mostly basal, sometimes forming a pseudostem, blades narrowly lanceolate to linear, reaching to base of spike or above, 5–12 mm wide, midrib and margins plus two or more pairs of secondary veins hyaline and moderately thickened, cauline leaves progressively shorter blades and uppermost sometimes entirely sheathing. *Spike* ± erect or weakly inclined, (12)16- to 22(40)-flowered; bracts usually pale green or flushed purple, soft-textured becoming dry and membranous above in fruit, 15–20(–28) mm long and ± 2 internodes long, acute to attenuate, inner shorter than outer and forked apically. *Flowers* pale to deep pink or light purple, orange-red or cream-coloured, lower lateral, and sometimes lowermost tepals with a band of darker colour across limbs often edged with cream-coloured, unscented; perianth tube obliquely funnel-shaped, 9–17 mm long; tepals broadly ovate, unequal, dorsal largest and arched to hooded over stamens, 18–22 × 10–12 mm, upper laterals directed forward and curving outward above, 18–20 × 16–18 mm, lower 3 tepals ± straight and directed downward, united below for 2–3 mm, narrowed into channelled claws below, lower laterals 12–16 × 5–7 mm, lower median 15–20 × 12 mm. *Filaments* 12–14 mm long, exserted 6–7 mm from tube; anthers 7–8 mm long, pale lilac to purple; pollen whitish to pale yellow. *Style* arching over the filaments, usually dividing opposite lower half of anthers, branches ± 3 mm long, seldom reaching past middle of anthers. *Capsules* obovoid, 9–12(–14) mm long, 3-lobed above and retuse. *Seeds* elliptic, broadly winged, 4–6 × 2.5–4.0 mm. *Flowering time*: mainly February and March, occasionally later or earlier [in tropical Africa usually April to June].

Distribution and ecology: widespread through the eastern southern Africa at mid to high elevations, from near Elliot in Eastern Cape, South Africa, to Limpopo, Eswatini and into tropical Africa; in rocky grassland.

Diagnosis: recognised by the dense spike of small flowers with overlapping bracts ± two internodes long and the basal fan of tough, fibrous leaves with the margins and midrib plus one or more pairs of secondary veins thickened and hyaline. The flowers vary greatly in colour but are most frequently pink to salmon or dull purplish with darker nectar guides highlighted with yellow. Plants with orange to coral-pink flowers occur locally in Mpumalanga. The species is often confused with *Gladiolus densiflorus*, which occurs mainly to the east



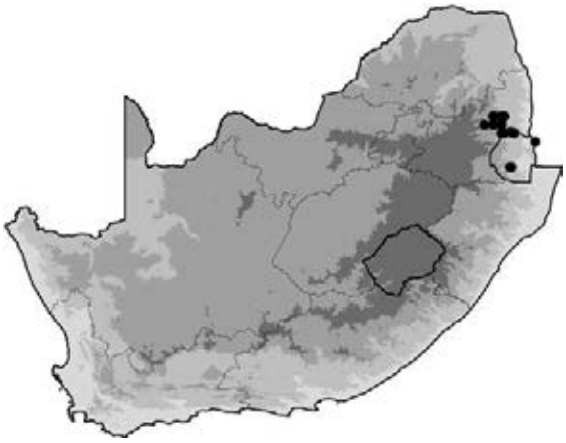
Distribution of ***Gladiolus crassifolius***.

and at lower elevations, but their distribution overlaps along the Mpumalanga Escarpment, where *G. crassifolius* typically flowers slightly later. The flowers in the two species are very similar, although the perianth in *G. densiflorus* is sometimes finely speckled, but the two are most reliably separated by their foliage: the leaves in *G. densiflorus* are characterised by numerous, fine, closely spaced tertiary veins uninterrupted by evident secondary veins between the margins and main vein. Some plants may, however, be difficult to place. *Gladiolus serpenticola* from near Barberton can also be confused with *G. crassifolius* but is typically a taller plant with erect stems 750–1 500 mm high, less fibrous leaves, and mostly shorter bracts 12–16 mm long.

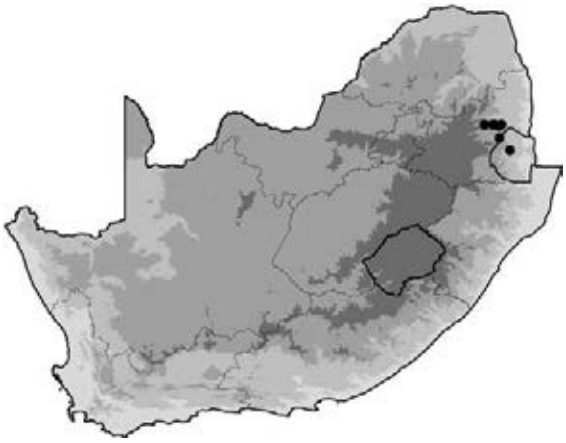
4. **Gladiolus hollandii** *L.Bolus* in Journal of Botany, British and foreign 69: 261 (1931b). Type: South Africa, [Mpumalanga], Tomango near Nelspruit, cult. at Kirstenbosch Gardens, Apr. 1928, *Holland s.n. NBG 493/27* (BOL, holo.).

Gladiolus varius var. *elatus* F.Bolus in L.Bolus: 104 (1917). Type: South Africa, [Mpumalanga], Barberton, base of the mountains, 2 800–3 000 ft [850–900 m], 17 Mar. 1890, *Galpin 860* (BOL, holo.; K, PRE, SAM, iso.).

Plants 650–1 200(–1 500) mm high. *Corm* depressed-globose, 18–40 mm diam.; tunics leathery, fragmenting irregularly with age, bearing small cormlets at base. *Stem* erect, simple or 1- or 2-branched. *Leaves* 7 to 10, lower 4 to 6 ± basal, reaching between base and apex of spike, blades narrowly to broadly lanceolate, 8–18(–28) mm wide, main vein and margins lightly thickened, sometimes a second pair of veins also thickened, remaining veins fine and closely set, cauline leaves shorter and uppermost often entirely sheathing, imbricate, enclosing stem almost to base of spike. *Spike* erect, 18- to 30(–55)-flowered; bracts green, lanceolate- attenuate, becoming dry soon after flowering, outer 23–30(–35) mm long, inner shorter than outer, acute or subobtuse. *Flowers* pale pink, usually minutely dotted with dark pink, all tepals with a dark pink to



Distribution of ***Gladiolus hollandii***.



Distribution of ***Gladiolus serpenticola***.

reddish median streak, most pronounced on lower lateral tepals, unscented; perianth tube obliquely and narrowly funnel-shaped, 18–25(–30) mm long, wider upper part ± 9 mm long; tepals subequal, lanceolate, dorsal inclined over stamens, 20–27 × 12–14 mm, upper laterals 18–25 × 11–12 mm, lower 3 tepals united for 1–2 mm, free parts (12–)18–20 × 10 mm, lower median slightly longer than lower laterals. *Filaments* 12–17 mm long, exserted 6.0–8.5 mm from tube; anthers 6.5–8.0 mm long, dark purple; pollen cream-coloured. *Style* arching over stamens, dividing at or just beyond anther apices, branches ± 3 mm long. *Capsules* narrowly obovoid, 10–12 mm long, 3-lobed above and truncate. *Seeds* oblong, poorly and unevenly winged, ± 5 × 3 mm. *Flowering time*: mid-February to April.

Distribution and ecology: restricted to the eastern lowveld of southern Africa, extending from Limpopo to Barberton in Mpumalanga, South Africa, and in Eswatini and southern Mozambique; on lower slopes and granite outcrops in open savanna and bush.

Diagnosis: distinguished from related species with similar small flowers by the relatively longer perianth tube, 18–30 mm long and ± as long as or longer than the dorsal tepal. This character serves to separate it from species such as *Gladiolus crassifolius, G. densiflorus* and *G. serpenticola*.

5. **Gladiolus serpenticola** *Goldblatt & J.C.Manning* in Novon 6: 173 (1996). Type: South Africa, Mpumalanga, Kaap Valley on Nelspruit–Barberton Road near Noordkaap River Bridge, serpentine outcrops, 9 Feb. 1994, *Goldblatt & Manning 9844* (NBG, holo.; E, K, MO, PRE, WAG, iso.).

Plants 750–1 500 mm high. *Corm* depressed-globose, 25–50 mm diam.; tunics initially leathery, fragmenting irregularly and becoming coarsely fibrous. *Stem* erect, usually with 1 or 2 branches, occasionally more, 2.0–2.5 mm diam. below base of spike. *Leaves* 8 to 10, lower 4 or 5 ± basal and reaching to ± base of spike, grey-green and somewhat glaucous, blades narrowly sword-shaped to linear, 7–10 mm wide, margins and midribs moderately thickened, cauline leaves progressively smaller above, imbricate and sheathing stem to ± base of spike. *Spike* slightly inclined, ± straight, 18- to 30-flowered; bracts pale green in bud, dry and light brown above by anthesis, lanceolate-attenuate, apices dry and twisted, 12–16 mm long, inner bracts slightly shorter than outer. *Flowers* pale pink to nearly white, lower lateral tepals each with a central yellow streak surrounded by a light purple blotch, unscented; perianth tube obliquely funnel-shaped, 10–12 mm long; tepals broadly ovate, dorsal inclined to hooded over stamens, 23 × 14 mm, upper laterals directed forward, weakly curving upward in distal third, 23 × 12 mm, lower 3 tepals united for ± 2 mm, lower laterals narrowed below, 13–14 × 5.5–6.0 mm, lower median 16–18 × ± 8 mm, arching downward. *Filaments* 14 mm long, exserted ± 8 mm from tube; anthers ± 6 mm long, purple; pollen cream-coloured. *Style* arching over stamens, dividing opposite lower to upper ⅓ of anthers, branches ± 2 mm long, not reaching anther tips. *Capsules* ovoid, 3-lobed apically, 5–8 mm long. *Seeds* ovate, ± 5–6 × 2.5–3.0 mm, wing unevenly developed, sometimes lacking on one side or across middle. *Flowering time*: early February to late March, rarely in late January.

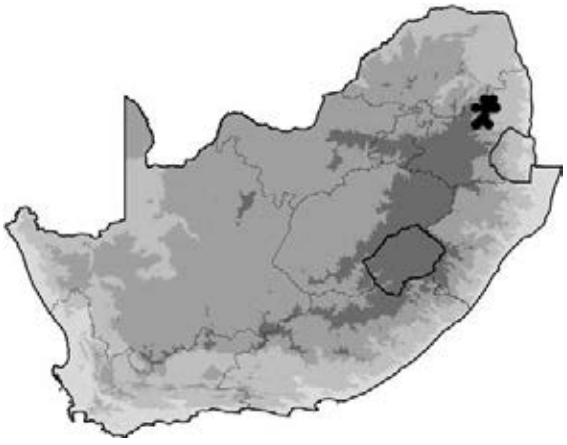
Distribution and ecology: an edaphic endemic around Barberton in Mpumalanga, especially the Kaap Valley; in open woodland and savanna, on verdite and other serpentine outcrops.

Diagnosis: distinguished from allied species by its tall stature, 750–1 500 mm high, narrow glaucous leaves 7–10 mm wide, and small, dry, brittle floral bracts 12–15 mm long. The short-tubed flowers resemble those of *Gladiolus densiflorus* and *G. crassifolius* and the three species are best distinguished vegetatively: *G. crassifolius* has strongly fibrous leaves with more heavily thickened midrib and margins plus at least one pair of secondary veins, and *G. densiflorus* has leaves with fine, closely set tertiary veins. Some plants in Mpumalanga, where the distribution of the species overlaps, may be difficult to place.

6. **Gladiolus exiguus** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 58 (1972). Type: South Africa, [Mpumalanga], Lydenburg District, Long Tom Pass, 19 km east of Lydenburg, 22 Feb. 1949, *Codd 5173* (PRE, holo.; BM, K, iso.).

Plants 300–400 mm high. *Corm* depressed-globose, 25–35 mm diam.; tunics of coarse, netted fibres, accumulating to form a thick collar of fibres around base of stem. *Stem* erect below, flexed outward above sheath of penultimate leaf, inclined in upper third, unbranched. *Leaves* 7 or 8, lower 5 or 6 ± basal, forming a crowded fan, reaching to between upper ⅓ of stem and base of spike, narrowly lanceolate, 9–15 mm wide, margins moderately thickened and main vein less so, with fine, closely set tertiary veins between, upper 1 or 2 leaves cauline, overlapping and largely sheathing. *Spike* inclined, 12- to 20-flowered; bracts dull green or flushed with grey-purple, outer 23–33 mm long, 1.5–2.0 internodes long, lightly folded along midline, acute to somewhat attenuate, inner bracts a little more than ½ as long, notched apically. *Flowers* pale creamy pink to deep pink, without noticeable nectar guides, unscented; perianth tube obliquely funnel-shaped, 14–16 mm long; tepals lanceolate-elliptic, dorsal arching over stamens and nearly horizontal, 20–22 × 14 mm, upper lateral and lower median ± 22 × 12 mm, lower laterals smallest, ± 18 × 10 mm. *Filaments* ± 15 mm long, exserted ± 7 mm from tube; anthers ± 6 mm long, brownish purple; pollen cream-coloured. *Style* arching over stamens, dividing opposite middle of anthers, branches ± 3 mm long. *Capsules* broadly ovoid, rounded apically, (9–)12–14 mm long. *Seeds* ovate to triangular, 4–6 mm long, unevenly winged or winged only at one end. *Flowering time*: late January to March.

Distribution and ecology: a relatively narrow endemic of the Mpumalanga Escarpment between Mt Sheba and Waterval Boven; in open, well-drained grassland on stony quartzite slopes.



Distribution of ***Gladiolus exiguus***.

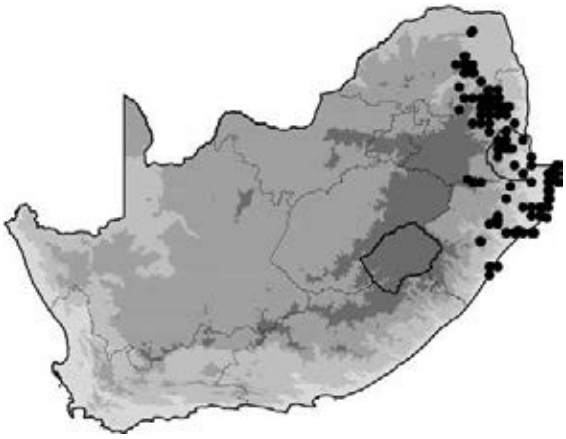
Diagnosis: distinguished by its low stature, seldom more than 400 mm high, with a fan of relatively short, often slightly twisted leaves not exceeding the spike. The leaf blades have thickened margins and midrib with fine, closely set tertiary veins between. The flowers are slightly larger than those of *Gladiolus densiflorus*, which has similar leaf venation, especially the perianth tube, 14–16 mm long vs. 12–14 mm long.

7. **Gladiolus densiflorus** *Baker* in Vierteljahrsschrift der Naturforschenden Gesellschaft Zürich 49: 178 (1904b). Type: South Africa, [Limpopo], Letaba District, Shilouvane, Apr. ± 1900, *Junod 1204* (Z, possible holo.; G, K, PRE, iso.).

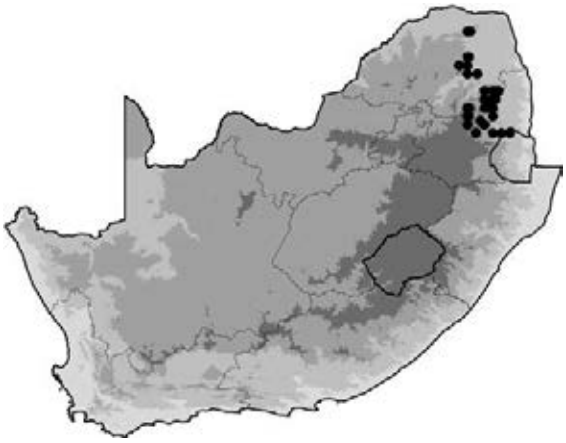
Gladiolus invenustus G.J.Lewis in Lewis et al.: 65 (1972). Type: Swaziland [Eswatini], Little Usutu River at Evelyn Baring Bridge, 13 Dec. 1960, *Compton 30382* (NBG, holo.; PRE, iso.).

Plants (400–)650–1 200 mm high. *Corm* depressed-globose, 25–40 mm diam.; tunics leathery, fragmenting irregularly with age and becoming somewhat fibrous. *Stem* erect below, flexed outward and inclined above sheaths of upper 1 or 2 leaves, usually unbranched, occasionally 1-branched. *Leaves* 8 or 9, lower 4 or 5 ± basal, forming a 2-ranked fan, reaching to ± middle of stem or base of spike, linear-lanceolate to lanceolate, (5–)10–24 mm wide, margins and main vein thickened and raised, remaining veins fine and closely set, cauline leaves progressively smaller, upper 2 usually entirely sheathing. *Spike* inclined, lightly flexuose, 12- to 25(45)-flowered; bracts greenish or purple, outer 15–20(–28) mm long, acute to attenuate, 1–2 internodes long, inner shorter than outer, acute or minutely forked apically. *Flowers* cream-coloured, greenish, pink, mauve, slate-grey, or occasionally orange, usually minutely speckled with pink to purple, either without noticeable nectar guides or lower 3 tepals each with poorly defined pale yellow median patch, unscented; perianth tube obliquely funnel-shaped, 12–14 mm long; tepals narrowly to broadly ovate, dorsal 15–18(–20) × 11–13 mm, ascending and arching over stamens, upper laterals 15–20 × 10–12 mm, directed forward and curving weakly outward in upper ⅓, lower 3 tepals joined together for 1.0–1.5 mm, 13–17 × 6–9 mm, weakly clawed and channelled in lower 3 mm, flexed downward distally. *Filaments* 10–12 mm long, exserted 5–6 mm from tube; anthers 4.5–6.0 mm long, dark purple to blackish; pollen white to cream-coloured. *Style* arching over stamens, dividing opposite distal ½, branches 2–3 mm long. *Capsules* obovoid, 3-lobed above and sometimes retuse, ± 10 mm long. *Seeds* ovate to triangular, 4–6 × 3–4 mm, poorly and unevenly winged, only one end. *Flowering time*: December to March but at almost any time of the year on the northern KwaZulu-Natal coastal plain.

Distribution and ecology: relatively widespread through the lowveld and eastern littoral, from Tate Vondo in Limpopo, South Africa, through Mpumalanga into Eswatini, southern Mozambique and KwaZulu-Natal; in



Distribution of ***Gladiolus densiflorus***.



Distribution of ***Gladiolus ferrugineus***.

moist grassland, mainly below 300 m but up to 2 000 m elevation in the mountains south of Barberton.

Diagnosis: highly variable in size and flower colour and recognised by the fan of leaves with thickened margins and main vein and fine, closely set tertiary veins between, and the generally tall, dense spike of small, short-tubed flowers. The flowers are plain or speckled and variable in colour. The species is superficially similar to *Gladiolus crassifolius* and the two may be confused where they co-occur along the Mpumalanga Escarpment. They are distinguished by details of the leaf venation: the leaves in *G. crassifolius* are more fibrous, with one or more pairs of secondary veins thicker and more conspicuous than the tertiary veins developed on each side of the main vein.

8. **Gladiolus ferrugineus** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 81 (1998), replacement name for *G. micranthus* Baker: 1005 (1904a), illegitimate homonym, not *G. micranthus* Stapf (1885). *G. varius* var. *micranthus* Oberm. in Lewis et al.: 34 (1972). Type: South Africa, [Limpopo], Sanatorium, Apr.–May 1901, *Junod 1716* (G, lecto., designated by Goldblatt & Manning: 81 (1998); G, Z, isolecto.).

Plants 350–600(–800) mm high. *Corm* globose, 15–20 mm diam.; tunics leathery, decaying into medium-textured fibres. *Stem* erect below, flexed outward above sheaths of cauline leaves and inclined, unbranched. *Leaves* 6 to 8, lower 3 or 4 ± basal, reaching to between base and apex of spike, narrowly lanceolate to linear, (3–)5–8(–15) mm wide, twisted several times, fibrotic and tough, margins and main vein thickened and raised, sometimes heavily so, remaining veins poorly developed, cauline leaves progressively smaller, upper 2 largely sheathing. *Spike* inclined, 8- to 15(–27)-flowered; bracts greenish in bud becoming dry and rusty brown in upper ⅓ at anthesis and soon entirely dry, outer 20–30 mm long, attenuate-apiculate, inner shorter, yellowish green, forked apically. *Flowers* white, cream-coloured to pearl-grey or pale pink, flushed with pink or blue on fading, lower lateral tepals with faint cream-coloured to pale yellow blotches in midline, markings sometimes darkening to purple with age, unscented; perianth tube obliquely funnel-shaped, 12–16(–25) mm long; tepals ovate, dorsal arching over stamens, nearly horizontal, 18–25(–28) × 12–15 mm, broadest in lower ⅓, upper laterals directed forward, barely curving outward toward apices, 18–30 × 15 mm, lower 3 tepals united basally for 1.5–6.0 mm, laterals 12–20 × ± 9 mm, narrowed below for ± 1.5 mm into claws, limbs abruptly widened and channelled below, lower median 15–25 × ± 11 mm. *Filaments* 12–15 mm long, exserted 7–8 mm from tube; anthers 6–8 mm long, lilac to purple; pollen yellow. *Style* arching over stamens, dividing between middle and apex of anthers, branches 3–4 mm long. *Capsules* obovoid, 3-lobed above and retuse, (6–)10–15 mm long. *Seeds* oval, ± 3–4 × 2.5 mm, narrowly and evenly or unevenly winged. *Flowering time*: mostly January to March, occasionally in late November and December or in April.

Distribution and ecology: extending along the eastern escarpment from the Soutpansberg in Limpopo, South Africa, through eastern Mpumalanga to the Saddleback Mtns near Barberton and Pigg's Peak in northern Eswatini; in marshy or well-watered grassland, often in peaty soil, on quartzite.

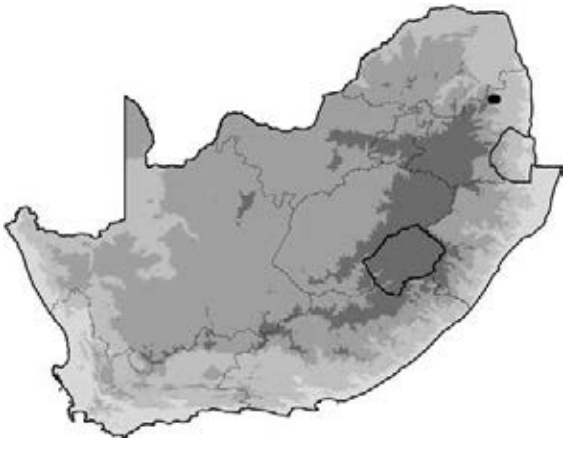
Diagnosis: recognised by the fibrous leaves with poorly developed secondary veins, and unbranched spike of white to pink flowers with relatively short perianth tube 13–16(–20) mm long and dry, rusty brown bracts 20–30 mm long. *Gladiolus ferrugineus* is closely related to *G. varius*, distinguished by its mostly larger flowers with longer perianth tube 30–50 mm long. Hybrids between the two species occur on the upper slopes of Long Tom Pass.

Gladiolus ferrugineus comprises two, more-or-less distinct forms that we interpret as ecological races: an early-flowering form from the lower escarpment with slightly broader leaves 6–15 mm wide and flowers with a short perianth tube, mostly 12–16 mm long, flowering

from late November to early February; and a later-flowering form from the upper escarpment with narrow, heavily thickened and often twisted leaves 3–6 mm wide and flowers with a slightly longer tube 18–25 mm long, flowering in March and April.

9. **Gladiolus saxatilis** *Goldblatt & J.C.Manning* in Bothalia 29: 63 (1999), as a replacement name for *G. lithicola* Goldblatt & J.C.Manning: 82 (1998), illegitimate homonym, not *G. lithicola* Goldblatt (1996). Type: South Africa, Mpumalanga, God's Window, Fanie Botha Hiking Trail, 3 Apr. 1996, *Lötter & Krynauw 86* (NBG, holo.)

Plants 450–800 mm high. *Corm* depressed-globose, 20–35 mm diam.; tunics firm-papery, becoming partly fibrous. *Stem* erect or inclined to horizontal below, lightly flexed in upper third, unbranched. *Leaves* 6 to 10, lower 4 to 8 in basal fan reaching to between base and middle of spike, drooping if stem inclined, lanceolate to narrowly sword-shaped, (12–)18–35 mm wide, margins and main vein barely thickened, main vein placed asymmetrically, uppermost leaf inserted on ± middle of stem and sheathing upper part of stem usually to ± base of spike, without blade. *Spike* inclined, straight, 9- to 16-flowered; bracts initially grey-green, soft-textured, becoming dry and rusty brown at tips or ± entirely rust-brown, lightly folded in midline, outer 38–48 mm long, ± 2 internodes long, inner shorter, minutely forked. *Flowers* whitish flushed pale mauve or mauve to pink, darkening with age, lower 3 tepals each with pale mauve, linear to narrowly diamond-shaped median streak, unscented; perianth tube narrowly and obliquely funnel-shaped, 30–40 mm long, flared outward in upper 10 mm; tepals ovate, margins slightly undulate, 3 upper largest, 30–37 × 18–20 mm, dorsal inclined, upper laterals spreading outward in distal ½, lower tepals joined to upper laterals for ± 4 mm and together for ± 2 mm, lower lateral tepals ± 28 × 15 mm, spreading in distal ½, lower median ± 33 × 16 mm long. *Filaments* 16–24 mm long, exserted 10–15 mm from tube; anthers ± 9 mm long, yellow; pollen cream-coloured. *Style* arching over stamens, dividing 1–2 mm below anther apices, branches 5–6 mm long. *Capsules* globose, 3-lobed above, 8–10 mm long. *Seeds* oblong, 4–6 × ± 3 mm, unevenly and weakly winged. *Flowering time*: mid-March to late April or early May.



Distribution of ***Gladiolus saxatilis***.

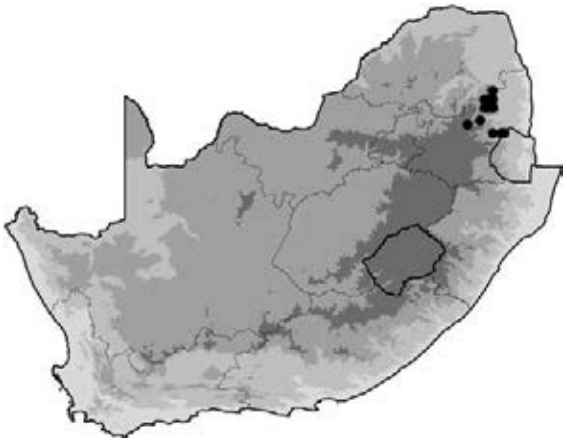
Distribution and ecology: a narrow endemic of the eastern escarpment between Graskop and Mariepskop in Mpumalanga, South Africa; on sheltered or partly shaded quartzite cliffs or outcrops in peaty soil in crevices.

Diagnosis: recognised by its broad, moderately soft-textured leaves, (12–)18–35 mm wide and relatively large, pale pink flowers with perianth tube 30–40 mm long, and rusty red-brown bracts 38–48 mm long. The leaves lack the fine, closely set tertiary veins of species such as *Gladiolus ferrugineus* and *G. varius*.

10. **Gladiolus varius** *F.Bolus* in Annals of the Bolus Herbarium 2: 104 (1917). Type: South Africa, [Mpumalanga], Pilgrim's Rest, Mar. 1915, *Rogers 14601* (BOL, holo.; J, K, iso.).

Gladiolus varius var. *brevifolius* F.Bolus: 104 (1917). Type: South Africa, [Mpumalanga], Barberton, Saddleback Mt, 5 000 ft [1 500 m], 22 Feb. 1890, *Galpin 828* (BOL, holo.; K, SAM, Z, iso.).

Plants 450–700 mm high. *Corm* depressed-globose, 18–25 mm diam.; tunics cartilaginous, becoming coarsely fibrous, often accumulating around base of stem in a collar of coarse fibres. *Stem* erect, flexed outward above sheath of penultimate leaf, inclined above, unbranched, ± 3 mm diam. at base of spike. *Leaves* usually 7, lower 4 or 5 ± basal, forming a lax 2-ranked fan, reaching to ± base of spike, blades narrowly lanceolate to nearly linear, (2.5–)4.0–9.0 mm wide, margins and main vein moderately or strongly thickened, cauline leaves shorter, uppermost usually entirely sheathing. *Spike* inclined, (6–)8- to 12-flowered; bracts pale greenish brown below and ± dry and rusty brown in distal half by anthesis, outer (25–)30–40(–70) mm long, 1.5–2.0 internodes long, inner bracts slightly shorter. *Flowers* usually deep pink, occasionally pale pink to nearly white, lower 3 tepals each usually with dark pink to purple median streak, unscented; perianth tube narrowly and obliquely funnel-shaped, (27–)37–50 mm long, cylindric lower part (20–)27–38 mm long, wider upper part ± 10 mm long; tepals lanceolate, unequal, dorsal largest, horizontal and hooded over stamens, 26–32 × 17–20 mm (often smaller in preserved specimens), upper laterals directed forward and curving outward in distal ½, 24–32 × ± 12 mm, lower 3 tepals united basally for 4–6 mm, lower lateral tepals 20–24 × 12 mm, narrowed below into claws ± 2 mm long, lower median tepal 23–26 × 12 mm. *Filaments* 12–16 mm long, exserted 5–8 mm from tube; anthers 8–9 mm long, lilac; pollen cream-coloured. *Style* arching over stamens, dividing below or up to 5 mm beyond anther apices, branches ± 6 mm long. *Capsules* oblong, 3-lobed and retuse apically, 12–15 mm long. *Seeds* discoid to angular, 2.5–3.5 × ± 2.5 mm, wing poorly and irregularly developed or vestigial. *Flowering time*: February to March, rarely late January.



Distribution of ***Gladiolus varius***.

Distribution and ecology: endemic to the eastern escarpment in Mpumalanga, South Africa, from Mt Sheba to near Barberton; at high elevations in rock crevices on exposed rocky quartzite ridges and outcrops.

Diagnosis: recognised by the narrow, fibrous leaves up to 9 mm wide with strongly thickened margins and midrib, and the moderately large, long-tubed pink flowers with perianth tube (27–)37–50 mm long, and large, rusty brown bracts (25–)30–70 mm long. The narrow, thickened leaves distinguish the species from *Gladiolus saxatilis*. Shorter tubed plants may be confused with *G. ferrugineus*, with mostly paler pink flowers with perianth tube 12–16(–25) mm long. Hybrids between the two species are recorded from the upper slopes of Long Tom Pass.

Ser. **Calcarati** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus calcaratus* G.J.Lewis

Corm globose to depressed-globose; tunics leathery or firmly papery to fibrous. *Leaves* with moderately thickened margins and midribs and sometimes secondary veins; bracts often dry and papery or membranous and brown above, 18–55 mm long. *Flowers* small to moderately large. *Anthers* basally tailed or spurred.

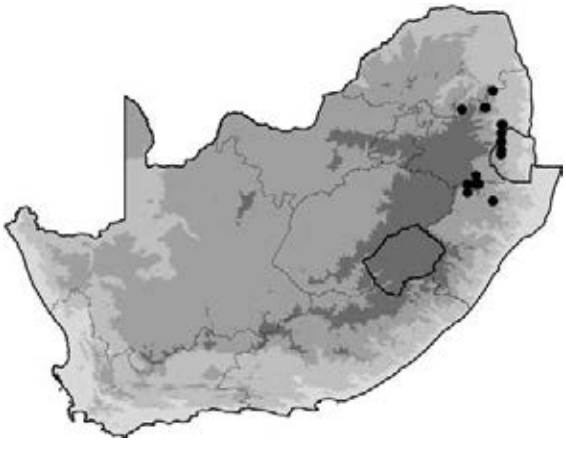
11. **Gladiolus appendiculatus** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 68 (1972). Type: South Africa, [Mpumalanga], Wakkerstroom District, Farm Oshoek, 15 Feb. 1961, *Devenish 582* (PRE, holo.; K, NBG, iso.).

Gladiolus appendiculatus var. *longifolius* G.J.Lewis in Lewis et al.: 69 (1972). Type: Swaziland [Eswatini], Hlatikulu, May 1906, *Stewart s.n.* (BOL, holo.).

Plants 350–600(–850) mm high. *Corm* globose, 15–20 mm diam.; tunics leathery to firm-papery, becoming ± fibrous or irregularly broken. *Stem* evidently erect and ± straight, unbranched. *Leaves* 6 to 9, lower 4 or 5 basal, either narrow and reaching to at least base of spike and often shortly exceeding it or broad and reaching only to middle of stem, lanceolate or narrowly sword-shaped to linear, (2.5–)4.0–12.0(–20.0) mm wide, sometimes longitudinally concave or channelled, main vein usually lightly thickened, margins lightly to fairly heavily thickened, intercostal surface occasionally shortly hairy, cauline leaves progressively smaller, uppermost 1 or 2 usually entirely sheathing. *Spike* ± erect and straight, 6- to 14(–27)-flowered; bracts firm-textured, green to grey-purple but usually dry and brownish above by anthesis, outer 18–30 mm long, overlapping and usually ½–2 internodes long, inner shorter or almost as long. *Flowers* white or pale to deep pink, lower laterals or all 3 lower tepals with small purplish spot or sometimes crescent in upper ⅓, yellowish in throat, unscented; perianth tube obliquely funnel-shaped, ± 15 mm long; tepals ovate, ± acute, upper 3 largest, 15–18 × 10–12 mm, dorsal arching over stamens, strongly channelled, upper laterals directed forward, curving outward in distal ⅓, lower 3 tepals united for ± 3 mm, 9–12 mm long, channelled below, curving downward above. *Filaments* 9–11 mm long, exserted ± 3 mm from tube; anthers appressed to dorsal tepal, 8–9 mm long including sterile spurs 3–4 mm long, pale yellow fading to mauve, spurs white, held at right angles to anther thecae; pollen whitish. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches ± 3 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mainly April and May, occasionally March.

Distribution and ecology: extending along the eastern escarpment from Mariepskop and Pilgrim's Rest in Mpumalanga into Eswatini and as far as south as Vryheid in northern KwaZulu-Natal; in rocky grassland, at least sometimes in dolerite clay, usually above 1 800 m.

Diagnosis: among the three species with basally spurred anthers, *Gladiolus appendiculatus* is recognised by its short-tubed, white or pale pink flowers with perianth tube ± 15 mm long. The species includes two distinct forms. Taller plants, more than 450 mm tall, with narrow leaves 2.5–8.0 mm wide reaching to the middle of the spike and with up to 25 flowers per spike, are known from Eswatini and near Lydenburg in Mpumalanga. Shorter plants with broader leaves 8–12 mm wide not



Distribution of ***Gladiolus appendiculatus***.

reaching the base of the spike and with 5 to 12 flowers per spike have been recorded from Pilgrim's Rest and Barberton to Wakkerstroom and Vryheid. Intermediates occur near Lydenburg and Barberton.

12. **Gladiolus calcaratus** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 67 (1972). Type: South Africa, [Mpumalanga], Lydenburg District, Long Tom Pass, near highest point, 4 Mar. 1968, *Mauve & Leistner 3218* (PRE, lecto., designated by Goldblatt & Manning: 87 (1998); K, PRE, isolecto.).

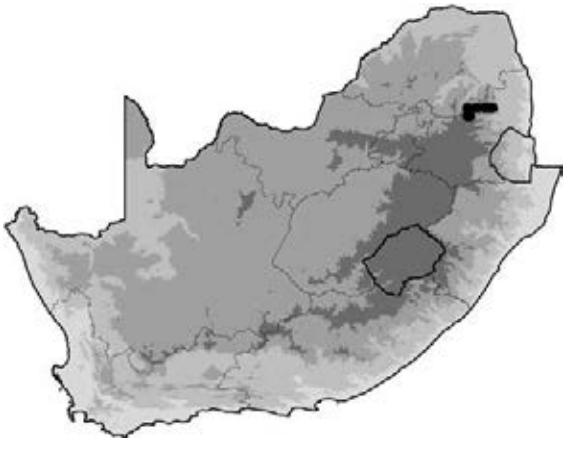
Plants 300–450 mm high. *Corm* globose, 12–15 mm diam., bearing small cormlets at base; tunics leathery to ± woody, decaying into fairly coarse vertical fibres. *Stem* erect, simple, usually slightly flexed above sheaths of upper 2 leaves. *Leaves* 6 to 8, lower 3 to 5 basal, reaching to between middle of stem and middle of spike, narrowly sword-shaped to nearly linear, 4–8 mm wide, main vein and margins moderately thickened, cauline leaves decreasing in size and progressively reduced, upper 1 or 2 ± entirely sheathing. *Spike* ± straight, 6- to 10-flowered; bracts firm-textured, dark green, dry and brownish above, outer 35–45(–55) mm long, overlapping, 1.5–2.0 internodes long, lightly folded in midline, inner shorter. *Flowers* white, fading to pale pink or lilac, especially in midlines of tepals, yellow in throat, lower tepals each with pale yellowish median longitudinal streak outlined in pale dull pink, unscented; perianth tube obliquely funnel-shaped, (16–)25–40 mm long, lower cylindric part (12–)20–32 mm long; tepals broadly lanceolate, upper 3 largest, 28–33 × 12–14 mm, dorsal extended horizontally and curving upward near tip, upper laterals sometimes up to 5 mm longer than dorsal, directed forward, curving outward in distal fourth, lower 3 tepals basally united for ± 2 mm, lower laterals 20–22 × ± 12 mm, lower median 23–30 × ± 12 mm. *Filaments* 12–14 mm long, exserted ± 7 mm from tube; anthers 9–12 mm long, including sterile tails or spurs 3–4 mm long, whitish; pollen cream-coloured. *Style* arching over stamens, dividing at or shortly beyond anther apices, branches 3.0–4.5 mm long. *Capsules* obovoid, 3-lobed above, 10–12 mm long. *Seeds* narrowly ovate to pear-shaped, 4–5 × ± 2 mm, unevenly and weakly winged, sometimes one half without a wing. *Flowering time*: mid-February to early April.

Distribution and ecology: endemic to the higher parts of the eastern escarpment in Mpumalanga, South Africa, from Dullstroom and Kemp's Heights to Mt Sheba, with an outlying record from Loskop Dam to the west; in seasonally damp grassland.

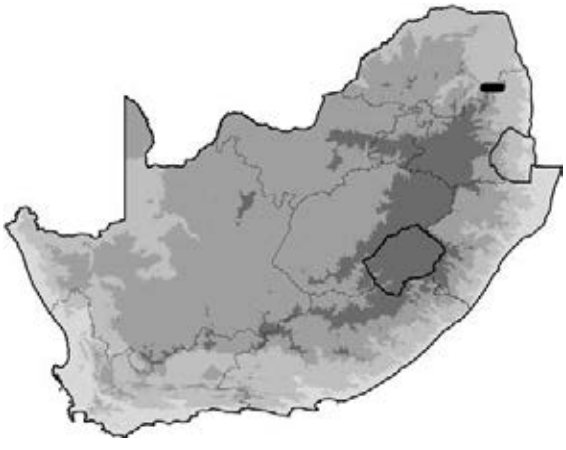
Diagnosis: recognised by the relatively large, white or pinkish flushed flowers with a moderately long perianth tube (16–)25–40 mm long and the basally spurred or tailed anthers.

13. **Gladiolus macneilii** *Oberm.* in Lewis et al. in Journal of South African Botany, Suppl. 10: 84 (1972). Type: South Africa, [Mpumalanga], Pilgrims Rest District, Abel Erasmus Pass, dolomite in red loam, 17 Apr. 1969, *Mauve & MacNeil 4788* (PRE, holo.; BOL, K, NBG, iso.).

Plants 700–900 mm high. *Corm* ovoid, 16–22 mm diam.; tunics cartilaginous, soon decaying into pale, medium-textured fibres. *Stem* erect, flexed outward above sheaths of upper 2 or 3 leaves, simple or with 1 or 2 short branches. *Leaves* 8 or 9, lower 4 basal and reaching to between base and middle of spike, blades linear, mostly 2.5–4.0 mm wide, main vein moderately thickened and raised, margins lightly thickened, cauline leaves progressively smaller and largely sheathing. *Spike* usually inclined, weakly flexuose, 7- to 17-flowered; bracts narrowly lanceolate-attenuate, pale green in bud, becoming membranous to dry and light pinkish brown above, dry at end of flowering, apices dark brown, outer (25–)30–40(–50) mm long, ± 2 internodes long, inner shorter. *Flowers* cream-coloured to pale salmon-pink, lower 3 tepals each with dark red longitudinal median streak, unscented; perianth tube 40–45 mm long, cylindric below, curved and flared outward in upper ± 8 mm; tepals lanceolate-attenuate, upper 3 largest, dorsal ± 30 × 15 mm, arching over stamens, upper laterals directed forward and curving outward lightly in distal ⅓, ± 27 × 13 mm, lower 3 tepals united basally for



Distribution of ***Gladiolus calcaratus***.



Distribution of ***Gladiolus macneilii***.

4–5 mm, apices narrow and recurving, lower laterals ± 18 × 4 mm, lower median ± 25 × 7 mm. *Filaments* 12–14 mm long, exserted ± 5 mm from tube; anthers 10–12 mm long, including sterile tails 1.5–2.5 mm long, apiculate, purple; pollen pale yellow. *Style* extending horizontally over stamens, dividing opposite anther apices, branches ± 2 mm long. *Capsules* obovoid, 3-lobed above and retuse, 15–20 mm long. *Seeds* oblong, broadly winged, ± 6 mm long. *Flowering time*: March and April.

Distribution and ecology: a local endemic known only from the Abel Erasmus Pass in Mpumalanga, South Africa; in dolomite outcrops in grassland and open woodland.

Diagnosis: readily recognised by the narrow leaves and long-tubed, white to pale salmon-pink flowers with attenuate tepals, slender perianth tube 40–45 mm long, and basally spurred anthers.

Sect. 2. **Ophiolyza** *(Klatt) Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 99 (1998). *Gladiolus* subg. *Ophiolyza* Klatt: 343 (1882). Type species: *Gladiolus natalensis* Reinw. ex Hook.f. = *G. dalenii* Van Geel.

Plants medium-sized to large. *Stem* branched or unbranched, glabrous or pubescent. *Corm* tunics papery or leathery to fibrous. *Leaves* several, mostly basal in a fan, sometimes with a pseudostem formed by clasping sheaths, narrowly lanceolate to lanceolate, firm-textured, plane with thickened main vein and margins, usually at least 4 mm wide, smooth or pubescent. *Spike* often many-flowered, usually crowded, sometimes 2-ranked; bracts glabrous or pubescent, margins of inner bracts sometimes connate and tubular around ovary. *Flowers* medium to large, weakly or more strongly bilabiate, nectar guides usually present, often of streaks or speckles on a paler ground, unscented; perianth tube usually obliquely funnel-shaped, shorter or longer than dorsal tepal; lower tepals narrower but usually ± as long as upper. *Anthers* without tails. *Capsules* usually large, oblong and rounded or obscurely lobed above. *Seeds* broadly and evenly winged.

Defined by the basal fan of lanceolate leaves and the dense spike of mostly relatively large, unscented flowers often with nectar guides streaked or speckled on a paler ground, sect. *Ophiolyza* is restricted to grasslands and savannas in the summer-rainfall region. The section includes 21 southern African species, as well as several from tropical Africa.

Ser. **Scabridi** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus scabridus* Goldblatt & J.C.Manning

Corm globose to depressed-globose; tunics leathery or firmly papery to fibrous. *Stems* glabrous or scabrid-pubescent. *Leaves* leathery or relatively soft-textured, margins and midrib often only weakly thickened, glabrous or scabrid-pubescent; bracts glabrous or scabrid-pubescent. *Spike* subsecund. *Flowers* mostly moderate-sized, often deep pink with red streaks on lower tepals; perianth tube usually longer than dorsal tepal.

14. **Gladiolus ochroleucus** *Baker* in Journal of Botany, British and foreign 14: 182 (1876a). Type: South Africa, [Eastern Cape], Umtata District, Baziya Mountain, Dec.–Mar., *Baur 94* (K, holo.; B, BOL, SAM, iso.).

Gladiolus kirkii Baker: 524 (1890). Type: South Africa, [Eastern Cape], King William's Town, cultivated in Britain, 30 July 1890, *Kirk s.n.* (K, holo.).

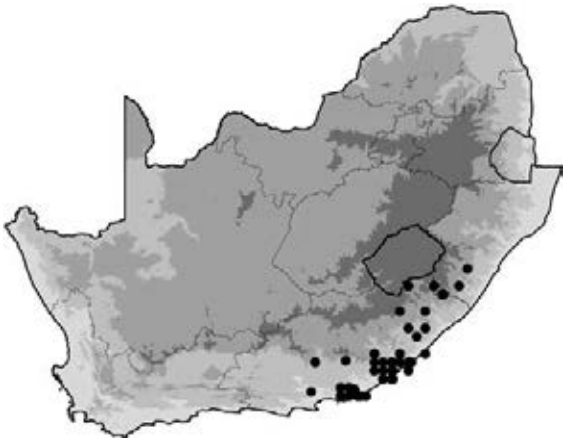
Gladiolus reductus Baker: 4: 1006 (1904a). Type: South Africa, [Eastern Cape], East London, Feb. 1898, *Seifert sub Conrath 581* (GZU, holo. [photo at PRE]).

Gladiolus masoniorum C.H.Wright: 305 (1913). Type: South Africa, [Eastern Cape], Tembuland, cultivated in Britain, 30 May 1913, *Mason & Mason s.n.* (K, holo.).

Gladiolus stanfordiae L.Bolus: 293 (1927b). Type: South Africa, [Eastern Cape], without precise locality, cult. hort. Stanford, Stellenbosch, Feb. 1927, *Stanford s.n.* (BOL, holo.).

Gladiolus triangulus G.J.Lewis: 140, fig. a (1933). Type: South Africa, [Eastern Cape], Albany District, Bushman's River, cult. Kirstenbosch Gardens, 27 Apr. 1933, *Holland 4006* (BOL, lecto., designated by Goldblatt & Manning: 89 (1998); BOL, isolecto.).

Plants (300–)400–800 mm high, occasionally ± evergreen. *Corm* globose to depressed-globose, 25–35 mm diam.; tunics leathery to firm-papery, decaying into irregularly shaped fragments. *Stem* erect, simple or with 1 or 2 short branches. *Leaves* 7 to 12, mostly basal in a close fan, ± ½ as long as stem with longest reaching base of spike, blades narrowly lanceolate, (8–)15–25 mm wide, margins and main vein moderately thickened, margins sometimes minutely ciliate to scabrid, secondary and tertiary veins also lightly thickened, cauline leaves shorter than basal. *Spike* flexed at base and inclined (4–)12- to 18-flowered; bracts green, outer 25–40(–50) mm long, acute or sometimes attenuate, inner slightly shorter, bifid or deeply divided. *Flowers* pink to light purple or reddish, whitish or yellow flushed brownish on reverse, lower tepals white in basal ½, sometimes with dark red-purple median streaks, reddish at top of tube, unscented; perianth tube obliquely funnel-shaped, 15–20 mm long; tepals ovate, margins ± undulate, upper 3 largest, 24–28 × 18–20 mm, dorsal hooded and horizontal, upper laterals usually slightly longer than dorsal, usually flaring outward distally or



Distribution of ***Gladiolus ochroleucus***.

directed forward, lower lateral tepals smallest, 16–19 × ± 9 mm, narrowly channelled, directed forward, lower median curving downward distally. *Filaments* 10–12 mm long, exserted ± 5 mm from tube; anthers ± 9 mm long, pale mauve; pollen cream-coloured. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches ± 4 mm long. *Capsules* narrowly obovoid-oblong, 3-lobed above and retuse, (20–)25–30 mm long, shorter than bracts. *Seeds* oval, 8–9 × ± 5 mm, broadly and evenly winged. *Flowering time*: December to April, or as late as May.

Distribution and ecology: extending along the southeastern seaboard of South Africa, from the Zuurberg west of Grahamstown in Eastern Cape to Byrne in southern KwaZulu-Natal; in grassland and open woodland, from near sea level to 1 200 m.

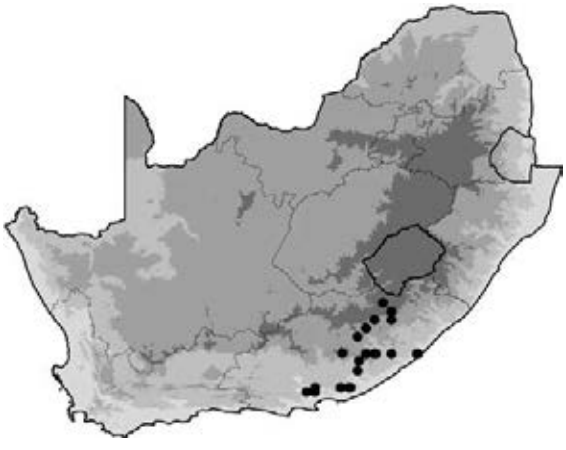
Diagnosis: recognised by the basal fan of lanceolate leaves and smallish, short-tubed flowers with relatively long, green bracts 25–50 mm long and perianth tube 15–20 mm long. The leaf margins are often ciliolate or scabrid. Plants from the northern and central parts of the range, in southern KwaZulu-Natal and Transkei [Eastern Cape], have creamy yellow flowers, while those from south of the Kei River are mostly bright pink. A dark purple form occurs near East London. *Gladiolus mortonius* from slightly higher elevations inland has a considerably longer perianth tube, 30–45 mm long, and firmer, more fibrous leaves.

15. **Gladiolus mortonius** *Herb.* in Curtis's Botanical Magazine 65: t. 3680 (1838) & sub t. 3693 (1838). *G. blandus* var. *mortonius* (Herb.) Baker: 217 (1892). Type: South Africa, without precise locality, illustration in Herb.: t. 3680 (1838).

Gladiolus macowanii Baker: 219 (1892). *G. ochroleucus* var. *macowanii* (Baker) Oberm. in Lewis et al.: 37 (1972). *G. massonii* Klatt in Th.Durand & H.Schinz: 220 (1894), illegitimate superfluous name. Type: South Africa, [Eastern Cape], Somerset East, slopes of Boschberg, Apr. 1869, *MacOwan 236* (K, lecto., designated by Goldblatt & Manning: 91 (1998), K; BOL, G, GRA, S, Z, isolecto.).

Gladiolus davisoniae F.Bolus: 98 (1917). Type: South Africa, [Eastern Cape], Berlin, Somerset East mountains, cultivated in Cape Town, 17 Mar. 1915, *De Courcy s.n.* (BOL 14762, holo. [on 2 sheets]).

Plants 400–720 mm high. *Corm* globose to depressed-globose, (20–)30–50 mm diam.; tunics leathery to firm-papery, decaying into irregular fragments. *Stem* erect, simple, rarely with one branch. *Leaves* 7 to 12, mostly basal in a tight fan, ± ½ as long as stem with longest reaching to between middle of stem and base of spike, blades narrowly lanceolate, (8–)15–25 mm wide, margins and main vein moderately thickened, sometimes ciliolate on margins, secondary and tertiary veins also lightly thickened, cauline leaves shorter. *Spike* flexed at base and inclined, 5- to 16-flowered; bracts pale green, sometimes glaucous, the outer 40–60 mm long, acute to attenuate, inner shorter to ± as long as outer, usually minutely forked. *Flowers* pink, lower tepals each with red median streak flanked by a few fine reddish longitudinal lines, base of throat dark red, unscented; perianth tube cylindric and curving outward above, (20–)30–45 mm long, expanded gradually in upper 6–8 mm; tepals lanceolate-ovate, margins undulate, 3 upper largest, 32–40 × 20 mm, dorsal arching over stamens, upper laterals usually slightly longer and wider than dorsal, usually directed forward and flaring outward distally, lower 3 tepals joined basally for ± 4 mm, lower laterals 30–35 × 12–16 mm, lower median ± as long as upper tepals, 32–40 × 12–18 mm, directed forward, lowermost tepal curving downward distally. *Filaments* ± 14 mm long, exserted 4–7 mm from tube; anthers 12–15 mm long, shortly apiculate, usually purple; pollen whitish. *Style* arching over stamens, dividing opposite anther tips, branches 4–6 mm long. *Capsules* narrowly obovoid-oblong, 3-lobed above and retuse, 28–32 mm long, shorter than bracts. *Seeds* ovate, ± 8 × 5 mm, broadly and evenly winged. *Flowering time*: February to April.



Distribution of ***Gladiolus mortonius***.

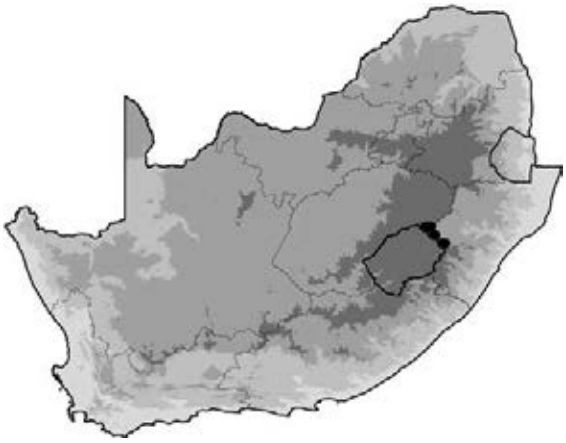
Distribution and ecology: endemic to the Eastern Cape, South Africa, from Elliot through the Winterberg and Amatole Mtns to the Boschberg near Somerset East and the Zuurberg; in stony grassland, mostly at moderate to higher elevations.

Diagnosis: distinguished from *Gladiolus ochroleucus* by the larger, consistently pink flowers with longer perianth tube, 30–45 mm long. *Gladiolus mortonius* can be confused with forms of *G. oppositiflorus*, but that species has a markedly 2-ranked spike and distinctive floral bracts, somewhat inflated below with the margins of the inner bracts connate and tubular around the ovary and the apices drawn into long, brown-tipped cusps.

16. **Gladiolus microcarpus** *G.J.Lewis* in Lewis et al. Journal of South African Botany, Suppl. 10: 85 (1972). Type: South Africa, [KwaZulu-Natal], Cathedral Peak Forest Station, cliffs in Ndumeni River Valley, 7 Feb. 1958, *Killick 1655* (PRE, holo.).

Plants up to 1 m high, usually inclined or pendent, with densely puberulous cataphylls. *Corm* ± globose, ± 20 mm diam.; tunics membranous to finely fibrous. *Stem* inclined or drooping, unbranched or with 1 to 3 branches. *Leaves* 5 to 7, lower 3 ± basal, ± as long or longer than stem but trailing, narrowly lanceolate, 6–12 mm wide, main vein strongly thickened and raised, a pair of secondary veins, 1 or 2 pairs of tertiary veins and margins lightly raised, with minute hairs on blades and sheaths, cauline leaves decreasing in size above. *Spike* inclined to ascending, lightly flexuose, (5)8- to 12-flowered, sub-2-ranked; bracts dull green to dull greenish purple, lightly ridged, outer 25–35 mm long, ± 2.5 internodes long, inner shorter and completely enclosed, forked apically. *Flowers* bright pink, lower 3 tepals each with broad white longitudinal zone in lower ⅔ with narrow reddish purple streak in midline, reddish at base of throat, unscented; perianth tube obliquely funnel-shaped, 35–40 mm long, cylindric in lower 30–35 mm; tepals lanceolate, outer whorl smaller than inner, dorsal largest, 35–40 × ± 17 mm, ascending and inclined over stamens, upper laterals curving outward near tips, 25–30 × ± 10 mm, lower laterals lightly inclined, tips curving downward, 32–35 × ± 13 mm, lower median 24–26 × ± 8 mm. *Filaments* ± 15 mm long, exserted ± 10 mm from tube; anthers ± 8 mm long, whitish to lilac, apiculate; pollen white. *Style* arching over stamens, dividing shortly beyond anther apices, branches ± 4 mm long. *Capsules* oblong, 3-lobed above and retuse, 12–15 mm long, enclosed in bracts. *Seeds* oblong, broadly and evenly winged, ± 5 × 4 mm. *Flowering time*: December to late January at lower elevations, to early March at higher elevations.

Distribution and ecology: a local endemic of the high Drakensberg of Lesotho and central KwaZulu-Natal and adjacent Free State, South Africa, from Witzieshoek and the Mahai Valley to Cathkin Park; on seasonally wet basalt or sometimes sandstone outcrops and cliffs, from 1 800 to 2 700 m elevation.



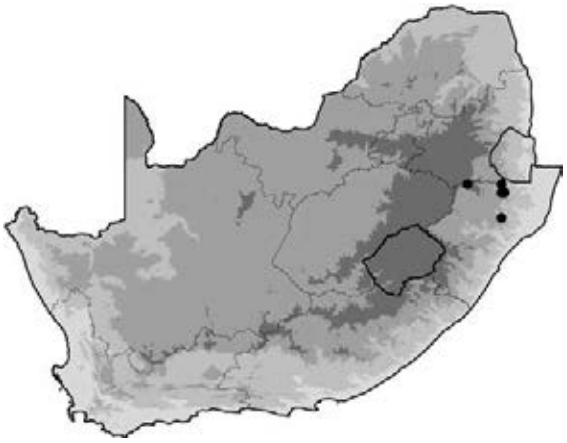
Distribution of ***Gladiolus microcarpus***.

Diagnosis: recognised by its drooping spikes of long-tubed pink flowers with slender perianth tube 35–40 mm long, attenuate tepals with the outer whorl subequal and notably wider than the inner whorl. The cataphylls and leaves are minutely pubescent. The habitat on wet cliffs and rocks is characteristic.

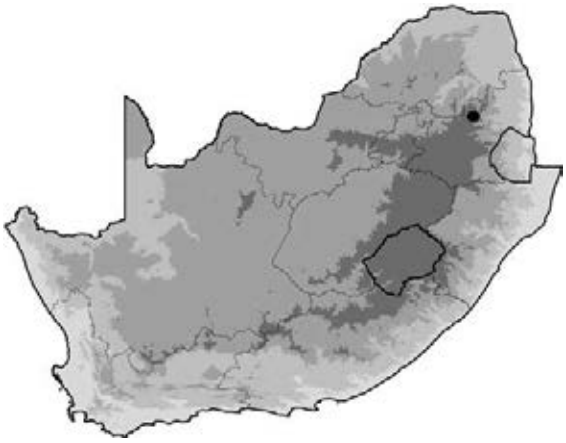
17. **Gladiolus scabridus** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 94 (1998). Type: South Africa, [KwaZulu-Natal], Itala Nature Reserve, Craigadam Farm, Mabomvu Ridge, 2 950 ft [890 m], 5 Jan. 1978, *McDonald 399* (NU, holo.; K, PRE, iso.).

Gladiolus microcarpus subsp. *italaensis* Oberm.: 451 (1981). Type: South Africa, [KwaZulu-Natal], Itala Nature Reserve, hills above Pongola River, 10 Jan. 1980, *Mauve & Reid 5266* (PRE, holo.).

Plants up to 1 m high, sometimes puberulous on cataphylls. *Corm* ± globose, 30–35 mm diam.; tunics firm-papery becoming fibrous. *Stem* erect, scabrid, simple or 1- or 2-branched. *Leaves* 7 to 9, lower 5 or 6 ± basal in a loose fan reaching to between base and apex of spike, scabrid-papillose, sword-shaped, usually 10–20(–24) mm wide, main and a pair of secondary veins moderately thickened and raised, margins less so, cauline leaves decreasing in size above, uppermost often entirely sheathing. *Spike* erect and straight, 10- to 16-flowered; bracts dull green to dull greenish purple, scabrid, often ± dry above, apices twisted outward, outer 25–35 mm long, ± 2.5 internodes long, inner forked, shorter to slightly longer than outer. *Flowers* pink, lower 3 tepals with narrow white longitudinal zone in lower ⅔ and reddish median streak, unscented; perianth tube obliquely funnel-shaped, 35–40 mm long, cylindric in lower 30–35 mm; tepals lanceolate, upper 3 largest and subequal, 40–45 mm long, dorsal 18–20 mm wide, upper laterals 16–18 mm wide, lower 3 tepals joined to upper laterals for 3–4 mm and together for ± 4 mm, ± straight, tilted toward ground, 35–40 × 10–12 mm. *Filaments* 15–16 mm long, exserted ± 8 mm from tube; anthers 10–13 mm long, pale yellow; pollen white. *Style*



Distribution of ***Gladiolus scabridus***.



Distribution of ***Gladiolus cataractarum***.

arching over stamens, dividing opposite or shortly beyond anther apices, branches 5–6 mm long. *Capsules* oblong, 3-lobed above and retuse, 16–22 mm long. *Seeds* broadly ovate, 6–8 × 4–5 mm, ± evenly winged or wing only on one side. *Flowering time*: December to late January at lower elevations, sometimes into late February in cooler, wetter sites.

Distribution and ecology: restricted to southern Eswatini and northern KwaZulu-Natal and southern Mpumalanga, South Africa, along the Pongola River; in well-drained rocky sites in open woodland on quartzite outcrops, from 1 000 to 2 000 m elevation.

Diagnosis: distinguished by the scabridulous stems, leaves and floral bracts, and the long-tubed, pink flowers with slender perianth tube 35–40 mm long. *Gladiolus microcarpus* has similar long-tubed, pink flowers but hairless, drooping stems and attenuate tepals.

18. **Gladiolus cataractarum** *Oberm.* in Bothalia 14: 78 (1982). Type: South Africa, [Mpumalanga], near Dullstroom, Farm Waterval above Lunsklip Waterfall, Feb. 1981, *Krijt s.n.* (PRE 58472, holo. [on two sheets]).

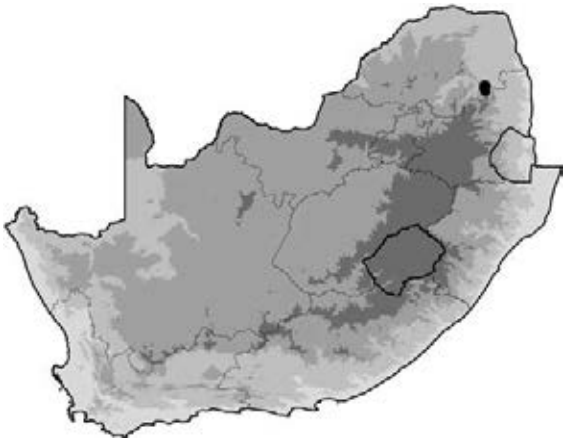
Plants to 0.7 m high. *Corm* globose, ± 30 mm diam.; tunics leathery becoming partly fibrous. *Stem* erect, unbranched. *Leaves* 8 or 9, lower 6 basal and reaching to shortly below base of spike, narrowly to broadly lanceolate, (20–)35–45 mm wide, margins and main vein lightly thickened and hyaline, cauline leaves progressively shorter, largely sheathing. *Spike* straight and erect, 8- to 16-flowered; bracts green, firm-textured, outer 50–60(–70) mm long, attenuate, ± 2 internodes long, inner shorter, minutely forked. *Flowers* pink, lower 3 tepals marked with longitudinal reddish lines along midline, unscented; perianth tube cylindric below, 40–50 mm long, flared outward in upper 10 mm; tepals lanceolate, upper 3 largest, 44–48 × ± 16 mm, dorsal arched to nearly horizontal, upper laterals spreading outward in distal ½, lower lateral tepals ± 40 × 14 mm, spreading distally. *Filaments* ± 12 mm long, exserted ± 4 mm from tube; anthers ± 12 mm long, yellow; pollen yellow. *Style* arching over stamens, dividing shortly beyond anther apices, branches ± 5 mm long. *Capsules* oblong, 3-lobed above and retuse, ± 30 mm long. *Seeds* oblong, 7–8 × 4–5 mm, broadly and evenly winged. *Flowering time*: February to mid-March.

Distribution and ecology: a narrow endemic of the eastern escarpment in Mpumalanga, between Dullstroom and Lydenburg; on cliffs and steep south-facing rocky slopes on quartzite.

Diagnosis: a robust species with leaves 20–45 mm wide, large, long-tubed pink flowers with a perianth tube 40–50 mm long and firm-textured, green bracts 50–70 mm long. *Gladiolus cataractarum* has a general resemblance to *G. saxatilis*, but that species has unmarked flowers with shorter bracts, 40–50 mm long, that turn rusty brown at flowering.

19. **Gladiolus pavonia** *Goldblatt & J.C.Manning* in Novon 6: 174 (1996). Type: South Africa, Mpumalanga, dolomite hill slopes between the top of Abel Erasmus Pass and Strydom Tunnel, 6 Dec. 1994, *Goldblatt & Manning 10131* (NBG, holo.; K, MO, PRE, iso.).

Plants 450–800 mm high. *Corm* ovoid, 8–13 mm diam., with long stolons from base; tunics ± papery, becoming irregularly broken and ± fibrous. *Stem* erect, sometimes flexed outward above sheaths of upper 2 leaves, but remaining erect, unbranched. *Leaves* 6 or 7, lower 3 or 4 ± basal and reaching to base or sometimes slightly exceeding spike, sword-shaped, 8–14 mm wide, usually slightly twisted in upper ½, cauline leaves much smaller, uppermost largely to entirely sheathing. *Spike* erect, (2)4- to 7-flowered, 2-ranked; bracts relatively soft-textured, apices becoming dry and light brown soon after anthesis, outer (15–)23–30 mm long, inner bracts slightly shorter to ± as long, apiculate or minutely forked. *Flowers* pale pink, upper tepals dark red toward base, dorsal ½ of tube dark red distally, lower margins of dorsal tepal with wide transparent band, lower lateral



Distribution of ***Gladiolus pavonia***.

tepals lightly streaked with pink longitudinal lines in basal half, lower median tepal whitish in lower ½ with purple streaks, lower tepals also with white zone and central red spot just below tepal sutures, unscented; perianth tube obliquely funnel-shaped, ± 16 mm long, lower cylindric part ± 8 mm long; tepals widely spreading, dorsal slightly larger than others, ± 25 × 16 mm, curving outward with margins curved back, upper laterals patent distally, 24–26 × 15 mm, lower 3 tepals recurved above, 21–24 × 12 mm. *Filaments* ± 16 mm long, reddish in lower ½, exserted ± 8 mm from tube; anthers ± 8 mm long, curved below the horizontal, dark purple; pollen cream-coloured. *Style* arching over stamens, dividing between base and middle of anthers, branches 5–6 mm long. *Capsules* obovoid, 3-lobed above and retuse, 21–24 mm long. *Seeds* evidently ovate, ± 7 mm long, broadly and evenly winged. *Flowering time*: late November and December, occasionally in late January.

Distribution and ecology: a local endemic restricted to the slopes of the Abel Erasmus Pass in Mpumalanga, South Africa; on steep dolomite slopes in dry woodland.

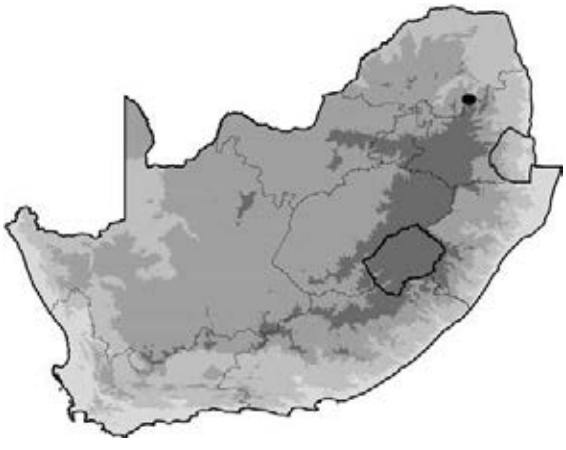
Diagnosis: evidently restricted to dolomite outcrops and distinctive in its long, relatively soft-textured leaves and short-tubed, pale shell-pink flowers with a conspicuous dark red mouth and purple anthers. The slender stolons are characteristic of the species.

20. **Gladiolus reginae** *Goldblatt & J.C.Manning* in Bothalia 39: 41 (2009). Type: South Africa, Mpumalanga, Kennedy's Vale, Two Rivers Mine, hills west of bridge over Klein Dwarsrivier, 26 Mar. 2008, *Manning & Valente 3156* (NBG, holo.; K, MO, NBG, PRE, iso.).

Plants 400–1 500 mm. *Corm* subglobose, ± 20 mm diam.; outer tunics papery, becoming ± fibrous. *Stem* erect or inclined outward above basal leaves, unbranched or occasionally 1-branched. *Leaves* 8 or 9, lower 6 or 7 basal and reaching to base of spike or above, narrowly sword-shaped, (3–)5–10 mm wide, relatively soft-textured with main vein raised, but other veins and margins not thickened, slightly twisted in distal ½, cauline leaves smaller, uppermost largely to entirely sheathing. *Spike* erect, 7- to 16-flowered, 2-ranked; bracts soft-textured, pale green becoming pale straw-coloured and dry shortly after anthesis, outer (20–)22–32 mm long, inner slightly shorter or ± as long, minutely forked apically, margins fused in basal ½ and thus tubular below; outer and inner bracts exuding photosynthate from tips. *Flowers* pale flesh-pink, tepal sutures and tube flushed deeper salmon-coloured, lower 3 tepals flushed deep red laterally in basal third, streaked with 3 main and 2 minor longitudinal lines in basal ½, upper 3 tepals flushed deep red at base, unscented; perianth tube obliquely funnel-shaped, slightly arched distally, 33–35 mm long, basal cylindric portion 25–27 mm long; tepals with upper 3 larger, erect below, recurved in distally, lanceolate-attenuate, margins slightly undulate, dorsal tepal horizontal in basal ½, deeply concave, 33 × 11–12 mm, upper laterals 32–34 × 10–12 mm, lower 3 tepals joined for 1 mm, lower laterals shortest, 28–29 × 9–10 mm, lower median 30 × 9–10 mm. *Filaments* 17 mm long, exserted 7 mm from tube, filaments deep red in basal ⅓; anthers 8–9 mm long, purple; pollen cream-coloured. *Style* arching under dorsal tepal, dividing at or beyond anther apices, branches 4 mm long. *Capsule* obovoid, 3-lobed above and retuse, 30 × 12 mm. *Seeds* oval to oblong, 8–10 × 4–6 mm, ± evenly winged or wing lacking on one side. *Flowering time*: mid-March to mid-April.

Distribution and ecology: a narrow endemic from the lower slopes of the Dwarsrivier Mtns near Kennedy's Vale in Mpumalanga, South Africa; in heavy metal-enriched rock outcrops in open woodland.

Diagnosis: recognised by its long, slender, relatively soft-textured leaves and two-ranked spikes of moderately long-tubed, pale pink flowers with dark red centre, purple anthers and lanceolate-attenuate tepals, the lower three streaked with red. The perianth tube is 33–35 mm long. The margins of the inner bracts are connate below forming a tube enclosing the ovary, and both outer and inner bracts exude drops of photosynthate from the tips that attract ants. The tubular inner

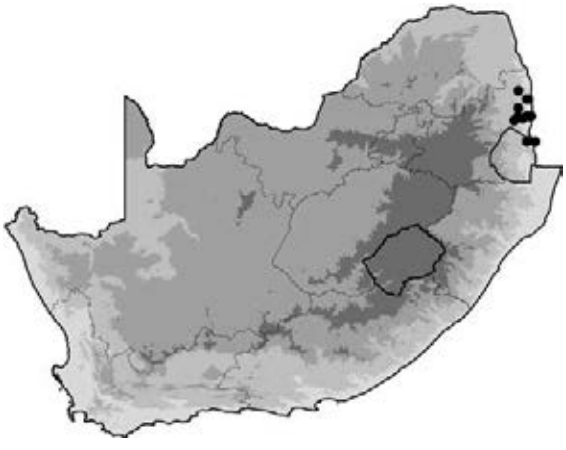


Distribution of ***Gladiolus reginae***.

bracts are otherwise characteristic of ser. *Oppositiflori*, where similar exudates are produced by *G. dolomiticus* and *G. pole-evansii*.

21. **Gladiolus brachyphyllus** *F.Bolus* in Annals of the Bolus Herbarium 2: 103 (1917). Type: South Africa, [Mpumalanga], between Komatipoort and Letaba River on the Selati Railway, Nov. 1913, *Rogers 11807* (BOL, holo.; GRA, K, PRE, iso.).

Plants 550–800 mm high. *Corm* globose, ± 20–25 mm diam.; tunics leathery, becoming ± fibrous. *Stem* erect, scarcely flexed outward above sheaths of upper 2 leaves but becoming straight again, simple or occasionally with one branch. *Leaves* 3, all largely sheathing, with short or vestigial blades, lowermost basal, 80–100 mm long, usually overlapping next leaf, second leaf inserted on lower ⅓ of stem, blades of first and second leaves short to vestigial, 5–50 mm long, third leaf inserted in ± middle of stem, with vestigial blade; leaves of non-flowering plants present at flowering time but not fully developed, up to 4 produced, ultimately reaching to ± 600 mm long, linear to narrowly lanceolate, 6–12 mm wide, soft-textured, main vein moderately thickened and raised, margins lightly thickened. *Spike* erect, barely flexuose, 7- to 9-flowered; bracts pale green, relatively soft-textured, outer 25–30 mm long, inner slightly shorter to ± as long, minutely forked. *Flowers* deep pink, lower 3 tepals with broad median band of white in lower ⅔, usually with dark purple streak along midline, base of lower tepals and throat of perianth tube dark red-purple, unscented; perianth tube obliquely funnel-shaped, ± 20 mm long, lower cylindric part ± 10 mm long; tepals obovate to lanceolate, subacute or apiculate, subequal, lower 3 slightly shorter than upper, dorsal extending forward, ± horizontal, ± 28 × 17 mm, upper laterals arching outward from base, ± 30 × 14–15 mm, lower 3 tepals joined to upper laterals for ± 2 mm, curving outward from base, ± 26 × 9–13 mm, lower median slightly larger than lower laterals. *Filaments* ± 17 mm long, exserted ± 8 mm from tube; anthers ± 10 mm long, violet; pollen lilac. *Style* arching over stamens, dividing opposite middle and upper ⅓ of anthers, branches ± 3.5 mm long. *Capsules* ovoid, 3-lobed above and retuse, 20–25 mm long. *Seeds* ovate, ± 10 × 6 mm, broadly and evenly winged. *Flowering time*: October to mid-November.



Distribution of ***Gladiolus brachyphyllus***.

Distribution and ecology: restricted to the lowveld and coastal plain of eastern southern Africa, from Klaserie in Limpopo, South Africa through the southern half of the Kruger National Park in Mpumalanga into northern Eswatini and southern Mozambique; on sandy flats and outcrops in dry woodland, flowering in spring at the start of the rainy season.

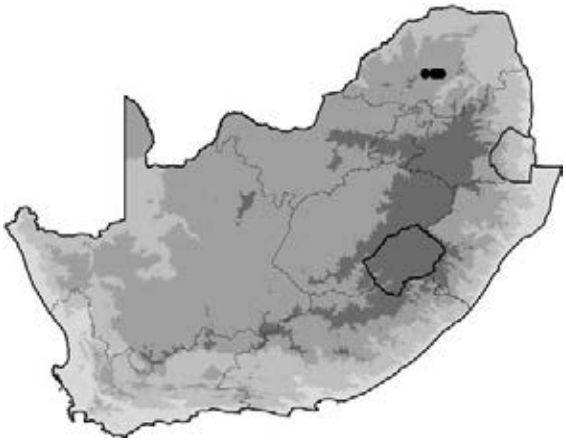
Diagnosis: flowering in late spring, *Gladiolus brachyphyllus* is distinctive in the foliage with short, largely sheathing leaves, and relatively large, deep pink flowers with dark red throat and violet anthers.

Ser. **Oppositiflori** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus oppositiflorus* Herb.

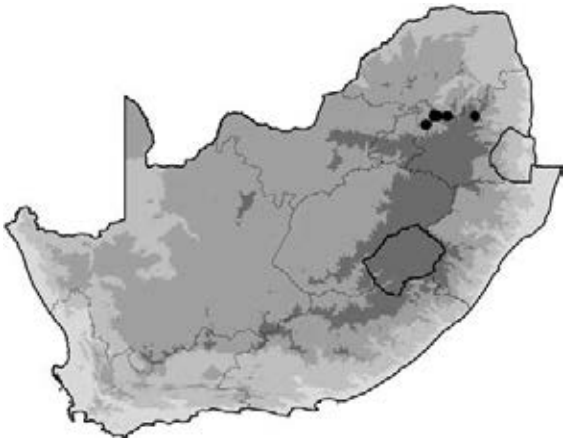
Corm globose to depressed-globose; tunics leathery or firmly papery to fibrous. *Stems* erect, glabrous or scabrid-pubescent to villous. *Leaves* leathery, margins and midrib thickened, smooth or scabrid-pubescent; bracts smooth or scabrid-pubescent to villous, inner bract margins united around ovary thus tubular below. *Spike* 2-ranked. *Flowers* mostly moderate-sized, with pale median markings on lower tepals; perianth tube usually shorter than dorsal tepal.

22. **Gladiolus dolomiticus** *Oberm.* in Bothalia 12: 636 (1979). Type: South Africa, [Limpopo], Makapansgat Valley, between Research Station and mountain top, 3 Mar. 1976, *Enslin s.n.* (PRE, lecto., designated by Goldblatt & Manning: 100 (1998); PRE, isolecto.).

Plants 700–1 000 mm high. *Corm* depressed-globose, ± 25 mm diam.; tunics leathery becoming coarsely fibrous. *Cataphylls* pubescent. *Stem* erect, softly pubescent, often with 1 to 3 short branches, lightly compressed, oval in section. *Leaves* 7 or 8, lower 4 or 5 basal in a lax fan, pale green, reaching or slightly exceeding spike, narrowly lanceolate, 10–15 mm wide, minutely scabrid on veins, intercostal surfaces minutely pubescent, margins, main and at least one secondary vein pair heavily thickened and raised, cauline leaves inserted well above ground, with short blades. *Spike* straight and erect, ± 2-ranked but flowers secund, 10- to 17-flowered; bracts pale green becoming dry and light brown above, minutely pubescent, often exuding photosynthate drops near apices, outer 26–30 mm long, attenuate, apex often twisted outward, inner slightly shorter to ± as long, forked, margins united below in a tube ± 10 mm long. *Flowers* pale pink, lower tepals each with yellow blotch in midline, throat pale yellow, unscented; perianth tube narrowly and obliquely funnel-shaped, 18–27 mm long; tepals lanceolate-elliptic, upper 3 largest, dorsal arching over stamens, 29–38 × 10–12 mm, upper laterals 30–40 × 12–15 mm, lower 3 tepals joined



Distribution of ***Gladiolus dolomiticus***.



Distribution of ***Gladiolus pole-evansii***.

below for 1–2 mm, laterals 25–30 × 7 mm, lower median 27–35 × 7–12 mm. *Filaments* 9–14 mm long, exserted 4–6 mm from tube; anthers (5–)8–10 mm long, shortly apiculate, pale yellow; pollen pale yellow. *Style* arching over stamens, dividing at or shortly beyond anther apices, branches 4–6 mm long, barely expanded above. *Capsules* narrowly obovoid-oblong, 3-lobed above and retuse, 25–35 mm long. *Seeds* ovate, ± 7 × 4.5 mm, broadly and evenly winged. *Flowering time*: March and April.

Distribution and ecology: a local endemic of Limpopo, South Africa, known only from Makapan Valley (Makapansgat); on rocky dolomite slopes in dry woodland.

Diagnosis: recognised by the pubescent cataphylls, stem, leaves and bracts, and the moderately-sized pale pink flowers with lanceolate-elliptic tepals, perianth tube 18–27 mm long, and relatively short anthers, 4–6 mm long. The leaves are fibrous and the inner bracts are tubular below.

23. **Gladiolus pole-evansii** *Verd.* in Flowering Plants of Africa 35: t. 1373 (1962). Type: South Africa, [Mpumalanga], bushveld near Bronkhorstspruit, Mar. 1936, *Pole Evans 3907* (PRE, lecto., designated by Goldblatt & Manning: 101 (1998); BOL, K, PRE, isolecto.).

Plants 600–1 100 mm high, with pubescent cataphylls. *Corm* globose, 15–22 mm diam.; tunics firm-papery to coarsely fibrous. *Stem* erect, scabrid, often with 1, rarely up to 3 branches, lightly compressed. *Leaves* 8 or 9, lower 5 or 6 basal in a lax, 2-ranked fan, glaucous-green, reaching to ± base or middle of spike, narrowly lanceolate, 10–15 mm wide, minutely scabrid on veins, intercostal surfaces pubescent, main and at least one other vein pair heavily thickened and raised, margins lightly thickened, cauline leaves inserted well above ground, with fairly short blades or entirely sheathing. *Spike* weakly inclined, often weakly 2-ranked, ± straight, 15- to 20-flowered; bracts pale green, minutely papillose-pubescent, apices usually ± dry at anthesis, often exuding photosynthate drops near apices, 16–25 mm long, up to 1.0(–1.5) internodes long, inner bracts ± as long as to slightly shorter, sometimes obscurely notched, margins united around flower in lower ½. *Flowers* translucent flesh-pink, becoming almost colourless at tepal apices, upper lateral tepals with narrow red lines along midline, lower tepals, or sometimes only lower median, yellow in lower midline with red median streak distal to yellow mark, base of upper part of tube often dark red; perianth tube obliquely funnel-shaped, ± 15 mm long, wider upper part exserted from bracts; tepals lanceolate, dorsal largest, extended horizontally over stamens, ± 28 × 16 mm, upper laterals extended forward below, curving outward and patent above, 24–26 × ± 12 mm, lower 3 tepals straight, inclined toward ground, 21 × ± 9.5 mm. *Filaments* 18–20 mm long, exserted ± 10 mm from tube; anthers 7.5–9.0 mm long, pale purple; pollen yellow. *Style* arching over stamens, dividing close to anther apices, branches ± 4 mm long. *Capsules* oblong, 3-lobed above, retuse, 20–25 mm long. *Seeds* oval to oblong, 8–10 × 4.5–5.5 mm, wing usually developed only on one side. *Flowering time*: mid-January to March.

Distribution and ecology: a fairly narrow endemic of Gauteng and Mpumalanga, South Africa, between Bronkhorstspruit and Groblersdal; in granite outcrops in open woodland.

Diagnosis: recognised by puberulous cataphylls, stems, leaves and bracts, and the relatively small, pale flowers with short perianth tube ± 15 mm long. The bracts are short, 16–25 mm long, usually no more than one internode long, and the inner bracts are tubular in the lower half. The bracts and bracteoles exude photosynthate from the tips that attract ants onto the inflorescence, a remarkable feature otherwise known only in *Gladiolus dolomiticus* Oberm. and *G. reginae* Goldblatt & J.C.Manning.

24. **Gladiolus oppositiflorus** *Herb.* in Edwards' Botanical Register 28: Miscell. 86 (1842). Type: South Africa [said to be from Madagascar], without precise locality or collector, cult. at Spofforth, Yorkshire, England, *Herbert s.n.* (K, holo. [photo at PRE]).

Gladiolus salmoneus Baker: 217 (1892). *G. oppositiflorus* subsp. *salmoneus* (Baker) Oberm. in Lewis et al.: 26 (1972). Type: South Africa, [KwaZulu-Natal], mountains around Kokstad, 1 600 m, Mar. 1883, *Tyson 1180* (K, holo.; BOL, SAM, iso.).

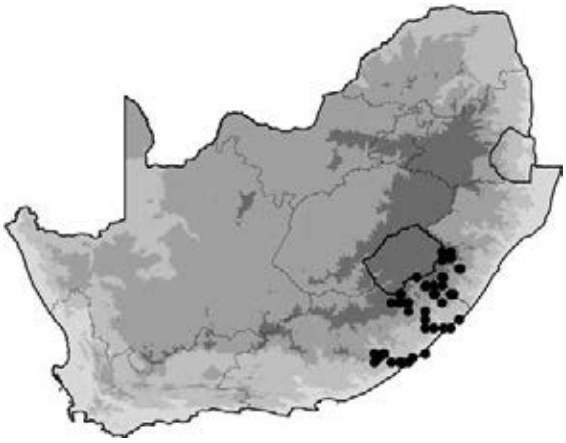
Gladiolus blackwellii L.Bolus: 77 (1921). Type: South Africa, [Eastern Cape], Tembuland, cult. Cape Town, Dec. 1917, *Blackwell s.n.* (BOL, lecto., designated by Goldblatt & Manning: 102 (1998); K, PRE, isolecto.).

Plants (400–)600–1 600 mm high, with velvety cataphylls. *Corm* depressed-globose, 30–40 mm diam.; tunics firm-papery to leathery, fragmenting irregularly but usually extending upward a short distance as coarse fibrous collar around base of stem. *Stem* erect and straight, often sparsely pubescent, unbranched. *Leaves* usually 7 or 8, mostly basal, sometimes forming pseudostem, reaching at least to base of spike or sometimes shortly exceeding it, imbricate and concealing lower ⅔ of stem, narrowly sword-shaped to nearly linear, 12–18(–24) mm wide, firm to rigid, main vein and margins strongly thickened, usually notably velvety between veins, uppermost leaf inserted in middle of stem, shorter. *Spike* straight and erect, weakly or fully 2-ranked, 7- to 15(26)-flowered; bracts green, firm-textured, attenuate, sometimes sparsely pubescent to velvety below, (27–)32–50(–62) mm long, inner slightly shorter, with margins united below and sheathing base of tube, forked into attenuate cusps 2–4 mm long. *Flowers* salmon- to pale pink or mauve, lower 3 tepals paler in midline and with reddish to purple median streak in lower ½, tube red or purple in throat and sometimes on reverse, unscented; perianth tube narrow and curving outward, expanded slightly near apex, (28–)40–50(–55) mm long; tepals lanceolate-elliptic, margins undulate, upper 3 largest, (37–)45–60 mm long, dorsal 20–25(–30) mm wide, arching over stamens, upper laterals curving outward in distal ½ when fully open, lower 3 tepals united for 3–4 mm, laterals shorter than lower median, ± 13 mm wide, arching downward distally. *Filaments* 15–17(–20) mm long, exserted 6–10 mm from tube; anthers ± 11 mm long, reaching to ± middle of dorsal tepal, pale mauve; pollen cream-coloured. *Style* arching over stamens, dividing 2–4 mm beyond anther apices, branches 6–7 mm long. *Capsules* narrowly obovoid-oblong, 3-lobed above, truncate to retuse, 20–25 mm long. *Seeds* ovate, ± 6 × 4 mm, broadly and evenly winged. *Flowering time*: mostly February and March, occasionally in December or April to early May.

Distribution and ecology: scattered through the south-eastern parts of South Africa, from Polela in KwaZulu-Natal through the mountains of Eastern Cape (Transkei) to the coast near East London; in open grassland, often on rocky slopes.

Occasional hybrids with *Gladiolus saundersii* have been reported from Naude's Nek in Eastern Cape.

Diagnosis: recognised by the two-ranked spikes of large, long-tubed flowers, the perianth tube (28–)40–55 mm long, the bracts ± inflated and the inner tubular below. The stem, leaves and bracts are either smooth or more often puberulous. The typical form of the species from the coastal Eastern Cape is tall with markedly two-ranked spikes of bright pink to mauve flowers. Plants from higher elevations inland are shorter with salmon-pink flowers in less markedly two-ranked spikes. *Gladiolus oppositiflorus* is most likely to be confused with *G. mortonius*, but that species has the leaves in a short fan not reaching above the base of the 1-sided spike, and the inner bracts are open to the base and not drawn into cusps above.



Distribution of ***Gladiolus oppositiflorus***.

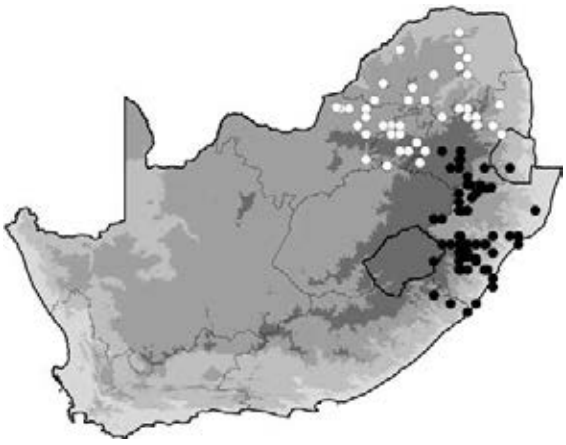
25. **Gladiolus sericeovillosus** *Hook.f.* in Curtis's Botanical Magazine 90: t. 5427 (1864). *Antholyza hirsuta* Klatt: 379 (1867b), illegitimate superfluous name for *G. sericeovillosus* Hook.f. and an illegitimate homonym, not *A. hirsuta* Lam. (1783). Type: South Africa, without precise locality, 'interior of the Cape Colony,' ± 1862, cult. in England, *Cooper s.n.*, illustration in Hook.f.: t. 5427 (1864).

Plants 350–1 000 mm high, with puberulous cataphylls. *Corm* depressed-globose, 25–35 mm diam., tunics firm-papery to leathery, decaying into vertical fibrous strips, usually drawn into stiff points above. *Stem* straight and erect, occasionally branched, sparsely pubescent where not sheathed by leaves, or smooth. *Leaves* 5 to 7, lower 4 or 5 basal, reaching to base of spike or much exceeding it, villous to microscopically pubescent on sheaths and blades, sometimes sparsely so on lower parts of leaves, or entirely smooth, narrowly sword-shaped to linear, 3–16 mm wide, margins, main and often 1 or more secondary vein pairs moderately to strongly thickened and hyaline, cauline leaves much shorter, uppermost entirely sheathing. *Spike* 2-ranked, erect and straight, rachis sometimes pubescent, 12- to 20(40)-flowered; bracts pale green and soft-textured, becoming membranous toward apices, usually dry and pale in upper 5 mm, ± inflated and pleated below, villous to minutely pubescent or smooth, 15–30 mm long, acute-attenuate, apices often twisted, inner bracts with

margins usually united around base of flower, slightly shorter to slightly longer, forked with attenuate cusps 2–4 mm long. *Flowers* greenish to cream-coloured, pink, pale lilac, or dull brownish red, tepals unicoloured or minutely dotted with dark red to maroon, often more densely along midlines, lower laterals or all lower tepals yellow-green in basal half or with darker spade-shaped markings distally, unscented; perianth tube obliquely funnel-shaped, widening and curving outward near apex, 10–16 mm long, extended between bracts; tepals with dorsal longest, hooded, (18–)25–32 × 12–15 mm, upper lateral tepals directed forward, usually curving outward in upper ⅓, 22–30 × 13–15 mm, lower 3 tepals united for ± 1.5 mm, laterals 16–22 × ± 7 mm, curving outward above, narrowed somewhat below, lower median curving toward ground, 20–25 × 10 mm. *Filaments* 10–12 mm long, exserted 6–8 mm from tube; anthers 8–10 mm long, reaching distal ⅓ of dorsal tepal, yellow; pollen whitish. *Style* arching over stamens, dividing between base and upper ⅓ of anthers, branches 4–5 mm long. *Capsules* obovoid to oblong, 3-lobed and auriculate above, 12–23 mm long. *Seeds* ovate, 5–7 × ± 4 mm, broadly and evenly winged. *Flowering time*: late summer and autumn, mainly February to April.

Distribution and ecology: widespread through eastern southern Africa, extending from Umtata in Eastern Cape, South Africa in the south to Eswatini and eastern Zimbabwe in the north; in a variety of subtropical habitats but mainly grassland, open woodland or savanna, usually in clay soils.

Diagnosis: recognised by the markedly two-ranked spikes of rather dull coloured, often greenish flowers with inflated, pleated bracts. The narrow, fibrous leaves often form a distinct pseudostem, the blades arising well above the ground, with strongly thickened midrib, margins and one or more pairs of other veins. Plants flower in the late summer and autumn. The typical form, ranging from Lydenburg southward, is more-or-less densely puberulous to villous on stems, leaves and bracts, and is treated as subsp. *sericeovillosus*. Plants from northern and northwestern South Africa into subtropical Africa are at best sparely pubescent or entirely glabrous, cataphylls excepted, and are treated as subsp. *calvatus*.



Distribution of ***Gladiolus sericeovillosus*** subsp. ***sericeovillosus***, ●; subsp. ***calvatus***, ○.

Key to subspecies

1a Stem, leaves and bracts hardly pubescent or hairless . . . . . 25a. subsp. *calvatus*
1b Stem, leaves and bracts pubescent to villous. . . . . .25b. subsp. *sericeovillosus*

25a. subsp. **calvatus** *(Baker) Goldblatt* in Flora Zambesiaca 12(4): 88 (1993). *Gladiolus ludwigii* var. *calvatus* Baker: 150 (1896). *G. sericeovillosus* f. *calvatus* (Baker) Oberm. in Lewis et al.: 31 (1972). Type: South Africa, [Mpumalanga], Umvoti Creek, Apr. 1890, *Galpin 925* (K, lecto., designated by Lewis et al.: 31 (1972), K; BOL, SAM, isolecto.).

Gladiolus rigidifolius Baker: 1006 (1904a). Type: South Africa, [Gauteng], Modderfontein, Dec. 1897, *Conrath 577* (Z, holo.; GZU, K [photo at PRE], iso.).

Gladiolus sericeovillosus var. *glabrescens* L.Bolus: 213 (1928). Type: South Africa, [Mpumalanga], Waterval Boven (grown at Kirstenbosch Botanic Gardens, 1928), *Hutchinson s.n. Nat. Bot. Gard. 873/27* (BOL, holo.).

Gladiolus dehnianus Merxm. in Süssenguth & Merxmüller: 151 (1951). Type: Zimbabwe, Marondera (Marandellas), dry veld, 30 Mar. 1941, *Dehn 14* (M, holo.; K, SRGH, iso.).

Plants usually entirely glabrous excepting cataphylls. *Leaves* usually reaching top of spikes or up to twice as long as stems, blades linear, stiffly erect, 3–6(–8) mm wide, margins, midribs and other veins strongly thickened. *Flowers* usually greenish, irregularly flecked or streaked with red, sometimes greenish yellow or dull red, lower tepals each with cream-coloured nectar guides in lower half.

Distribution and ecology: restricted to the northern and northwestern parts of the range, from Lydenburg in Mpumalanga to Thabazimbi in Northwest Province and northward to the Soutpansberg in Limpopo and into Zimbabwe.

25b. subsp. **sericeovillosus**

Gladiolus sericeovillosus var. *ludwigii* Pappe ex Baker: 175 (1877). *G. ludwigii* (Pappe ex Baker) Baker: 215 (1892). Type: South Africa, [KwaZulu-Natal], without precise locality, Mar. 1845, *Pappe s.n.* (K, holo.).

Gladiolus sericeovillosus var. *rubicundus* Kuntze: 308 (1898). Type: South Africa, [KwaZulu-Natal], Estcourt District, Highlands Station, 15 Mar. 1894, *Kuntze s.n.* (NY, holo.; K, iso.).

Plants villous to pubescent on cataphylls, leaf sheaths, often blades, and stems and bracts. *Leaves* usually reaching to ± base of spike, lanceolate to sword-shaped, 8–16 mm wide, margins, main and other veins lightly to moderately thickened. *Flowers* usually yellowish green, irregularly flecked or streaked with purple, sometimes creamy yellow or green, rarely reddish, lower tepals with cream-coloured nectar guides in lower half.

Distribution and ecology: extending from near Lydenburg in Mpumalanga southward through Eswatini, KwaZulu-Natal and Lesotho to Umtata in Eastern Cape.

26. **Gladiolus elliotii** *Baker* in Journal of Botany, British and foreign 29: 70 (1891). Type: South Africa, [Mpumalanga], Bethal District, Steenkoolspruit, marshy places, '1891' on specimen but probably Nov. 1889, *Scott Elliot 1557* (K, holo.).

Plants 400–600 mm high, with glabrous cataphylls. *Corm* depressed-globose, 20–30 mm diam.; tunics firm-papery to leathery, fragmenting irregularly. *Stem* straight and erect, occasionally branched, slightly compressed. *Leaves* 5 or 6, lower 4 basal in a 2-ranked fan reaching to ± base of spike or occasionally somewhat longer, leathery, often puberulous, lanceolate or rarely almost linear, 14–20 mm wide, margins strongly thickened and hyaline, main vein not or barely distinguished from secondary veins, these also prominent but not hyaline, cauline leaves overlapping and uppermost inserted on middle of stem, largely sheathing and enclosing stem and sometimes base of spike. *Spike* straight and erect, 14- to 20(25)-flowered; bracts pale green and soft-textured, slightly inflated, outer (18–)25–37 mm long, slightly more than 2 internodes long, pleated in lower ½, dry toward apices and folded back, inner ± as long, lower margins fused around ovary. *Flowers* bluish grey to cream-coloured, minutely speckled with blue to red, more densely so along midline of upper tepals, lower lateral tepals yellow in lower half, unscented; perianth tube obliquely funnel-shaped, ± 16 mm long, lower cylindric part ± 8 mm long; tepals ovate-lanceolate, unequal, dorsal and upper laterals nearly equal, ± 28 × 17 mm, dorsal arching horizontally over stamens, lower laterals directed forward or curving outward toward apices, lower 3 tepals united for ± 2 mm, curving outward and downward from base, lower laterals ± 23 × 8.5 mm, lower median ± 25 × 11.5 mm. *Filaments* 11–12 mm long, exserted ± 4–5 mm from tube; anthers ± 12 mm long, mauve; pollen cream-coloured. *Style* dividing between base and middle of anthers, branches ± 6 mm long. *Capsules* oblong, 3-lobed and auriculate above, retuse, ± 25 mm long. *Seeds* oval to round, 6 × 5 mm long, broadly and evenly winged. *Flowering time*: late November to early February, occasionally later.

Distribution and ecology: fairly widespread across the southern African highveld, from the eastern Free State, South Africa through Gauteng to the Waterberg in Limpopo and into eastern Botswana; in rocky or stony grassland.



Distribution of ***Gladiolus elliotii***.

Diagnosis: distinguished from glabrous or subglabrous forms of *Gladiolus sericeovillosus* by its shorter stature, 400–600 mm high, with the basal fan of leaves typically reaching no higher than the base of the spike and with distinctive venation, the margins strongly thickened but the midrib and other veins fine and closely set. *Gladiolus elliotii* also flowers earlier in the season, mainly November to January or early February.

Ser. **Ecklonii** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus ecklonii* Lehm.

Corm globose to depressed-globose; tunics leathery or firmly papery to fibrous. *Stems* inclined, glabrous. *Leaves* leathery, margins and midrib thickened, glabrous; bracts glabrous, often large, inner bracts with margins free. *Spike* subsecund. *Flowers* mostly large, with pale median markings on lower tepals; perianth tube usually shorter than dorsal tepal.

27. **Gladiolus ecklonii** *Lehm.* in Delectum semina in horto botanico hamburgensi: 7 (1835). Type: South Africa, [Eastern Cape], Fort Beaufort District, Katberg, cult. Hort. Hamburg, Mar. 1830, *Ecklon & Zeyher Irid. 162* (12.3) (S, neo.; B, C, G, PRE, iso.).

Gladiolus marmoratus Tausch: 421 (1836), illegitimate homonym, not *G. marmoratus* Lam. (1788). Type: South Africa, without precise locality, cult. Vienna, *Ecklon s.n.* (no preserved specimen known).

Gladiolus inclusus F.Bolus: 102 (1917). Type: South Africa, [Mpumalanga], Pilgrim's Rest, Dec. 1914, *Rogers 14311* (BOL, holo.).

Plants 150–350(–700) mm high, occasionally taller. *Corm* depressed-globose, 25–40 mm diam.; tunics brittle-papery to cartilaginous, decaying irregularly. *Stem* inclined in upper ⅔, unbranched. *Leaves* (6)7 to 9(13), lower 4 ± basal and usually forming a crowded fan

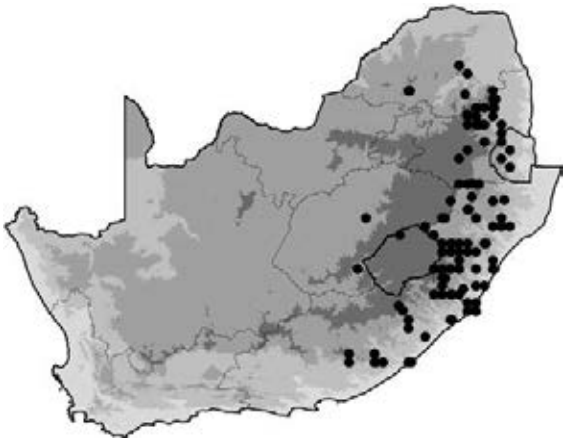
reaching to ± middle of stem, rarely to base of spike, lanceolate, 15–30(–53) mm wide, margins moderately to strongly thickened, main vein barely thickened, upper 2 leaves entirely sheathing or with vestigial blades, bract-like and slightly inflated. *Spike* inclined, 8- to 12(–26)-flowered; bracts sometimes flushed with purple below, strongly keeled, keels usually reddish, outer 43–53 mm long, (2–)3 internodes long, inner bracts shorter or rarely ± as long, acute and entire, those of lower flowers folded or keeled, those of upper flowers 2-keeled. *Flowers* variously spotted or speckled pink, red or purple on a white background, sometimes so densely spotted as to appear uniformly pink at least on distal ½ of tepals, lower 3 tepals with yellow to cream-coloured spear-shaped nectar guides on lower ½, closing tightly at night, unscented; perianth tube obliquely funnel-shaped, (14–)17–20 mm long; tepals broadly ovate-elliptic, sometimes emarginate-apiculate, dorsal horizontal, hooded over stamens, (25–)28–35 × (13–)15–20 mm, upper laterals usually longer than dorsal, (24–)28–37 × (11–)16–21 mm, lower lateral tepals smallest, 18–20 × 9–15 mm, lower median (22–)28–35 × (9–)13–20 mm, arching outward and downward. *Filaments* 12–15 mm long, exserted 4–5 mm from tube but included in lower part of flower; anthers 7–10 mm long, cream-coloured; pollen white. *Style* arching over stamens, dividing opposite middle of anthers, branches ± 4 mm long. *Capsules* obovoid, weakly 3-lobed above and retuse, 18–25 mm long. *Seeds* discoid, broadly and usually evenly winged, 7–8 × 4.5–6.0 mm. *Flowering time*: late December to early March, occasionally later.

Distribution and ecology: extending through temperate eastern South Africa from near Haenertsburg in Limpopo through Mpumalanga, interior KwaZulu-Natal and eastern Free State to the Amatole Mtns and Katberg in Eastern Cape, also Lesotho and Eswatini; in moist grasslands, often in stony places.

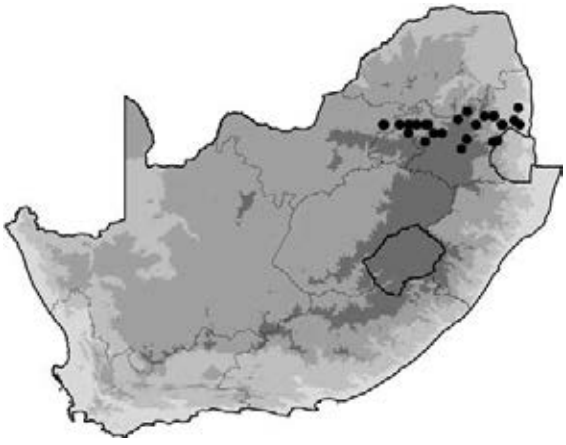
Diagnosis: a relatively low-growing species with a fan of short, often rather blunt leaves 15–53 mm wide borne at ground level, the main vein hardly thickened, other veins fine and close-set, and an inclined spike of finely speckled flowers with large, imbricate and keeled floral bracts. The flowers are short-tubed, the perianth tube 14–20 mm long. The species is variably in flower size and in the colour, degree and intensity of the speckling on the perianth. Populations around Dullstroom are especially attractive, with relatively large almost entirely pink or reddish flowers. The species can be confused with *Gladiolus vinosomaculatus*, but the latter has longer, narrower, ± glaucous leaves 4–12 mm wide with longer sheaths forming a pseudostem, and shorter filaments, 7–12 mm long, with longer anthers, 10–13 mm long.

28. **Gladiolus vinosomaculatus** *Kies* in Flowering Plants of Africa 29: t. 1123 (1952). *G. ecklonii* subsp. *vinosomaculatus* (Kies) Oberm. in Lewis et al.: 43 (1972). Type: South Africa, [Gauteng], Pretoria, Waverley, 22 Jan. 1948, *Wasserfal s.n.* (PRE, holo.; K, iso.).

Plants up to 650 mm high. *Corm* depressed-globose, 15–30 mm diam.; tunics brittle-papery to cartilaginous, decaying irregularly. *Stem* inclined above, occasionally with one or two short branches. *Leaves* 5 to 8, lower 4 or 5 basal with a short pseudostem, ± fan-like above, reaching to between base and apex of spike, narrowly sword-shaped to nearly linear, (4–)6–12 mm wide, margins and main vein moderately thickened, cauline leaves shorter. *Spike* strongly flexed at base, inclined, ± straight, 9- to 14-flowered; bracts grey-green, usually conspicuously glaucous, (25–)40–80(–120) mm long, 4–5 internodes long, inner ± ½ as long, acute. *Flowers* variously speckled or blotched with red to purple on a white background, unscented; perianth tube obliquely funnel-shaped, 15–18 mm long; tepals narrowly lanceolate, usually acute, sometimes obtuse, dorsal largest, arched to nearly horizontal, 32–35 × 13–15 mm, upper laterals directed forward, curving outward in upper ⅓, 30–34 × 8–12 mm, lower tepals arching downward, laterals 28–30 × 5–8 mm, lower median 30–33 × 8–11 mm. *Filaments* 7–11 mm long, exserted 2–4 mm from tube but included in lower part of flower; anthers 10–13 mm long; pollen yellow. *Style* arching over stamens, dividing opposite upper third of anthers, branches 3–4 mm long.



Distribution of ***Gladiolus ecklonii***.



Distribution of ***Gladiolus vinosomaculatus***.

Capsules oblong, apices rounded and shallowly 3-lobed, 24–30 mm long, concealed in bracts. *Seeds* ovate, ± 9.5 × 6 mm, broadly and evenly winged. *Flowering time*: mainly mid-January to March.

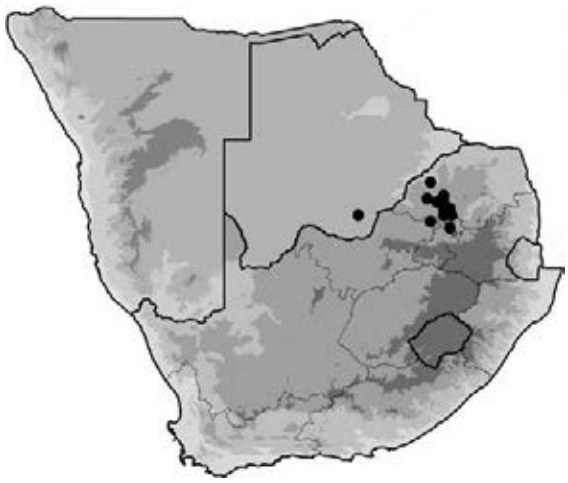
Distribution and ecology: extending north of the Vaal River from the Magaliesberg west of Pretoria in Gauteng, South Africa to the mountains above Barberton in Mpumalanga; in open or dry, rocky grassland.

Diagnosis: recognised by the narrow, glaucous leaves 4–12 mm wide, forming a pseudostem at the base, large glaucous bracts up to 120 mm long partly concealing the flowers, pale tepals spotted of blotched red or purple and short filaments, 7–11 mm long and anthers 10–13 mm long. *Gladiolus ecklonii*, with similarly but often more finely spotted flowers, has a basal fan of bright green leaves and often smaller flowers with longer filaments, 12–15 mm long, and shorter anthers, 7–10 mm long.

29. **Gladiolus rehmannii** *Baker*, Handbook of the Irideae: 216 (1892). *G. ecklonii* subsp. *rehmannii* (Baker) Oberm. in Lewis et al.: 44 (1972). Type: South Africa, [Mpumalanga], Bronkhorstspruit District, between Elandsrivier and Klippan, 1879–1880, *Rehmann 5096* (K, holo.).

Gladiolus cymbarius Baker: 866 (1901). Type: South Africa, [Mpumalanga], Bronkhorstspruit District, between Elandsrivier and Klippan, ?1880, *Rehmann 5100* (Z, holo. [photo at PRE]; Z, iso.).

Plants 300–500(–900) mm high. *Corm* globose, 18–22 mm diam.; tunics brittle-papery to cartilaginous, decaying irregularly. *Stem* erect or flexed outward just below base of spike, occasionally branched, completely sheathed by bases of cauline leaves. *Leaves* (6–)8 or 9, lower (3)4 or 5 basal with a pseudostem, forming a lax fan above, reaching at least to base or shortly exceeding spike, narrowly lanceolate, (4–)8–16 mm wide, main vein moderately thickened, margins barely thickened, cauline leaves overlapping, progressively smaller above, upper 1 or 2 usually entirely sheathing and bract-like, sometimes slightly inflated. *Spike* inclined, flexuose, 6- to 10(16)-flowered, internodes fairly short, 12–14(–20) mm long; bracts pale green or flushed with purple, often glaucous on upper surfaces (facing sun), occasionally folded but not keeled, outer (40–)45–60(–115) mm long, overlapping, 3–4 internodes long, inner shorter, acute or shortly forked. *Flowers* white to pale lilac, lower lateral or all 3 lower tepals with yellow nectar guides sometimes outlined in light purple, unscented; perianth tube obliquely funnel-shaped, 15–20 mm long, enclosed in bracts; tepals lanceolate, dorsal inclined over stamens, (30–)38–50 × 12–18 mm, upper laterals usually 32–52 × 10–16 mm, usually longer than dorsal, directed forward, curving outward distally, lower lateral tepals 28–43 × 8–14 mm, lower median usually substantially larger, 30–45 × 8–14 mm, arching downward. *Filaments* 10–12 mm long, exserted 2–5 mm from tube but enclosed in lower part of flower; anthers 9–10 mm long; pollen pale lilac to blue or yellow. *Style* arching over stamens, dividing between middle and apex of anthers, branches 6–8 mm long. *Capsules* oblong, 3-lobed above, 25–35 mm long. *Seeds* ovate-oblong, 12–14 × 7–8 mm, broadly and evenly winged; *Flowering time*: mid-January to March.



Distribution of ***Gladiolus rehmannii***.

Distribution and ecology: fairly widespread in northern southern Africa, in eastern Botswana and South Africa, from the Waterberg in Limpopo to Sybrandskraal near Groblersdal in Mpumalanga; in sandy or stony soils in open bushveld and woodland.

Diagnosis: vegetatively similar to *Gladiolus vinosomaculatus* and distinguished from it by the pure white to pale lilac flowers with slightly shorter anthers, 9–10 mm long but longer style branches, 6–8 mm long. The two species are allopatric, with *G. rehmannii* occupying subtropical habitats in drier bushveld and savanna to the north of *G. vinosomaculatus*.

Ser. **Ophiolyza** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus dalenii* Van Geel.

Corm globose to depressed-globose; tunics leathery or firmly papery to fibrous. *Stems* erect, glabrous. *Leaves* leathery, margins and main vein thickened, glabrous; leaves on flowering stem sometimes reduced, with foliage leaves produced from a separate shoot; bracts leathery, glabrous, inner bracts with margins free. *Spike*s secund. *Flowers* mostly large, with pale median markings on lower tepals; perianth tube usually longer than dorsal tepal, lower tepals often reduced.

30. **Gladiolus antholyzoides** *Baker* in Journal of Botany, British and foreign 29: 70 (1891). *Antholyza laxiflora* Baker: 170 (1896), illegitimate superfluous name for *G. antholyzoides* Baker. Type: South Africa, [Gauteng], Apies River near Pretoria, damp ground, Nov. 1890, *Scott Elliot 1447* (K, holo.).

Antholyza schlechteri Baker: 1007 (1904a). *Gladiolus brachylimbus* Baker: 178 (1904b), new name

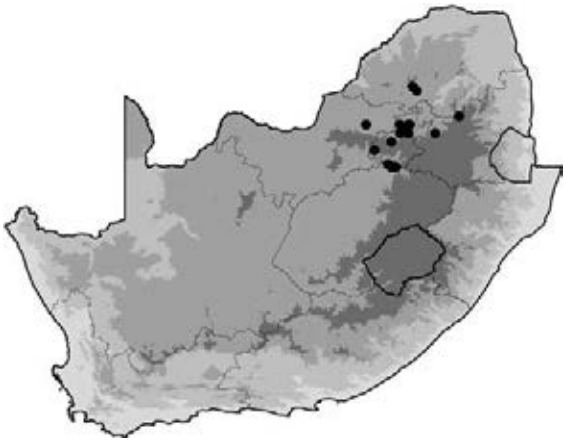
for *A. schlechteri* Baker [not *G. schlechteri* Baker (1904a)]. *G. magaliesmontanus* F.Bolus: 108 (1917), illegitimate superfluous name for *G. brachylimbus* Baker. Type: South Africa, [Gauteng], Magaliesberg near Apies River, 4 Nov. 1893, *Schlechter 3627* (as *3629*) (Z, holo. [drawing at BOL and K]; BOL, Z, iso.).

Gladiolus vogtsii L.Bolus: 133 (1929a). Type: South Africa, 'Transvaal', cult. Kirstenbosch Gardens, 4 Feb. 1919, *Vogts s.n. Natl. Bot. Gard. 617/28* (BOL, holo.).

Gladiolus strictiflorus L.Bolus: 15 (1931), illegitimate homonym, not *G. strictiflorus* (Ker Gawl.) Delile in Redouté (1812). Type: South Africa, [Free State], Reitz, cult. Kirstenbosch Gardens, 1930, (BOL, holo.).

?*Gladiolus anorthanthus* Ingram: 273 (1933). Type: South Africa, [Limpopo], Potgietersrust, cult. England, *Ingram s.n.* (BM, holo. [identity uncertain, flowers immature]).

Plants 0.6–0.9 m high, usually with 1 to 3 lateral leafing shoots as well as flowering stem. *Corm* depressed-globose, 23–35 mm diam.; tunics brittle-papery to membranous, decaying irregularly, with several cormlets around base. *Stem* erect, unbranched. *Leaves* 5 to 8, lower 3 to 5 basal and usually forming a fairly tight fan rarely reaching beyond lower ⅓ of stem, up to 300 mm long, lanceolate, (3–)10–20 mm wide, margins and main vein lightly raised, cauline leaves smaller, progressively shorter, uppermost sheathing for most of its length. *Spike* straight and erect, strongly secund, 8- to 12-flowered; bracts pale green, outer 30–35(–50) mm long, inner shorter, shortly notched. *Flowers* pale to deep yellow, sometimes streaked irregularly with red or orange and with an orange ring around throat, reverse of tube and lower part of tepals greenish yellow, lower tepals slightly darker yellow or yellow-green in basal ½, unscented; perianth tube narrowly and obliquely funnel-shaped, 28–40 mm long, flared upper part 15–25 mm long; tepals lanceolate, dorsal largest, 25–30 × 14–16 mm, extended ± horizontally over stamens, upper laterals directed forward below, curving outward distally, 25–28 × 16 mm, lower 3 tepals arching downward ± from base, lower laterals 17–20 × 9 mm, lower median 20–23 × 12 mm. *Filaments* 20–30 mm long, exserted 2–8 mm from tube; anthers 9–11 mm long, pale yellow; pollen cream-coloured. *Style* arching over stamens, dividing between middle and apex of anthers, branches ± 5 mm long. *Capsules* ovoid-oblong, 3-lobed above and retuse, 20–25 mm long. *Seeds* ovate, 7–9 mm long, broadly and evenly winged. *Flowering time*: mainly mid-November to early December, occasionally in late October.



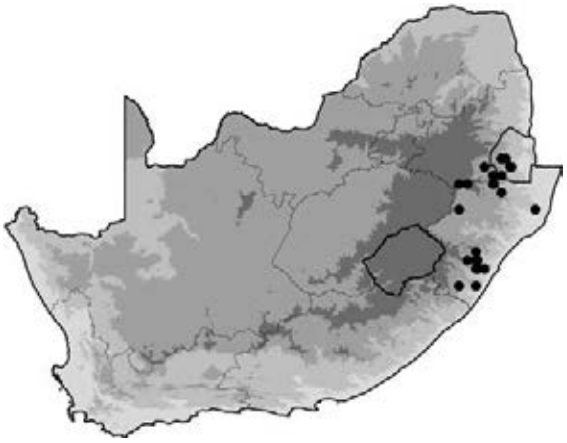
Distribution of ***Gladiolus antholyzoides***.

Distribution and ecology: scattered through the central and eastern highveld of South Africa, from the Waterberg in Limpopo through Gauteng to Reitz in the Free State; in seasonally wet or waterlogged grasslands, flowering in spring.

Diagnosis: a spring-flowering species recognised by the short leaves seldom exceeding the lower third of the stem and the ± funnel-shaped flowers with perianth tube 28–40 mm long and relatively small tepals, the upper three 25–30 mm long and the lower three 17–23 mm long. The plants produce separate leafy shoots from the corms toward the end of the flowering season. In this respect it resembles *Gladiolus aurantiacus* Klatt from east of the escarpment, which has larger, orange flowers, the perianth tube 44–70 mm long and the dorsal tepal usually 35–45 mm long.

31. **Gladiolus aurantiacus** *Klatt* in Linnaea 35: 378 (1867b). Type: South Africa, [KwaZulu-Natal], near Pietermaritzburg, Sept.–Oct. 1858, *Sutherland s.n.* (K, S, syn.)

Plants 450–750 mm high. *Corm* depressed-globose, 25–35 mm diam.; tunics brittle-papery to membranous, decaying irregularly shaped fragments, with several cormlets around base. *Stem* erect, unbranched. *Leaves* of flowering stem 4 or 5, superposed, imbricate, blades usually shorter than sheaths or ± as long, lanceolate to sword-shaped, 6–15 mm wide, uppermost leaves sometimes entirely sheathing; foliage leaves 5 or 6, produced from separate shoots on same corm near end of flowering, ultimately reaching up to 600 mm, narrowly lanceolate, 10–15 mm wide, main vein thickened and raised, margins barely thickened. *Spike* straight and erect, 10- to 16-flowered; bracts pale green, outer (28–)32–45 mm long, inner shorter, notched apically. *Flowers* deep yellow, finely dotted or streaked irregularly with red or orange, sometimes so densely mottled as to appear orange, lower tepals clear yellow in basal ½, unscented; perianth tube narrowly and obliquely funnel-shaped, 44–70 mm long, slender and erect below for 25–33 mm, abruptly expanded into a wide cylindric and horizontal upper part 30–35 mm long; tepals lanceolate, unequal, dorsal largest, (26–)35–45 × ± 15–24 mm, extended ± horizontally over stamens, upper laterals directed forward below, curving outward distally, 25–42 × 14–25 mm, lower 3 tepals arching downward, 15–25 × (7–)12–16 mm, lower median slightly larger than laterals. *Filaments* 28–40 mm



Distribution of ***Gladiolus aurantiacus***.

long, exserted 12–15 mm from tube; anthers 9–12 mm long, yellow to orange; pollen yellow. *Style* arching over stamens, dividing between base and middle of anthers, branches 4–6 mm long. *Capsules* ovoid-oblong, 3-lobed above and retuse, 18–25 mm long. *Seeds* ovate, ± 10 × 7–8 mm, broadly and evenly winged. *Flowering time*: mainly October, occasionally September or November.

Distribution and ecology: scattered through eastern southern Africa below the escarpment, from Eswatini and Piet Retief and Vryheid in southern Mpumalanga, South Africa through the KwaZulu-Natal midlands to Richmond and Dumisa; in open grassland, flowering in spring, mostly after fire.

Diagnosis: a spring-flowering species recognised by the short leaves not forming a basal fan, and the narrowly funnel-shaped flowers more-or-less strongly flecked or blotched orange, with an elongate perianth tube 44–70 mm long, slender in the lower half and abruptly expanded and cylindric above. The dorsal tepal is ascending to nearly horizontal and usually 35–45 mm long. The plants produce separate leafy shoots from the corms toward the end of the flowering season. In this respect the species resembles *Gladiolus antholyzoides* from the highveld, but this has smaller, mostly yellowish flowers with a narrowly funnel-shaped perianth tube 28–40 mm long and upper tepals 25–30 mm long. The narrow flowers of *G. aurantiacus* distinguish it from *G. dalenii*, which has a funnel-shaped perianth tube up to 50 mm long and concave dorsal tepal arching over the stamens.

32. **Gladiolus dalenii** *Van Geel* in Sertum Botanicum 2(1): 18 (1829). Type: South Africa, Natal [KwaZulu-Natal], without precise locality or collector, cultivated in Holland, illustration in Van Geel: 18 (1829).

subsp. **dalenii**

Watsonia natalensis Eckl.: 34 (1827) [not *Gladiolus natalensis* Reinw. ex Hook.f. (1831)]. Type: South Africa, Natal Coast (cultivated in Cape Town), *Ecklon s.n.* (S, holo.).

Gladiolus psittacinus Hook.f.: t. 3032 (1830). *G. natalensis* Reinw. ex Hook.f.: sub t. 3084 (1831), illegitimate superfluous name for *G. psittacinus* Hook.f. Type: South Africa, 'Natal', without precise locality, illustration in Hook.f.: t. 3032 (1830).

Gladiolus dracocephalus Hook.f.: t. 5884 (1871). Type: South Africa, [KwaZulu-Natal], foot of the Drakensberg, cultivated at Royal Botanic Gardens, Kew, *Cooper 3593* (K, holo.).

Gladiolus cooperi Baker: t. 6202 (1875). Type: South Africa, [KwaZulu-Natal], cultivated at Royal Botanic Gardens, Kew, *Cooper s.n.* (K, holo.).

Gladiolus adlami Baker: 233 (1889a). Type: South Africa, 'Transvaal', cultivated in Great Britain, *Adlam s.n.* (K, holo. [photos at NBG, PRE]).

Gladiolus leichtlinii Baker: 154 (1889b). Type: South Africa, without precise locality, as 'Transvaal,' cult. Hort. Leichtlin, July 1889, *Adlam s.n.* (K, holo.).

Gladiolus tysonii Baker: 220 (1892). Type: South Africa, [Eastern Cape], East Griqualand, near Fort Donald, *Tyson 1653* (K, holo.; SAM, iso.).

Gladiolus platyphyllus Baker: 456 (1893). Type: South Africa, [Eastern Cape], Transkei, cultivated in hort. Leichtlin, *Flanagan s.n* (K, holo.).

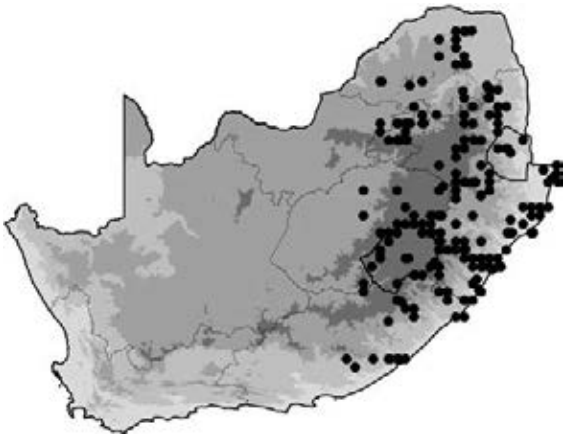
Gladiolus fuscoviridis Baker: 530 (1897a). Type: South Africa, location unknown.

Gladiolus pageae L.Bolus: 214 (1928). Type: Lesotho, Thaba Tseueu, *Page s.n. BOL 17030* (BOL, holo.).

Gladiolus leptophyllus L.Bolus in Bolus and Lewis: 204 (1932). Type: South Africa, [Limpopo], Blouberg, cult. Hort. Stellenbosch University, without date, *Neethling sub Grosskopf s.n.* (BOL, holo.; K, iso.).

Gladiolus retrocurvus G.J.Lewis Bolus and Lewis: 204 (1932). Type: South Africa, [Limpopo], Selati Estate, near Rubbervale, cultivated at Kirstenbosch Gardens, collector unknown, *Natl. Bot. Gard. 1361/30* (BOL, holo.).

Plants (500–)700–1 500 mm high, with cataphylls sometimes densely puberulous. *Corm* (15–)20–30 mm diam., tunics brittle or leathery becoming irregularly broken or sometimes fibrous, usually with many tiny cormlets around base, sometimes with stolons. *Stem* erect and straight, unbranched. *Leaves* contemporary with flowering stem, 4 to 6(7), at least lower 2 basal or nearly so and usually ± ½ as long as spike, lanceolate to ± linear, (5–)10–30(–70) mm wide, firm textured with moderately raised and thickened main vein and margins, cauline leaves often imbricate and largely or entirely sheathing. *Spike* straight, (2)3- to 8(14)-flowered; bracts pale green to grey-purple on upper surfaces, sometimes dry and pale apically, outer (35–)40–70 mm long, inner shorter. *Flowers* either red to orange with yellow mark on basal half of lower tepals, or yellow to greenish and often with red to brown streaks on upper tepals, unscented;



Distribution of ***Gladiolus dalenii*** subsp. ***dalenii***.

perianth tube 35–50 mm long, nearly cylindric below, gradually widening above, curving outward in upper ½; tepals with upper 3 broadly ovate, dorsal largest, 35–50 × 22–30 mm, horizontal to downcurved, concave, concealing stamens, upper laterals ± as long as or slightly shorter than dorsal, 20–30 mm wide, directed forward, often curving outward distally, lower 3 tepals curving downward, 20–25(–30) × 8–12 mm, lowermost somewhat longer and narrower than laterals. *Filaments* 25–30 mm long, exserted 15–20 mm from tube; anthers 12–16 mm long, yellow to brownish; pollen pale yellow. *Style* arched over stamens, dividing near apex of anthers, branches (4–)5–6 mm long. *Capsules* ovoid-oblong, 3-lobed apically, (18–)25–35 mm long. *Seeds* 8–12 × 5–9 mm, wing well developed. *Flowering time*: December to May (to June) in southern and east tropical Africa.

Distribution and ecology: widespread through eastern southern Africa, in South Africa from Limpopo to the Zuurberg in Eastern Cape an inland to the eastern Free State and Gauteng, also in Lesotho and Eswatini, extending north into tropical and West Africa and Madagascar; in grassland and open woodland.

Diagnosis: recognised by the large flowers with the upper tepals 35–50 mm long and much exceeding the recurved lower tepals, the dorsal tepal concave and arching over and concealing the stamens. The species is variable in flower colour and flowering time. Madagascan populations of the species are diploid but most of those from continental Africa are polyploid.

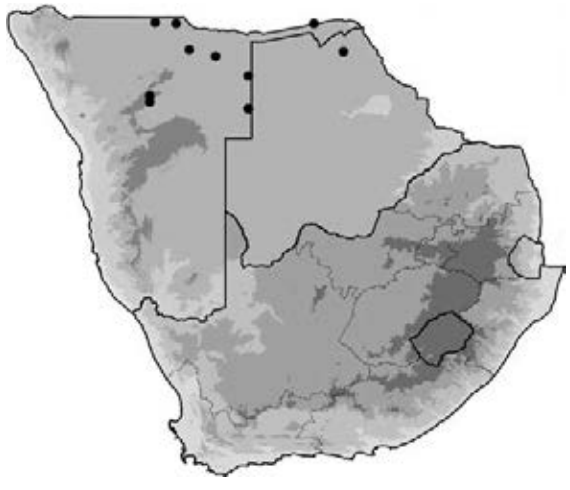
33. **Gladiolus magnificus** *(Harms) Goldblatt* in Goldblatt & M.P. de Vos in Adansonia 11: 426 (1990). *Antholyza magnifica* Harms in Warburg: 201 (1903). *Petamenes magnifica* (Harms) R.C.Foster: 50 (1936). Type: Angola, on the Longa near Minnesera, 1 200 m, 11 Jan. 1901, *Baum 651* (B, holo.; BM, COI, K, W, iso.).

Antholyza zambesiaca Baker: 232 (1892) [not *Gladiolus zambesiacus* Baker (1892)]. *Petamenes zambesiaca* (Baker) N.E.Br.: 277 (1932a). *Oenostachys zambesiacus* (Baker) Goldblatt: 443 (1971). Type: Botswana (or northwestern Zimbabwe), south of the Zambezi River, Leshumo [Leshomo] Valley, in or before 1883, *Holub s.n.* (K, holo.).

Antholyza spectabilis Schinz: 13 (1900) [not *Gladiolus spectabilis* Baker (1904a)]. *Chasmanthe spectabilis* (Schinz) N.E.Br.: 274 (1932a). *Petamenes spectabilis* (Schinz) E.Phillips: 44 (1941). Type: Namibia, Waterberg Plateau, 19 Apr. 1899, *Dinter s.n.* (†B, holo.).

Plants 0.8–1.4 m high. *Corm* depressed-globose, 20–30 mm diam.; tunics of fine, wiry fibres. *Stem* straight, unbranched. *Leaves* 5 to 7, lower 4 or 5 basal and ± ½ as long as stem, reaching almost to base of spike, narrowly lanceolate, 6–9 mm wide, main vein and margins lightly thickened, upper leaves progressively smaller and sometimes entirely sheathing. *Spike* erect and straight, 6- to 15-flowered; bracts green, outer 25–30(–35) mm long, inner shorter. *Flowers* bright red with yellow markings on lower tepals and in throat, lower 3 tepals sometimes with dark red-purple blotch in midline; perianth tube 25–30 mm long, narrow below, expanded near top of bracts and curving outward and nearly horizontal, ± 4 mm wide at mouth; tepals very unequal, dorsal largest, hooded and horizontal, 35–42 × 18–22 mm, upper laterals broadly lanceolate, 13–15 mm long, curving outward apically, lower 3 tepals narrowly lanceolate, up to 10 mm long, ± horizontal or lowermost recurving. *Filaments* arched under dorsal tepal, ± 35 mm long, exserted ± 20 mm from tube; anthers 12–17 mm long, dull yellow; pollen yellow. *Style* dividing shortly below anther apices, branches ± 3 mm long. *Capsules* oblong, 20–30 mm long. *Seeds* ovate, ± 13 × 8 mm, broadly and evenly winged. *Flowering time*: January and February, occasionally in March.

Distribution and ecology: extending across south tropical Africa from central Angola and Namibia through southern Zambia and northern Botswana to western Zimbabwe; in open Kalahari woodland on sandy soils.



Distribution of ***Gladiolus magnificus***.

Diagnosis: recognised by the scarlet flowers with enlarged, concave dorsal tepal 35–42 mm long and ± twice as long as the upper lateral tepals, and the reduced lower tepals ± one third as long as the dorsal.

34. **Gladiolus flanaganii** *Baker* in Flora capensis 6: 530 (1897a). Type: Lesotho, Mont aux Sources, near the summit, 8 500 ft [2 600 m], Jan. 1894, *Flanagan 1832* (BOL, holo.; PRE, iso.).

Plants 350–600 mm high, erect or trailing. *Corm* globose, 20–28 mm diam.; tunics softly cartilaginous becoming coarsely fibrous. *Stem* usually inclined, occasionally ± erect, flexed outward above, unbranched. *Leaves* usually 5, lower 4 basal and reaching to between middle and apex of spike, lanceolate, 7–14 mm wide, main vein moderately thickened and hyaline, a pair of secondary veins also somewhat thickened, margins hardly thickened, uppermost leaf much shorter, narrowly channelled for almost entire length. *Spike* lightly flexuose, 4- to 7-flowered; bracts firm-textured, green or flushed dull purple, outer with a light median fold, 60–70 mm long, inner shorter and lightly 2-keeled, notched apically. *Flowers* dark carmine-red, somewhat urn-shaped, lower tepals each with narrow longitudinal, median white streak outlined with dark red, ventral part of upper part of tube whitish streaked with red, unscented; perianth tube gradually flared from base, slightly sigmoid in profile, 35–45 mm long; tepals obovate, ± cupped above, outer whorl subequal and slightly larger than inner, dorsal and lower laterals 30–38 × 18–20 mm, upper laterals and lower median 30–42 × 25 mm. *Filaments* 27–30 mm long, exserted 14–15 mm from tube; anthers ± 10 mm long, dark purple; pollen pale lilac. *Style* arching over stamens, dividing shortly beyond anther apices, branches ± 4.5 mm long. *Capsules* oblong, 16–20 mm long. *Seeds* oblong, 6–7 × 2.0–2.5 mm, wing developed only at ends. *Flowering time*: late November to early January.

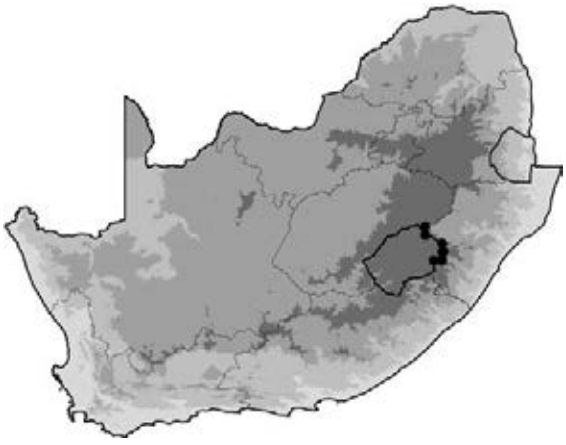
Distribution and ecology: restricted to the high Drakensberg Escarpment along the frontier between Lesotho and South Africa, from the Sentinel in Free State to Sani Pass in KwaZulu-Natal; on basalt cliffs in moist places.

Diagnosis: readily recognised by the fan of stiff leaves, and thick-textured carmine-red flowers with a rather closed, urn-like shape and somewhat sigmoid perianth tube 35–45 mm long. The lower tepals are each marked with a median white streak outlined with dark red.

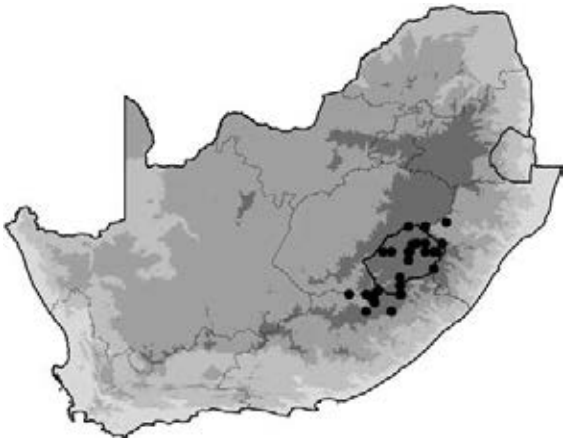
35. **Gladiolus saundersii** *Hook.f.* in Curtis's Botanical Magazine 96: t. 5873 (1870a). Type: South Africa, [Eastern Cape], Herschel District, summit of the Witteberg, 1861, *Cooper 605* (K, holo.; BM, Z, iso.).

Gladiolus spectabilis Baker: 1006 (1904a). Type: Lesotho, Maluti Mountains, Mt Machache (± 32 km east of Maseru), Mar. 1903, *Junod 1927* (Z, ?holo. [photo at PRE]; G, SAM, Z, iso.).

Plants (300–)400–600 mm high. *Corm* depressed-globose, (20–)30–50 mm diam.; tunics papery, with numerous small cormlets. *Stem* erect, unbranched. *Leaves* 7 to 9, mostly basal in a fan reaching to base of spike or exceeding it, lanceolate, 15–25 mm wide, main vein strongly thickened, margins usually less so, 1 or more secondary vein pairs also usually prominent, cauline leaves usually sheathing stem to base of spike. *Spike* erect to slightly inclined, ± straight, (2)4- to 9-flowered; bracts green, apices twisted, outer 40–60(–70) mm long, lightly folded in midline, inner bracts slightly shorter, forked into linear cusps. *Flowers* facing sideways or drooping, bright red, lower 3 tepals lightly to densely speckled in lower half with red on a white field, unscented; perianth tube obliquely funnel-shaped, 33–37 mm long; tepals lanceolate, unequal, upper 3 largest, 46–67 × 21–30 mm, dorsal extending horizontally or tilted downward over stamens, recurving distally, upper laterals curving outward from base, lower 3 tepals joined to upper laterals for ± 6 mm, and together for ± 2 mm, arching downward, recurved distally, somewhat smaller than upper, lower laterals 34–46 mm long, lower median 46–53 × 20–28 mm. *Filaments* 30–50 mm long, exserted 20–30 mm from tube; anthers 15–16 mm long, apiculate, tilted downward, purple; pollen cream-coloured. *Style* arching over stamens, dividing between middle



Distribution of ***Gladiolus flanaganii***.



Distribution of ***Gladiolus saundersii***.

and upper ⅓ of anthers, branches 7–8 mm long. *Capsules* oblong-obovate, 3-lobed above and retuse, 25–28 mm long. *Seeds* ovate, ± 6.5 × 8.5 mm, broadly and evenly winged. *Flowering time*: mid-January to March.

Distribution and ecology: scattered through the central and southern Drakensberg, from near Clarens in Free State, South Africa through Lesotho to Lady Grey and Joubert's Pass in Eastern Cape; on rocky outcrops and scree slopes.

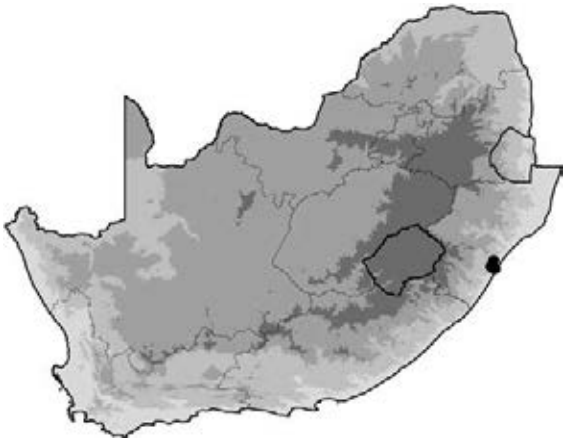
Occasional hybrids with *Gladiolus oppositiflorus* have been reported from Naude's Nek in Eastern Cape.

Diagnosis: distinctive in its large, nodding, scarlet flowers with horizontal to drooping dorsal tepal and strongly recurving lower tepals splashed with white on the lower half. The perianth tube is strongly curved, 33–37 mm long, and the anthers are well-exserted on filaments 30–50 mm long. The unusually long style branches, 7–8 mm long, are distinctive.

36. **Gladiolus cruentus** *T.Moore* in The Gardeners' Chronicle 1868: 1138 (1868). Type: South Africa, [KwaZulu-Natal], without precise locality, ?*McKen*, illustration in Hook.f.: t. 5810 (1869).

Plants 500–700 mm long, usually arching horizontally from cliffs. *Corm* globose, 15–20 mm diam.; tunics of medium textured fibres. *Stem* inclined to drooping below horizontal, usually arching upward in upper part, unbranched. *Leaves* 7 or 8, lower 4 or 5 ± basal and usually slightly longer than spike but trailing, sword-shaped, 10–15 mm wide, main vein moderately thickened, margins not raised, all except uppermost cauline leaf with long blades. *Spike* arching upward and inclined or nearly erect, straight, 4- to 9-flowered; bracts with outer 40–60(–80) mm long, usually ± 2 internodes long, inner shorter, forked, often lightly 2-keeled. *Flowers* bright scarlet, lower tepals each with transverse white chevron at limb base, lower part of lower tepals and upper part of tube speckled red on white, unscented; perianth tube ± cylindric, ± 28 mm long, flaring in upper ± 6 mm long; tepals lanceolate, dorsal lightly inclined over stamens, ± 60 × 30 mm, remaining tepals patent, upper laterals ± 55 × 27 mm, lower 3 tepals united basally for 2–3 mm, narrowed and ascending below for ± 15 mm long, limbs patent, ± 33 × 19 mm. *Filaments* arcuate, ± 40 mm long, exserted ± 35 mm from tube; anthers ± 12 mm long, diverging, dark purple; pollen whitish. *Style* arching over stamens, dividing at or shortly beyond anther apices, branches ± 5 mm long. *Capsules* oblong, rounded to retuse apically, 18–25 mm long. *Seeds* narrowly oblong, 7–9 × ± 4 mm, wing unevenly developed, longest at micropylar end. *Flowering time*: mid-January to early March.

Distribution and ecology: a narrow endemic of central coastal KwaZulu-Natal, South Africa, from the Noodsberg and Kranskop to Gillits and Kloof; on damp sandstone cliffs.



Distribution of ***Gladiolus cruentus***.

Diagnosis: recognised by its relatively soft-textured leaves, trailing stems and large, scarlet flowers with white transverse chevrons near the base of the lower tepals, the dorsal tepal horizontal but the others ± spreading from a narrow perianth tube ± 28 mm long. The filaments are ± 40 mm long and well exserted.

Sect. 3. **Blandi** *(Baker) Goldblatt, Gladiolus* in tropical Africa: 176 (1996) [as *Blandus*]. *Gladiolus* group *Blandi* Baker: 176 (1877). Type species: *Gladiolus blandus* Ait. = *G. carneus* D.Delaroche, lecto., designated by Goldblatt: 176 (1996).

Gladiolus subg. *Hyptissa* Klatt: 342 (1882). Type species: *G. blandus* Ait. = *G. carneus* D.Delaroche, lecto., designated by Goldblatt: 176 (1996).

Plants medium-sized to large. *Stem* branched or unbranched. *Corm* tunics papery or leathery to fibrous. *Leaves* several, mostly basal in a fan, narrowly lanceolate to lanceolate, firm-textured, plane with thickened main vein and margins, usually at least 4 mm wide. *Spike* mostly few flowered; bracts smooth, margins of inner bracts free. *Flowers* medium to large, weakly or more strongly bilabiate, often pink, nectar guides pale and lozenge-shaped outlined with red or purple, unscented; perianth tube usually obliquely funnel-shaped, shorter or longer than dorsal tepal; lower tepals narrower but usually ± as long as upper. *Anthers* never tailed. *Capsules* usually large, oblong and rounded, rarely obscurely lobed above. *Seeds* broadly and evenly winged.

Species 22: mainly Cape flora region of Western and Eastern Cape.

Ser. **Phoenices** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus phoenix* Goldblatt & J.C.Manning

Plants usually fire-adapted, small to moderate-sized. *Corm* tunics papery to fibrous. *Leaves* leathery, margins and main vein lightly thickened; bracts leathery, glabrous. *Spike*s secund. *Flowers* small or moderate-sized,

pink with pale median markings on lower tepals outlined with red; perianth tube shorter than dorsal tepal.

37. **Gladiolus oreocharis** *Schltr.* in Journal of Botany, British and foreign 34: 504 (1896). Type: South Africa, [Western Cape], Matroosberg, Dec. 1895, *Marloth 2265* (B, holo.; BOL, GRA, PRE, iso.).

Plants (120–)180–350(–500) mm high, with uppermost cataphylls sometimes hispid. *Corm* globose, 7–10 mm diam.; tunics of fine, reticulate fibres, often accumulating to form a collar around base. *Stem* erect or inclined, flexed outward above sheathing parts of uppermost 2 leaves. *Leaves* 3 to 5, lowermost 1 to 3 basal and reaching to between base and apex of spike, linear, (1–)2–6 mm wide, with (1)2 main veins and margins lightly to moderately thickened, cauline leaves largely to entirely sheathing. *Spike* inclined to almost horizontal, 2- to 7-flowered; bracts firm-textured, outer 13–20(–25) mm long, purple near apices, obtuse to truncate, inner shorter to slightly longer, minutely forked. *Flowers* pink to red-purple or violet (rarely white), lower 3 tepals with spear-shaped median dark red to purple mark with white to yellow centre, unscented; perianth tube obliquely funnel-shaped, 15–24 mm long, shortly exserted from bracts; tepals ovate, unequal, dorsal largest, inclined, 18–22 × 12–14 mm, upper laterals slightly smaller, 15–20 mm long; lower 3 tepals joined to upper laterals for ± 3–4 mm and together for 1–2 mm, free parts 14–20 mm long. *Filaments* 15–16 mm long, exserted 7–9 mm from tube; anthers 6–8 mm long, mauve. *Style* arching over stamens, dividing at or shortly beyond anther apices, branches ± 4 mm long. *Capsules* obovoid, 3-lobed above and retuse. *Seeds* unknown. *Flowering time*: mostly December, occasionally in early January.

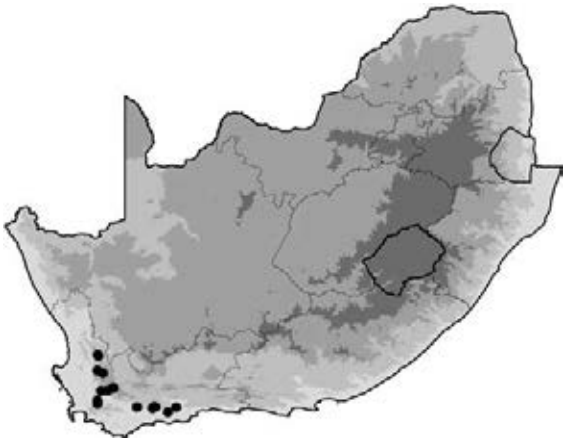
Distribution and ecology: a high montane species of Western Cape, South Africa, extending from the Cederberg to the Hex River Mtns, the Langeberg and Swartberg; on moist, south-facing slopes mainly above 1 600 m elevation, flowering mainly the first year after fire.

Diagnosis: a summer-flowering species with narrow leaves, 2–6 mm wide and typically with two main veins, short, obtuse floral bracts, mostly 13–20 mm long, and small, pink flowers with lozenge-shaped nectar guides and perianth tube 15–24 mm long. The upper cataphyll is sometimes hispidulous. *Gladiolus crispulatus* from the Langeberg has linear leaves 1–3 mm wide, mostly larger bracts, 24–33 mm long, and undulate or crisped tepals, the lower marked with median red chevrons and speckles toward the base.

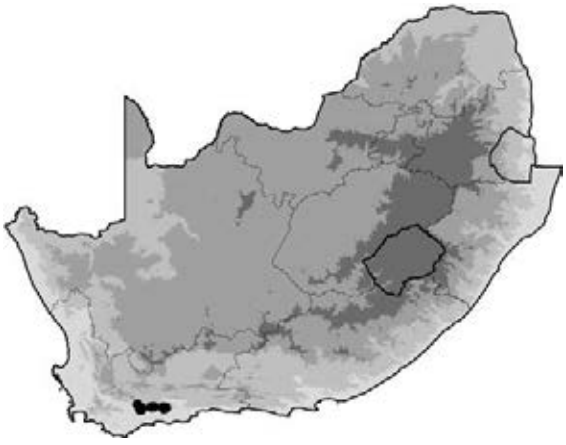
38. **Gladiolus crispulatus** *L.Bolus* in Annals of the Bolus Herbarium 3: 182 (1924). Type: South Africa, [Western Cape], Riversdale District, Corente River Farm, Dec. 1908, *Muir sub Galpin 5369* [BOL, lecto., Goldblatt & Manning: 125 (1998)].

Gladiolus tenuis Baker: 335 (1876b), illegitimate homonym, not *G. tenuis* M.Bieb. (1808). Type: South Africa, [Western Cape], Langeberg Mtns, Craggy Peak, Swellendam, 14 Jan. 1815, *Burchell 7303* (K, holo. [tracing at BOL]).

Plants slender, 300–400 mm high. *Corm* globose, 8–12 mm diam.; tunics of fine, netted fibres. *Stem* erect or inclined, unbranched. *Leaves* 4 or 5, superposed, lower 2 basal and reaching upper part of stem or shortly exceeding spike, linear, 1–3 mm wide, margins barely raised, main vein lightly thickened and usually paired on one side but single on other, cauline leaves progressively shorter and mainly sheathing. *Spike* flexed at base and lightly inclined, 2- to 4-flowered; bracts pale green, fairly soft-textured, outer 24–33 mm long, inner shorter, minutely bifid. *Flowers* deep pink, lower tepals with median dark red arrow-shaped streak and speckled with dark red toward base and in lower throat, base of throat red, unscented; perianth tube obliquely funnel-shaped, 20–26 mm long, widening in upper 8–10 mm; tepals lanceolate, margins undulate to lightly crisped, dorsal largest, 28–34 × 15–20 mm, arching over stamens, curving upward distally, upper laterals ± 30 × 16 mm, curving outward and spreading distally, lower 3



Distribution of ***Gladiolus oreocharis***.



Distribution of ***Gladiolus crispulatus***.

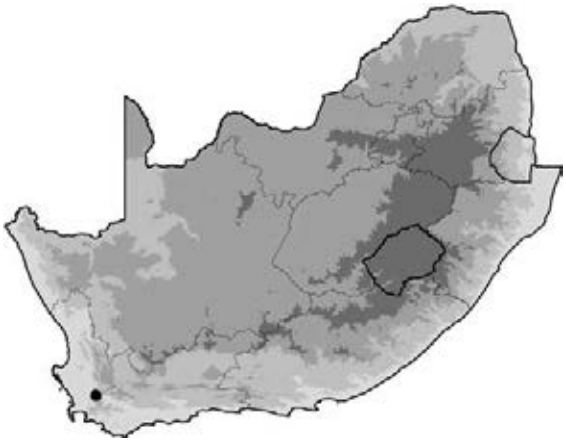
tepals joined to upper laterals for 6–8 mm and together for 1.5–3.0 mm, 20–25 × 8 mm, curving toward ground in distal ½. *Filaments* 14–19 mm long, exserted 5–9 mm from upper part of tube; anthers 8–11 mm long, lilac-pink; pollen whitish. *Style* arching over stamens, pink, dividing between upper ⅓ and slightly beyond apices of anthers, branches 3–5 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mainly November to December.

Distribution and ecology: endemic to the Langeberg between Swellendam and Riversdale in Western Cape, South Africa; on south-facing sandstone slopes from 300 to 900 m elevation, flowering only after fire.

Diagnosis: a summer-flowering species with linear leaves, 1–3 mm wide with two main veins on one side, floral bracts 24–33 mm long, and deep pink flowers with undulate or crisped tepals, the lower three marked with median red chevrons and speckles toward the base. The species may be confused with local populations of *Gladiolus oreocharis*, but that species has mostly wider leaves (1–)2–6 mm wide and shorter, obtuse bracts mostly 13–20 mm long, and flowers with lozenge-shaped nectar guides on the lower tepals.

39. **Gladiolus phoenix** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 126 (1998). Type: South Africa, [Western Cape], Bain's Kloof Mtns, Baviaanskloof, Nov. 1944, *Linley s.n.* (SAM, holo.; SAM, iso.).

Plants 500–750 mm high. *Corm* globose, 8–12 mm diam., with clusters of small cormlets around base on short fasciated stolons; tunics membranous, becoming finely fibrous but not accumulating significantly. *Stem* erect, usually with 1–3 branches. *Leaves* 6 to 9 (with an additional leaf per branch), lower 3 to 5 basal, reaching to base of spike, narrowly lanceolate to nearly linear, 6–12(–20) mm wide, main vein lightly raised, margins scarcely so, upper 1 or 2 leaves not normally sheathing stem, sometimes with short blades. *Spike* lightly flexed at base and inclined, secund, 9- to 12-flowered; bracts grey-green, outer lightly folded in upper midline, apices often slightly hooked, becoming brown near end of flowering, 13–16 mm long, inner shorter to nearly as long, minutely forked. *Flowers* deep pink, lower 3 tepals each with white, spear-shaped mark in midline outlined in deep pink, decurrent on the lower ½ of throat and with a broad white transverse band on reverse, unscented; perianth tube obliquely funnel-shaped, 18–20 mm long, lower cylindric part ± 10 mm long; tepals lanceolate, dorsal largest, 26–28 × 15 mm, ascending, upper laterals ± 23 × 13 mm, directed forward below, curved outward, becoming patent distally, lower 3 tepals united basally for ± 4 m, shortly clawed and channelled below, free parts of lower laterals ± 17 × 7.5–13.0 mm, lower median ± 20 × 9–13 mm. *Filaments* ± 20 mm long, exserted ± 13 mm from tube; anthers ± 8 mm long, dark purple; pollen pale yellow. *Style* arching over stamens, dividing just below anther tips, branches ± 6 mm long. *Capsules* narrowly ovoid, lightly 3-lobed above and retuse, 12–15 mm long. *Seeds* ovate, ± 8 × 5 mm, broadly and evenly winged. *Flowering time*: November to early December.



Distribution of ***Gladiolus phoenix***.

Distribution and ecology: restricted to moist banks and ravines in the Bain's Kloof Mtns above Wellington in Western Cape, South Africa; flowering only after fire,

Diagnosis: diagnosed by the branched stems up to 750 mm high, relatively soft-textured leaves 6–20 mm wide, and the small, dark pink flowers with short perianth tube 18–20 mm long, and lower tepals each with a white lozenge-shaped nectar guide outlined with red. The corms develop characteristic short, fasciated stolons bearing clusters of small cormlets.

Ser. **Sabulosi** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus gueinzii* Kunze

Plants littoral on dunes, moderate-sized. *Corm* producing dimorphic cormlets at base (cormlets from deeply buried corms small with soft tunics but cormlets from exposed or shallow corms larger with thick, leathery tunics), tunics leathery to fibrous. *Stem* suberect, producing clusters of cormlets at nodes. *Leaves* leathery, subsucculent; bracts leathery, smooth. *Spike* secund. *Flowers* small, subactinomorphic, mauve to purple with lozenge-shaped median markings on lower tepals; perianth tube shorter than dorsal tepal.

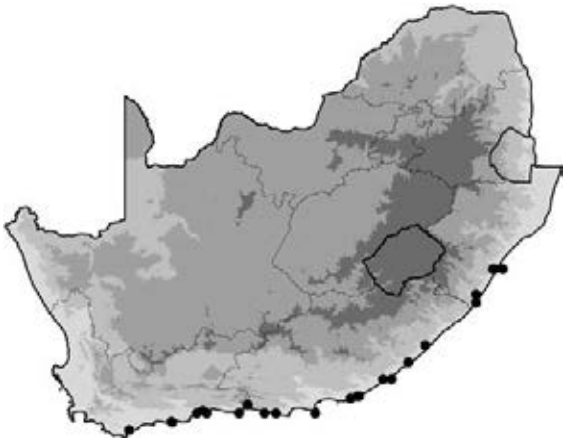
40. **Gladiolus gueinzii** *Kunze* in Hortus universitatis literarum Lipsiensis, seminum anno 1844 perceptorum offert delectum: [2] (1845). Type: South Africa, [KwaZulu-Natal], Durban (as Port Natal), without date, *Gueinzius 490* (*460* in protologue) (S, neo. [photo in NBG]).

Gladiolus sabulosus G.J.Lewis: 31 (1941), a replacement name for *Acidanthera brevicollis* Baker: 339 (1876b) [not *G. brevicollis* Klatt (1882). Type: South Africa, [Eastern Cape], Bathurst District, mouth of Fish River, Feb., *MacOwan 1890* (K, holo.).

Plants (200–)300–500 mm high. *Corm* globose, 25–35 mm diam., with numerous cormlets around base; tunics leathery, breaking up into fibrous fragments; corms near soil surface producing larger cormlets with dark brown, thickly leathery to corky, fissured tunics. *Stem* suberect, often branching after flowers of main axis have faded and capsules are ripening, with clusters of cormlets at nodes, cormlets sometimes sprouting on parent plant. *Leaves* usually 4 to 6, mostly basal, up to 600 mm long shorter or longer than stem, linear, 4–6 mm wide, slightly succulent, only midvein evident when live but hardly thickened (when dry midrib and margins evidently thickened), upper 1 or 2 leaves sometimes entirely sheathing. *Spike* weakly inclined at base, not or only weakly flexuose, (2)4- to 8-flowered; bracts pale grey-green or greyish pink, outer 18–27 mm long, acute, inner slightly shorter, usually forked. *Flowers* zygomorphic or occasionally actinomorphic, mauve to light purple, upper 3 tepals with red-purple median streak, lower 3 with white median streaks outlined in red-purple; perianth tube ± cylindric, 13–15 mm long; tepals subequal, obovate, 17–20 × 8–10 mm, or outer 3 slightly larger and to 13 mm wide, weakly to strongly spreading distally, lower 3 tepals slightly narrowed at bases and weakly clawed. *Filaments* unilateral or symmetrically disposed, 7–10 mm long, exserted 1.5–3.0 mm from tube; anthers 5.5–8.0 mm long, purple; pollen grey-blue to cream-coloured. *Style* dividing between base and middle of anthers, branches ± 5 mm long. *Capsules* obovoid to ellipsoid, 26–32 mm long. *Seeds* oval, 10–14 × 6–10 mm, broadly and evenly winged. *Flowering time*: mainly September to December (winter-rainfall zone), November to January (summer-rainfall zone).

Distribution and ecology: extending along the Indian Ocean Coast of South Africa from Arniston in Western Cape along the Eastern Cape Coast to Durban in KwaZulu-Natal; on sandy beaches and foredunes above the tidal high level.

Cormlets produced by deeply buried corms are small with soft-textured tunics but those produced by corms that have been exposed at the sand surface are larger, up to 15 mm long, with a dark, corky or leathery outer tunic. Buoyant and probably impermeable to sea water, these cormlets must be assumed to be floating propagules.



Distribution of ***Gladiolus gueinzii***.

Diagnosis: the littoral habitat is unique among southern African *Gladiolus* species and this, combined with the narrow, glaucous and subsucculent leaves and subactinomorphic, purplish flowers with white nectar guides, are diagnostic for the species.

Ser. **Blandi** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus carneus* D.Delaroche

Plants moderate-sized to large. *Corm* tunics papery to fibrous. *Stems* erect, glabrous. *Leaves* ± firm-textured, with thickened margins and main vein; bracts leathery, glabrous. *Spike*s secund. *Flowers* small to large, zygomorphic, usually pink to cream-coloured, rarely purple, with lozenge- or spear-shaped median markings on lower tepals outlined with red; perianth tube mostly longer than dorsal tepal.

41. **Gladiolus carneus** *D.Delaroche*, Descriptiones plantarum aliquot novarum 3: t. 4 (1766). *G. blandus* var. *carneus* (D.Delaroche) Ker Gawl.: 140 (1827) [misapplied by Andrews: t. 240 (1802) to *G. brevifolius* Jacq.]. Type: South Africa, without precise locality or collector (L, holo.).

Gladiolus trimaculatus Lam.: 727 (1788). Type: South Africa, without precise locality or date, *Sonnerat s.n.* (P, holo.).

Gladiolus ventricosus Lam.: 727 (1788). *G. cuspidatus* var. *ventricosus* (Lam.) Baker: 205 (1892). Type: South Africa, without precise locality or date, *Sonnerat s.n.* (P, holo.).

Gladiolus blandus Ait.: 64 (1789). Type: South Africa, without precise locality, cult. at Royal Botanic Gardens, Kew, *Masson s.n.* (BM, holo.).

Gladiolus albidus Jacq.: t. 256 (1795 [1788–1795]). *G. blandus* var. *albidus* (Jacq.) Ker Gawl.: 140 (1827). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 256 (1795 [1788–1795]).

Gladiolus tristis var. *cordatus* Thunb.: 13 (1784). *G. cordatus* (Thunb.) Thunb.: 185 (1800). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1017, holo.).

Gladiolus campanulatus Andrews: t. 188 (1801). *G. blandus* var. *campanulatus* (Andrews) Ker Gawl.: 140 (1827). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 188 (1801).

Gladiolus blandus var. *purpureo-albescens* Ker Gawl.: t. 645 (1803a). *G. lunulatus* Klatt: 342 (1882), as a replacement name for *G. blandus* var.

purpureo-albescens. Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 645 (1803a).

Gladiolus blandus var. *excelsus* Ker Gawl.: 2 (1821). *G. pictus* Sweet: 297 (1826), replacement name for *G. blandus* var. *excelsus* Ker Gawl. (1821). *G. excelsus* (Ker Gawl) Sweet: 501 (1830a), illegitimate superfluous name for *G. pictus* Sweet [based on same type]. Type: South Africa, without precise locality or collector, cultivated in England, illustration in Ker Gawler in Curtis's Botanical Magazine 40: t. 1665 (1814).

Gladiolus expallescens Schrank: 210 (1822). Type: South Africa, without precise locality or collector, cultivated in Belgium (BR, holo.).

Gladiolus vinulus Klatt: 199 (1885). Type: South Africa, [Western Cape], near Wynberg, Sept. 1884, *MacOwan 2651* in *Herb. Norm. Austr. Afr. 287* (SAM, holo.; B, BM, G, K, P, S, UPS, iso.).

Gladiolus macowanianus Klatt: 199 (1885). Type: South Africa, [Western Cape], Cape Peninsula, grassy slopes behind Hout Bay, Oct. 1884, *MacOwan 2065* (as *2605*) in *Herb. Norm. Austr. Afr. 284* (SAM, holo.; S, iso.).

Gladiolus cuspidatus var. *ensifolius* Baker: 205 (1892). Type: South Africa, [Western Cape], Houw Hoek, Oct., *Pappe s.n.* (K, holo.).

Gladiolus prismatosiphon Schltr.: 102 (1899). Type: South Africa, [Western Cape], Bredasdorp Mtns near Napier, 9 Dec. 1896, *Schlechter 9656* (B, holo.; BM, BOL, K, Z, iso.).

Gladiolus callistus F.Bolus in L.Bolus: 105 (1917). Type: South Africa, [Western Cape], Worcester District, Orchard Siding, 5 Oct. 1915, *Dicey s.n.* (BOL [Natl. Bot. Gard. 1217/13], lecto., designated by Goldblatt & Manning: 130 (1998); BOL, PRE, isolecto.)

Gladiolus callistus var. *gracilior* F.Bolus: 105 (1917). Type: South Africa, Western Cape, Bredasdorp District, Ratel River, 12 Dec. 1896, *Bolus 8693* (BOL, holo.; BOL, K, PRE, iso.).

Gladiolus eximius Ingram: 40 (1931a). Type: South Africa, [Western Cape], Caledon District, Palmiet River Mouth, without date, *Ingram s.n.* [K, lecto., designated by Goldblatt & Manning: 130 (1998)].

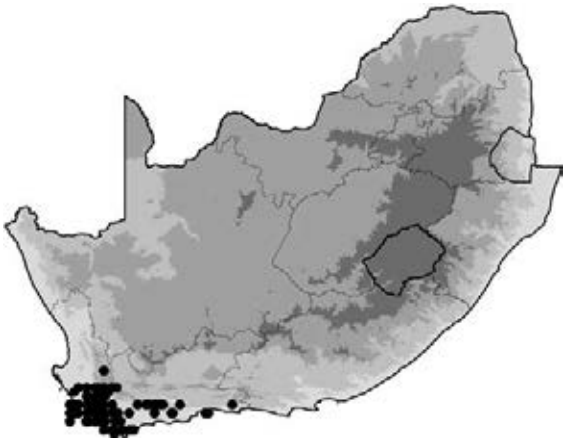
Gladiolus carneus var. *hibbertii* Baker: 217 (1892). Type: unknown.

[*Gladiolus dubius* Eckl.: 41 (1827), invalid name without description.]

Plants 200–600(–800) mm high, with cataphylls purple with cream-coloured or greenish spots. *Corm* ± globose, 15–20 mm diam.; tunics papery, fragmenting irregularly or becoming ± fibrous. *Stem* erect, inclined or drooping, simple, occasionally with 1(2) branches. *Leaves* 4 or 5, lower 2 or 3 basal, usually forming a fan or sometimes superposed, reaching at least to base of spike or longer, sometimes trailing, narrowly lanceolate to nearly linear, (2–)6–14(–19) mm wide, main vein and 1 or more secondary veins lightly thickened, margins narrowly hyaline, cauline leaves sometimes with short blade. *Spike* usually lightly flexed at base, inclined or erect, flowers nearly 2-ranked, (3)5- to 8(11)-flowered; bracts pale green or flushed grey, outer 35–45(–65) mm long, shorter than outer, acute or forked apically. *Flowers* white to pale or deep pink, lower tepals usually with pink to red spade- or diamond marks decurrent on tube, sometimes with linear median streaks, or unmarked, or with pale yellow blotches, tube often spotted or lined with red at base of throat, unscented; perianth tube narrowly funnel-shaped, (15–)25–38(–45) mm long, lower cylindric part 22–29 mm long, usually just emerging from bracts; tepals lanceolate, margins usually undulate or sometimes almost crisped, unequal, upper 3 largest, dorsal 28–40(–50) × 12–20(–30) mm, ascending, upper laterals slightly smaller, gently curving outward from base, lower 3 tepals sometimes joined to upper laterals for up to 6 mm, 25–30(–40) × 7–15 mm, nearly straight and horizontal or spreading distally, rarely somewhat spooned. *Filaments* 12–17(–25) mm long, exserted 5–10(–15) mm from tube; anthers 6–11 mm long, mauve; pollen cream-coloured or purple. *Style* arching over stamens, dividing between bases and apices of anthers, branches 4–8(–10) mm long. *Capsules* oblong-ellipsoid, 3-sided, obscurely 3-lobed above, 20–30 cm long. *Seeds* oblong, 7–9 × 5–6 mm, broadly and evenly winged. *Flowering time*: October to mid-November, occasionally later.

Distribution and ecology: endemic to the coastal and near-inland mountains of Western Cape, South Africa, from Ceres to the Cape Peninsula and as far south as Bredasdorp, also on the Langeberg and occasional on the Outeniqua Mtns north of Knysna; on cooler, rocky slopes, often along streams.

Diagnosis: a polymorphic species, varying in most features, especially flower shape, colour and markings but recognised by the moderately soft-textured leaves and the large, white to pink flowers with the perianth tube



Distribution of ***Gladiolus carneus***.

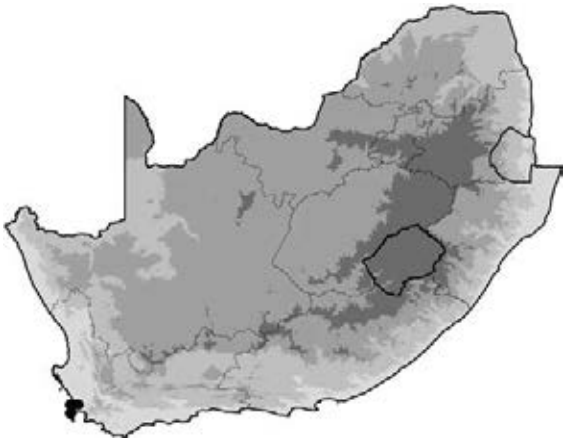
± as long as the dorsal tepal and usually slightly exserted from the bracts. Plants from the Langeberg and Outeniqua Mtns have paler flowers with more strongly crisped tepals, whereas those from the west are usually pink with less undulate tepals. Populations from coastal marshes between Rooi Els and Kleinmond have unmarked flowers with the lower tepals spooned, although similar floral morphs occur elsewhere as well.

Gladiolus carneus is especially difficult to distinguish from forms of *G. pappei,* a slender species with narrow, superposed leaves and 2 to 4 dark pink flowers, and from *G. undulatus*, a hygrophilous species with cream-coloured, attenuate and crisped tepals, and a perianth tube longer than the dorsal tepal.

42. **Gladiolus pappei** *Baker*, Handbook of the Irideae: 208 (1892). Type: South Africa, [Western Cape], Table Mtn., Dec., *Pappe s.n.* (K, holo.; SAM, iso.).

Plants 250–350 mm high, with cataphylls often decayed. *Corm* globose, 5 mm diam.; tunics membranous. *Stem* usually erect below, flexed outward above sheaths of upper 2 leaves but usually becoming erect again, unbranched. *Leaves* 3 or 4(5), lower 2 basal, lowermost usually fairly small, second lowest reaching to between middle of stem and base of spike, linear, 1.6–3.0 mm wide, main vein and margins noticeably thickened, cauline leaves smaller and mostly sheathing. *Spike* nearly erect or lightly flexed at base and weakly inclined, lightly flexuose, (1)2- or 3(4)-flowered; bracts greyish green, often flushed purple-grey, outer 25–45 mm long, inner shorter to ± as long, notched apically. *Flowers* deep or sometimes pale pink, lateral tepals usually with white median diamond- to heart-shaped markings reddish on edges, lower median tepals less prominently marked, base of upper part of throat red, unscented; perianth tube obliquely funnel-shaped, 30–35 mm long, lower cylindric part ± 12 mm long; tepals ± lanceolate, dorsal inclined over stamens, straight or curving upward distally, 26–30 × 15–19 mm, upper laterals gently curving outward from base, barely fully patent near apex, 25–28 × 12–15 mm, lower 3 tepals joined to upper laterals for ± 2 mm and together for ± 2 mm, horizontal below and curving downward distally, 20–28 × 10–11 mm, lower median slightly longer than lower laterals. *Filaments* 12–17 mm long, exserted 5–8 mm from tube; anthers 6–8 mm long, pale grey-blue; pollen pale mauve. *Style* arching over stamens, dividing between middle and shortly beyond anther apices, branches 5–7 mm long. *Seeds* ovate, 6.0–7.5 × 4–6 mm, broadly and evenly winged. *Flowering time*: mid-October to mid-December.

Distribution and ecology: a narrow endemic of Western Cape, South Africa, known with certainty only from the Cape Peninsula, from the Back Table to near Cape Point; in seasonally or perennially marshy habitats, flowering only after fire. Similar plants from the high plateau above Jonkershoek may be this species but are currently included in *G. carneus* on the basis of their wider leaves and more attenuate tepals.



Distribution of ***Gladiolus pappei***.

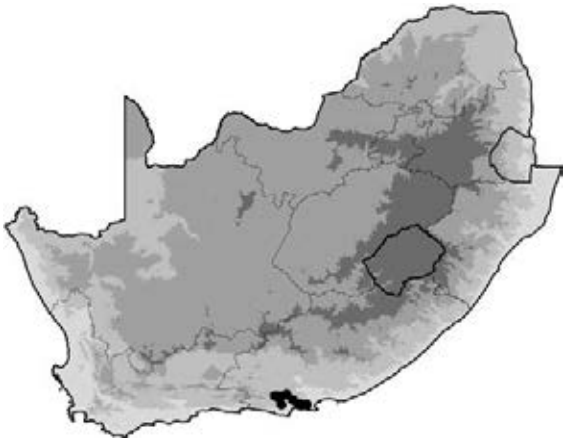
Diagnosis: difficult to separate from slender forms of *Gladiolus carneus* but diagnosed by its very narrow leaves, 1.6–3.0 mm wide, and few-flowered spike of one to four, mostly dark pink flowers with relatively short, lanceolate tepals, a preference for marshy habitats, and the very small corm, ± 5 mm diam. *Gladiolus pappei* is sympatric with *G. carneus* on the Cape Peninsula.

43. **Gladiolus geardii** *L.Bolus* in Annals of the Bolus Herbarium 4: 28 (1925). Type: South Africa, [Eastern Cape], Farm Hadley near Steytlerville, mountain slopes, cultivated at Kirstenbosch Gardens, Dec. 1923, *Paterson s.n. Natl. Bot. Gard. 135/23* (BOL, holo. [on 3 sheets]; K, iso.).

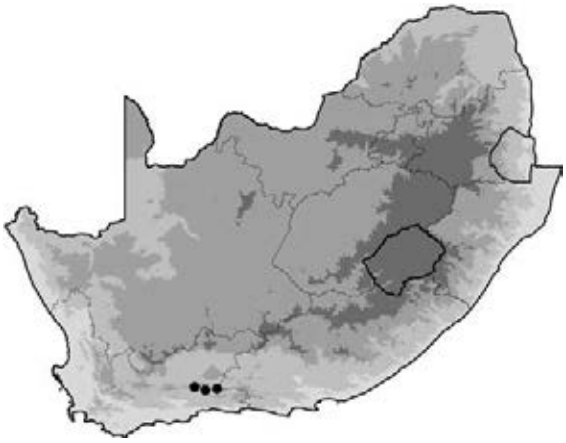
Gladiolus geardii var. *uitenhagensis* L.Bolus: 101 (1934). Type: South Africa, [Eastern Cape], Uitenhage District, Kamaehs, Apr. 1932, *Harcourt-Wood s.n.* (BOL [*BOL1319*], holo. [on 2 sheets]; K, SAM, iso.).

Gladiolus robustus Goldblatt: 453 (1984). Type: South African, [Eastern Cape], Baviaanskloof Mountains, Farm Enkeldoorn, 820 m, 16 Nov. 1982, *Vlok 475* (NBG, holo. [on 2 sheets]; MO, PRE, iso.).

Plants 0.8–1.5 m high. *Corm* depressed-globose, 15–20 mm diam.; tunics membranous, decaying to softly fibrous. *Stem* flexed outward below base of spike, inclined above, usually with 1 or 2 branches. *Leaves* 7 to 9, mostly basal, ± ½ as long as stem, narrowly lanceolate, 14–28 mm wide, main vein moderately thickened, margins lightly thickened. *Spike* inclined, lightly flexuose, 6- to 10-flowered; bracts green, outer 30–50(–60) mm long, inner shorter. *Flowers* pink to light purple, lower 3 tepals each with dark purple spear-shaped mark in lower midline, often pale in centre, unscented; perianth tube obliquely funnel-shaped, 30–40 mm long, cylindrical lower part 24–32 mm long; tepals lanceolate, dorsal largest, extending ± horizontally over stamens, 40–55 × 28–30 mm, upper laterals spreading, 45–50 × ± 20 mm, lower 3 tepals 35–40 × 15–18 mm,



Distribution of ***Gladiolus geardii*** .



Distribution of ***Gladiolus aquamontanus***.

lower median slightly longer than laterals. *Filaments* 20–30 mm long, exserted 14–18 mm from tube; anthers 9–14 mm long, purple; pollen cream-coloured. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches ± 8 mm long. *Capsules* ovoid-ellipsoid, ± 28 mm long. *Seeds* ovate, 6.5–7.0 × 4–5 mm, broadly and evenly winged. *Flowering time*: November to mid-December.

Distribution and ecology: restricted to a few localities in Eastern Cape, South Africa, including Baviaanskloof and the Great Winterhoek, Kouga and Van Staden's River Mtns; in moist montane situations in seeps, streambanks and shady kloofs; flowering in late spring and early summer.

Diagnosis: a robust species, mostly more than 0.8 m tall, with seven to nine leaves and multi-flowered inflorescences of pink to purple flowers, the perianth tube 30–40 mm long and the dorsal tepal 40–55 mm long. *Gladiolus carneus*, which is not recorded east of Knysna, is a smaller plant, seldom more than 600 mm tall, with 4 or 5 leaves and mostly smaller flowers with the dorsal tepal 28–40(–50) mm long.

44. **Gladiolus aquamontanus** *Goldblatt* in South African Journal of Botany 55: 261 (1989). Type: South Africa, [Western Cape], Swartberg Mtns, northern slopes of Blesberg, in perennial stream, 1 585 m, 15 Dec. 1986, *Vlok 1774* (PRE, holo.; K, MO, NBG, SAAS, iso.).

Plants 400–1 000 mm high, inclined or drooping, with cataphylls often decaying. *Corm* vestigial, resembling an erect rhizome, 9–12 mm diam.; tunics softly papery, not persisting. *Stem* inclined to drooping, unbranched. *Leaves* (4)5 or 6, lower 3 basal, soft-textured, narrowly lanceolate, 8–15 mm wide, main vein lightly raised, cauline leaves shorter, uppermost bract-like, partly to entirely sheathing. *Spike* inclined or drooping, usually 4- to 8-flowered, occasionally less; bracts green, soft-textured, outer 25–40 mm long, inner shorter. *Flowers* pale mauve-pink, lower 3 tepals with fairly broad, dark purple longitudinal median streak in basal ⅔ and purple toward base of upper part of tube; perianth tube (25–)34–40 mm long, slender and cylindric below for 20–30 mm, curving outward and flared in upper 5–10 mm; tepals lanceolate, dorsal largest, inclined to arching over stamens, 30–35 × 10–12 mm, upper laterals curving outward distally, ± 28 × 7 mm, lower 3 tepals extending forward ± horizontally, 25–30 × ± 10 mm. *Filaments* 15–20 mm long, exserted 10–15 mm from tube; anthers ± 7 mm long, dark purple; pollen cream-coloured. *Style* arching over stamens, dividing between base and apex of anthers, branches 5–6 mm long. *Capsules* narrowly obovoid, 18–22 mm long. *Seeds* narrowly oblong to slightly sigmoid, 7–9 × ± 2.5 mm, unevenly winged with wing narrow at sides. *Flowering time*: mid-November to late December.

Distribution and ecology: a local endemic of the Swartberg in Western Cape, South Africa, where it has been recorded between Swartberg Pass and Blesberg near Meiringspoort; in perennial streams and on wet cliffs, flowering in late spring and early summer.

Diagnosis: recognised by the reduced, rhizome-like rootstock with a basal fan of four to six, relatively soft-textured leaves, and pale mauve-pink flowers with perianth tube 34–40 mm long and slightly longer than the dorsal tepal. The oblong or slightly sigmoid seeds are unusual in the series.

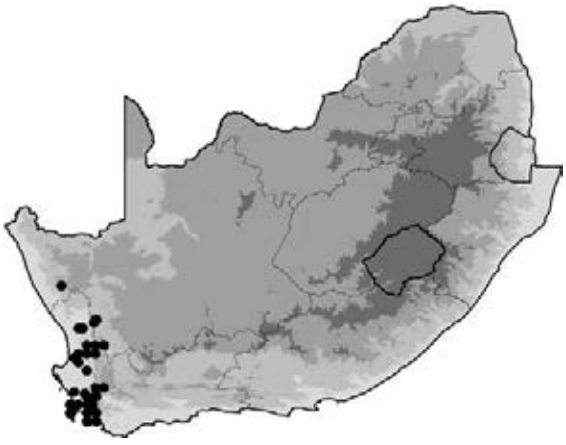
45. **Gladiolus undulatus** *L.*, Mantissa plantarum 1: 27 (1767). Type: South Africa, without precise locality or collector, ?cult. in Holland *LINN59/11* (LINN, holo.).

Gladiolus cuspidatus Jacq.: 5, t. 257 (1795) [1788–1795]. Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 257 (1795).

Gladiolus affinis Pers.: 45 (1805). Type: South Africa, Cape, without precise locality or collector, illustration in Andrews: t. 219 (1802) '*G. cuspidatus* Jacq.'.

Plants (250–)450–1 500 mm high, with cataphylls reddish purple speckled with white. *Corm* depressed-globose, 16–24 mm diam.; tunics soft-textured, not normally persisting. *Stem* erect below, lightly flexed above sheaths of upper 3 leaves, inclined above, unbranched or robust plants with 1 or 2 branches. *Leaves* 4 or 5, at least lower 2 basal and usually reaching to ± middle of spike, narrowly lanceolate, 5–12 mm wide, main vein lightly raised and thickened, margins hyaline but barely thickened, cauline leaves shorter. *Spike* inclined, ± 2-ranked, (3)6- to 9(12)-flowered; bracts firm-textured, dull green or flushed dull purple, outer 33–40(–70) mm long, inner shorter and completely enclosed by outer. *Flowers* pinkish cream-coloured to greenish or pale lilac, lower tepals each with reddish to purple diamond-, spear-shaped or linear marking in lower midline, base of upper part of tube with reddish to purple blotches opposite bases of tepals, unscented; perianth tube 52–75 mm long, cylindric below for 45–60 mm, flared in upper 7–9 mm; tepals narrowly lanceolate-attenuate, margins strongly undulate, dorsal largest, extended almost horizontally over stamens and arching distally, 40–50 × 12–15 mm, upper laterals gradually curving outward, 40–45 × 10–12 mm, lower 3 tepals united for ± 2 mm, directed forward below, somewhat twisted and curving downward distally, 33–36 × 6–9 mm, lower median slightly longer than laterals. *Filaments* (12–)15–28 mm long, exserted 6–13 mm from tube; anthers 8–9 mm long, cream-coloured above, purple below; pollen purple. *Style* arching over stamens, usually dividing shortly beyond anther apices or sometimes below, branches ± 6 mm long. *Capsules* oblong-ellipsoid, 20–27 mm long. *Seeds* ovate, ± 8 × 5 mm, broadly and evenly winged. *Flowering time*: mid-November to late December.

Distribution and ecology: essentially restricted to the Atlantic Coast and adjacent interior of Western and Northern Cape, South Africa, from Nieuwoudtville to Bredasdorp, with an outlying population to the north on the Kamiesberg; in seasonally wet or moist sites along streams and marshes, mainly on sandstone but also granite, flowering in late spring and early summer.



Distribution of ***Gladiolus undulatus***.

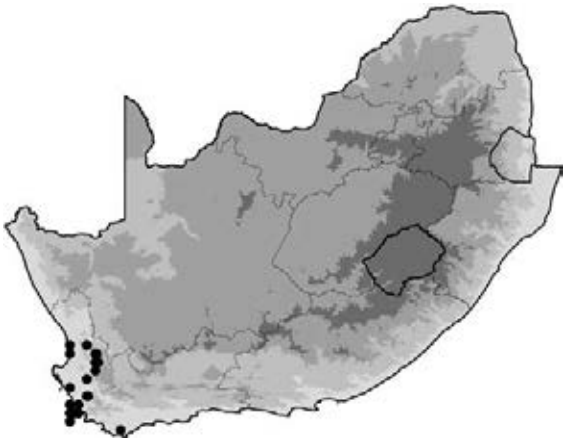
Diagnosis: vegetatively similar to *Gladiolus carneus* but distributed mostly north and west of that species and distinguished by the consistently paler flowers with longer perianth tube, 52–75 mm long, about twice as long as the bracts and longer than the dorsal tepal, and the attenuate, ± strongly undulate or crisped tepals. The distinction between the species is especially difficult between Wellington and Paarl, where their distributions overlap.

46. **Gladiolus angustus** *L.*, Species plantarum: 37 (1753). [*G. angustifolius* Salisb.: 40 (1796), ?orthographic variant or illegitimate homonym]. *G. telifer* Stokes: 217 (1830), illegitimate superfluous name for *G. angustus* L. Type: South Africa, without precise locality, cultivated in Holland, illustration in Linneaus, Hortus Cliffortianus: 20, t. 6 (1738), lecto., designated by Stearn in Introduction to Linnaeus' Species Plantarum (Ray Society Edition): 47 (1957). In error: Herb. Linnaeus *LINN59.16* (LINN, [as holotype]).

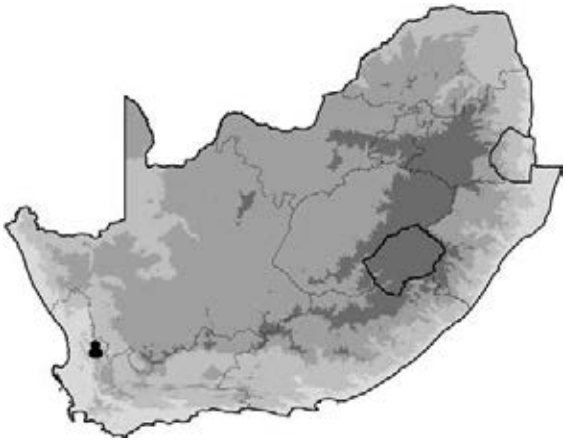
Plants 0.6–1.2 m high, with cataphylls obscurely mottled with green or white. *Corm* ± globose, 14–20 mm diam.; tunics papery, fragmenting irregularly. *Stem* erect or inclined, flexed outward above sheaths of 2 cauline leaves, simple or branched. *Leaves* 4 or 5, lower 2 or 3 basal and reaching or shortly exceeding spike, narrowly lanceolate, (3–)5–10 mm wide, main vein lightly thickened, margins narrowly hyaline, cauline leaves shorter. *Spike* flexed at base, inclined, weakly flexuose, (3)5- to 9-flowered; bracts with outer (30–)50–65(–80) mm long, pale green sometimes flushed reddish, inner shorter to ± as long, minutely forked. *Flowers* cream-coloured to pale yellow, lower 3 tepals with spade-shaped yellow marking in midline outlined in dark red, unscented; perianth tube cylindric, expanded in upper 10 mm, (45–)60–110 mm long; tepals lanceolate, dorsal largest, 32–40 × 16–18 mm, extended ± horizontally over stamens, upper laterals 28–38 × 10–13 mm, extending forward, curving outward distally, 3 lower tepals 25–30 × 9–10 mm, extending forward and nearly horizontal, in profile shorter than upper tepals. *Filaments* 17–24 mm long, exserted 8–12 mm from tube; anthers 9–11 mm long, whitish; pollen cream-coloured. *Style* extending over stamens, dividing just below anther apices, branches 6–8 mm long. *Capsules* ellipsoid, acute, (25–)35–40 mm long. *Seeds* ovate, 8–9 × 5–6 mm, broadly and evenly winged. *Flowering time*: October and November.

Distribution and ecology: occurring along the Atlantic Coast and near interior mountains of Western Cape, South Africa, extending from the Cederberg and Piketberg to the Cape Peninsula, with an isolated population near Elim; in seasonally moist places and along streams and in marshes.

Diagnosis: distinguished from closely allied *Gladiolus carneus* and *G. undulatus* by the combination of a very long perianth tube, (45–)65–110 mm long, and relatively



Distribution of ***Gladiolus angustus***.



Distribution of ***Gladiolus buckerveldii***.

short tepals, the dorsal 32–40 mm long with the lower tepals markedly shorter. Lowland populations along the Atlantic Coast have especially long perianth tubes. The geographical variation in perianth tube length is associated with similar variation in the length of the proboscis of the local long-proboscid flies that are the pollinators (Manning & Goldblatt 1997).

47. **Gladiolus buckerveldii** *(L.Bolus) Goldblatt* in Journal of South African Botany 37: 443 (1971). *Antholyza buckerveldii* L.Bolus: 118 (1927). *Petamenes buckerveldii* (L.Bolus) N.E.Br.: 276 (1932a). Type: South Africa, [Western Cape], Clanwilliam District, mountains above Algeria Forest Station, 1 000 m, 1926, cultivated at Kirstenbosch Gardens 75/26, *Buckerveld s.n.* [as *Natl. Bot. Gard. 75/26*] (BOL, holo. [on 3 sheets]; K, iso.).

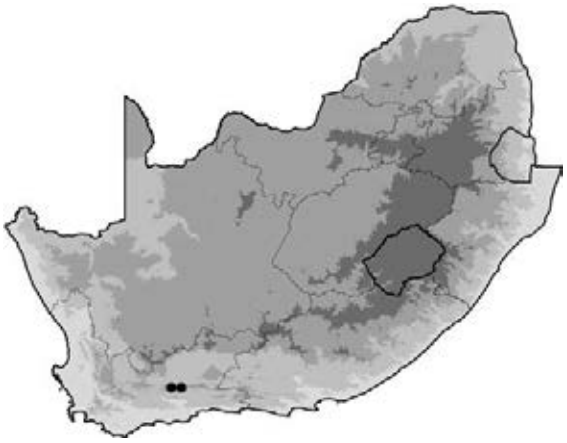
Plants 0.80–1.25 m high, trailing from cliffs, cataphylls usually light purple mottled pale green. *Corm* globose, 15–24 mm diam.; tunics soft-papery, soon decaying. *Stem* inclined to drooping, unbranched. *Leaves* 5 or 6, lower 3 or 4 basal, narrowly lanceolate, 25–35 mm wide, ± trailing distally, main vein and 1 or 2 pairs of secondary veins prominent, margins not thickened. *Spike* inclined or ± horizontal, strongly secund, 12- to 20-flowered; bracts fairly soft-textured, outer 50–80 mm long, reaching to between top of perianth tube and top of flower, inner bracts shorter, acute. *Flowers* ivory-coloured to creamy yellow, lower tepals with a spade- or heart-shaped dark red mark in centre, unscented; perianth tube 45–50 mm long, slender below, widening to 6–7 mm diam. in upper ½; tepals lanceolate, dorsal largest, 28–32 × 13 mm, extended horizontally, upper laterals ± 21 × 10 mm, curving outward ± from base, lower 3 much smaller, ± 12 × 6 mm, curving gradually outward. *Filaments* 25–28 mm long, exserted ± 10 mm from tube; anthers ± 10 mm long, cream-coloured turning to lilac; pollen cream-coloured. *Style* arching over stamens, dividing at or near anther tips, branches ± 5 mm long. *Capsules* oblong, obtuse, 22–26 mm long. *Seeds* oblong to slightly sigmoid, 8–9 × 3–4 mm, broadly winged at one end and sometimes weakly at opposite end but hardy at all on the sides. *Flowering time*: January, rarely in late December.

Distribution and ecology: a local endemic of the northern Cederberg in Western Cape, South Africa; on mossy cliffs along permanent streams and waterfalls, often in the spray zone, flowering in midsummer.

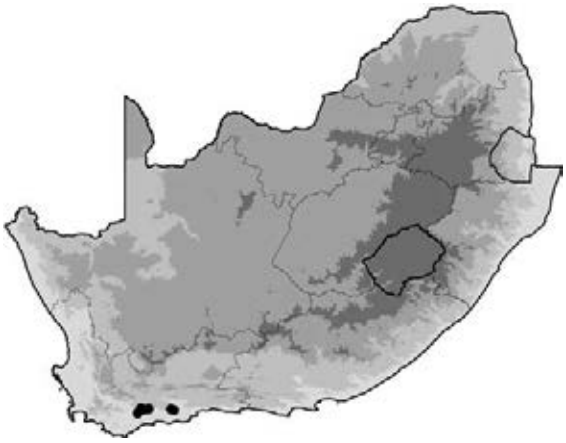
Diagnosis: a summer-flowering species characterised by its long spikes of narrowly tubular flowers, the upper part of the tube cylindric with comparatively short tepals, especially the lower, and disproportionately long bracts reaching at least to the top of the perianth tube and sometimes to the top of the flower.

48. **Gladiolus dolichosiphon** *Goldblatt & J.C.Manning* in Bothalia 39: 37 (2009). Type: South Africa, Western Cape, Rooiberg, south of track between Rooiberg Pass and Bailey's Peak, 7–23 Feb. 2008, *A.L. Schutte & J. Vlok 941* (NBG, holo.; K, MO, iso.).

Plants 200–400 mm high, with cataphylls purple obscurely mottled with green or white. *Corm* subglobose, 10–15 mm diam.; tunics softly fibrous. *Stem* inclined outward above basal leaves, unbranched or with small lateral branch from axil of 1 or both uppermost leaves. *Leaves* 6 or 7, lower 3 basal and reaching or shortly exceeding spike, linear to narrowly lanceolate, 1.5–4.0(–6.5) mm wide, main vein slightly thickened, margins hyaline, cauline leaves smaller and sheathing. *Spike* flexed at base, inclined, weakly flexuose, 4- or 5(7)-flowered, subsecund; bracts flushed purple, 20–30(–35) mm long, subacute or lower attenuate, inner shorter, subacute. *Flowers* pale creamy pink to salmon-coloured, lower 3 tepals with pale lozenge-shaped median mark outlined in dark red, unscented; perianth tube cylindric, expanded in upper 10 mm, straight or arched distally, (30–)40–55 mm long; tepals lanceolate, dorsal largest, 30–40 × 15–17 mm, arching forward over stamens, curving upward distally, upper laterals 25–28 × 12–14 mm, curving outward above, lower 3 tepals united basally



Distribution of ***Gladiolus dolichosiphon***.



Distribution of ***Gladiolus bilineatus***.

for ± 2 mm, narrowly lanceolate, 20–25 × 4–5 mm. *Filaments* 16–20 mm long, exserted 10–14 mm from tube; anthers 8–9 mm long, purple; pollen cream-coloured. *Style* arching beneath dorsal tepal, dividing just below to just beyond anther apices, branches 5–6 mm long. *Capsules* obovoid, 3-lobed, 18–25 mm long. *Seeds* unknown. *Flowering time*: late January to mid-February.

Distribution and ecology: endemic to the mountains of the Little Karoo in Western Cape, South Africa, on the Klein Swartberg and the Rooiberg; on cooler south-facing slopes in seasonally moist situations, at 1 300 and 1 900 m elevation, flowering in midsummer.

Diagnosis: recognised by the narrow leaves and spikes of creamy pink or pale salmon-pink flowers with slender perianth tube 30–55 mm long and longer than the relatively shorter tepals. It broadly resembles autumn-flowering *Gladiolus bilineatus* from the southern foothills of the Langeberg, but that species has just three, mostly slightly wider leaves on the flowering stem and a slightly longer perianth tube 50–70 mm long, with the filaments shortly exserted only ± 2 mm.

49. **Gladiolus bilineatus** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 268 (1972). Type: South Africa, [Western Cape], Riversdale District, foothills of Langeberg Mtns, 27 Mar. 1934, *Ferguson s.n.* (BOL, holo.; K, SAM, iso.).

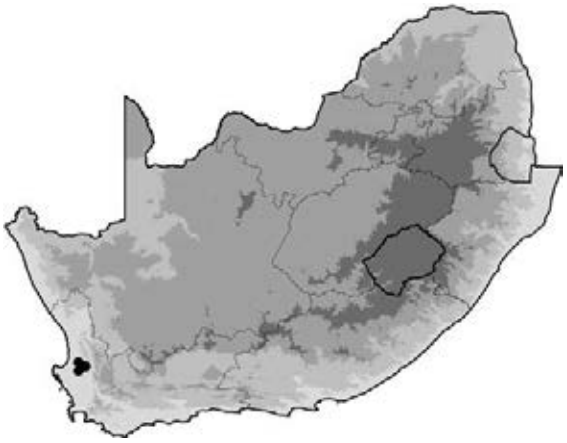
Plants 200–350 mm high, with cataphylls green or sometimes obscurely speckled with purple. *Corm* ± globose, 18–24 mm diam.; tunics finely fibrous. *Stem* erect or inclined, lightly flexed outward above sheaths of upper 2 leaves, unbranched. *Leaves* 3, lowermost basal and reaching to ± base of spike, linear-lanceolate, 6–8 mm wide, midvein evident but only lightly thickened, margins narrowly hyaline, cauline leaves progressively smaller, usually overlapping. *Spike* lightly inclined, ± straight, 2- to 5-flowered; bracts green or flushed dull purple, outer 40–50(–60) mm long, inner shorter, usually minutely forked. *Flowers* creamy pink to pale salmon-coloured, lower 3 tepals with long pale median streak edged in dark pink to red, unscented; perianth tube 50–70 mm long and cylindric in lower 40–50 mm, flared in upper 10–20 mm; tepals lanceolate, dorsal largest, 23 × 15–16 mm, inclined nearly horizontally over stamens, upper laterals 22–23 × 9 mm, curving outward distally, lower 3 tepals joined to upper laterals for ± 3 mm, 15–17 × 7–8 mm. *Filaments* ± 20 mm long, exserted ± 2 mm from tube; anthers ± 9 mm long, purple; pollen lilac. *Style* arching over stamens, dividing just beyond anther apices, branches ± 4 mm long. *Capsules* ovoid [mature capsules not seen]. *Seeds* ovate, 5.5–6.5 mm long, broadly and evenly winged. *Flowering time*: March and April.

Distribution and ecology: a poorly collected species of the southern foothills of the Langeberg in Western Cape, South Africa, from Tradouw Pass to Albertinia; in fynbos–renosterveld transitional vegetation on loamy soils, flowering in autumn.

Diagnosis: an autumn-flowering species with only three leaves on the flowering stem and few-flowered spikes of pale pink to salmon-pink flowers with long, slender perianth tube 50–70 mm long, the filaments mostly included and exserted just ± 2 mm. Non-flowering plants produce a single long leaf.

50. **Gladiolus insolens** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 139 (1998). Type: South Africa, Western Cape, Piketberg Mtns, SW slopes of Zebrakop, 4 Jan. 1995, *Goldblatt & Manning 10166* (NBG, holo.; K, MO, PRE, iso.).

Plants 300–500 mm high. *Corm* globose, 18–20 mm diam.; tunics papery becoming softly and finely fibrous. *Stem* inclined to trailing, occasionally hanging from rocks, usually unbranched or with one short branch. *Leaves* 5 or 6, lower 3 basal, up to 300 mm long, inclined to trailing, linear, 3.5–5.5 mm wide, main vein thickened and lightly raised, margins narrowly hyaline, not thickened, cauline leaves progressively smaller, usually overlapping. *Spike* curving upward and inclined, 1- to



Distribution of ***Gladiolus insolens***.

4-flowered, lightly flexuose; bracts firm-textured, light green, outer 30–45 mm long, inner shorter, minutely notched. *Flowers* bright scarlet, tepals forming a wide bowl with apices curving inward, lower tepals each with obscure darker red median blotch in upper ½; perianth tube cylindric below, ± 38 mm long, slightly curved and flared in upper 10 mm; tepals subequal, upper 3 slightly larger than lower 3, broadly obovate, arching forward with apices curving inward, 27–30 × 18–20 mm, slightly spooned, in profile lower exceeding upper by ± 8 mm. *Filaments* ± 20 mm long, exserted ± 7 mm from tube; anthers ± 8 mm long, scarlet; pollen pale yellow. *Style* arching over stamens, dividing opposite lower ⅓ of anthers, branches ± 12 mm long. *Capsules* and *seeds* unknown. *Flowering time*: late December to mid-January.

Distribution and ecology: endemic to the Piketberg in Western Cape, South Africa, and known only from Zebrakop; on cooler slopes along streams and seeps, flowering in midsummer.

Diagnosis: unmistakable in its scarlet, tulip-shaped flowers with obovate, cupped tepals. The fan of several hairless leaves distinguishes it from the unrelated, autumn-flowering *Gladiolus stokoei* from the Riviersonderend Mtns, which has remarkably similar flowers but highly reduced, softly hairy foliage.

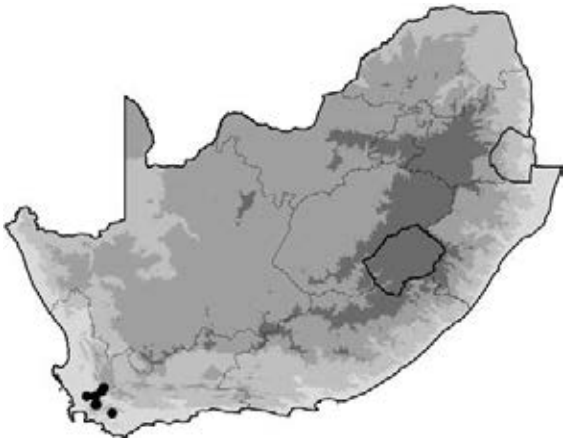
51. **Gladiolus cardinalis** *Curtis* in The Botanical Magazine 4: t. 135 (1790). Type: South Africa, without precise locality or collector, cultivated in England, illustration in Curtis: t. 135 (1790).

Gladiolus speciosus Eckl.: 41 (1827), illegitimate homonym, not *G. speciosus* Thunb. (1811). Type: unknown.

Plants 550–900 mm high. *Corm* poorly developed, globose, 12–18 mm diam., attached to rocks, not underground, tunics firm membranous to papery, decaying into fine fibres but not accumulating. *Stem* inclined to drooping, unbranched. *Leaves* 5 to 7, lower 3 or 4 basal, always drooping but reaching to base or sometimes slightly exceeding spike, narrowly lanceolate, 11–21 mm wide, main vein thickened and slightly raised and 1 other vein pair prominent, margins not thickened, cauline leaves smaller and largely sheathing. *Spike* inclined or drooping, flowers borne on upper side, (4) 8- to 11-flowered; outer bract 45–60(–70) mm long, inner shorter, acute, not normally notched apically. *Flowers* bright red, lower 3 tepals with broad median white longitudinal spear-shaped mark, unscented; perianth tube 32–40 mm long, straight or obliquely funnel-shaped, lower cylindric part ± 28 mm long; tepals lanceolate, acute or obtuse, unequal, dorsal largest, held apart, spreading or slightly recurved, 45–55 × 24–30 mm, upper laterals spreading distally, 48–56 × 20–22 mm, lower 3 tepals joined to upper laterals for 3–7 mm and together for 1–3 mm, 36–53 × 17–19 mm. *Filaments* (25–)35–42 mm long, exserted 23–29 mm from tube; anthers 11–14 mm long, upper surface reddish, lower surface white with violet sutures on thecae; pollen cream-coloured. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches 8–14 mm long. *Capsules* obovoid, 18–27 mm long. *Seeds* ovate to oblong, 6–8 × 3.5–4.0 mm, wing evenly developed or reduced at sides. *Flowering time*: mid-December to mid-January.

Distribution and ecology: restricted to the mountains in the extreme southwest of Western Cape, South Africa, from the Hex River Mtns to Du Toit's Kloof and Worcester; usually on sheer cliffs close to waterfalls, flowering in midsummer.

Diagnosis: one of three allopatric species with similar, large red flowers with white marks on the lower tepals, *Gladiolus cardinalis* is distinguished by the well-developed foliage, small corm, and habitat, trailing from wet cliffs. Autumn-flowering *Gladiolus sempervirens* from the Outeniqua and Tsitsikamma Mtns is a more leafy, evergreen species with a rhizome-like rootstock and scaly stolons. Both have flowers adapted for pollination by the large butterfly, *Aeropetes tulbaghia*.



Distribution of ***Gladiolus cardinalis***.

52. **Gladiolus sempervirens** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 18 (1972), replacement name for *G. splendens* Baker: 333 (1876b), illegitimate homonym, not *G. splendens* (Sweet) Herb. (1843). Type: South Africa, Western Cape, George District, mountains near Oakhurst, Apr. 1870, *Dumbleton s.n.* (K, holo.).

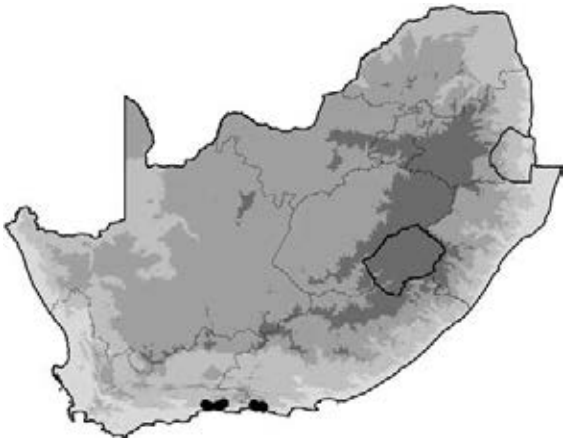
Plants 350–1 000 mm high, evergreen. *Corm* 8–12 mm diam., shallowly seated, producing scaly, rhizome-like stolons from base; tunics leathery and not much distinguished from bases of leaves. *Stem* erect or inclined, flexed above sheathing parts of upper 1 or 2 leaves, sometimes with a branch, 2.5–4.0 mm diam. below base of spike. *Leaves* 7 to 12, lower 5 to 10 basal, reaching to ± the middle of stem, lanceolate, 6–18 mm wide, main vein and 1 other vein pair lightly thickened, margins not thickened. *Spike* inclined, bearing flowers on upper surface, 4- to 8-flowered; bracts soft-textured, outer 35–55(–70) mm long, inner shorter to about as long. *Flowers* deep carmine red, lower 3 tepals with narrow longitudinal white streak in lower midline, unscented; perianth tube funnel-shaped, 25–42 mm long, lower cylindric part ± 15 mm long; tepals elliptic, dorsal broadly elliptic, largest, 55–58 × 32–36 mm, upper laterals ± 54 × 31 mm, lower 3 joined basally for ± 4 mm, ± 50 × 20 mm. *Filaments* 28–42 mm long, exserted 20–24 mm from tube; anthers ± 14 mm long, purple; pollen yellow. *Style* arching over stamens, dividing opposite anther apices, branches 7–8 mm long. *Capsules* oblong, 3-lobed above and retuse, (15–)20–25 mm long. *Seeds* oval, ± 8 × 6 mm, wing well developed. *Flowering time*: February to March, rarely April.

Distribution and ecology: restricted to the southern slopes of the Outeniqua Mtns between George and Knysna in Western Cape, South Africa, and on both sides of the Tsitsikamma Mtns as far east as Kareedouw in Eastern Cape; in seeps and perennially damp, sheltered situations.

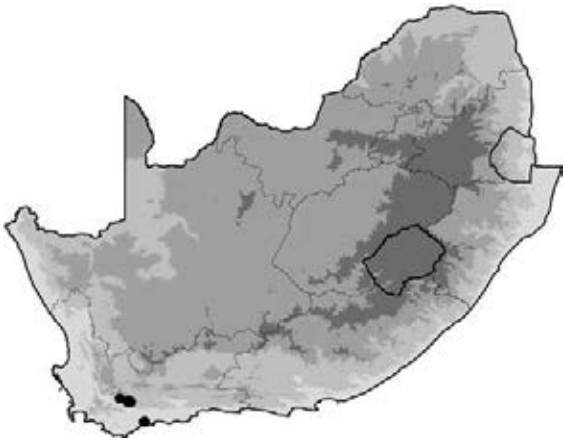
Diagnosis: one of three allopatric species with similar, large red flowers with white marks on the lower tepals, distinguished by the evergreen habit, numerous, relatively soft-textured leaves and the rhizome-like rootstock with well-developed, scaly stolons.

53. **Gladiolus stefaniae** *Oberm.* in Lewis et al. in Journal of South African Botany, Suppl. 10: 252 (1972). Type: South Africa, [Western Cape], Montagu District, mountains west of Cogmanskloof, Farm Kalkoensnes, 1 Apr. 1970, *Pienaar s.n.* (NBG, holo.).

Plants 400–650 mm high, with cataphylls dark purple and usually lightly mottled with cream-coloured or green. *Corm* globose, ± 20 mm diam.; tunics papery becoming soft and finely fibrous. *Stem* ± erect, slightly flexed outward above sheaths of upper 2 leaves, unbranched. *Leaves* 3 to 5(6), all cauline, lowermost lanceolate, blade shorter than sheath, others usually entirely sheathing; non-flowering plants producing 3 or 4 linear leaves ± 5 mm wide, main vein fairly strongly thickened, margins lightly raised. *Spike* erect, 2- to 4-flowered; bracts pale green or flushed grey, outer 55–65 mm long, inner shorter. *Flowers* bright scarlet or carmine, lower 3 tepals with median whitish streak in lower midline, sometimes paler on edges and shading to mauve, unscented; perianth tube 35–45 mm long, narrowly and obliquely funnel-shaped, lower cylindric part 25–30 mm long; tepals with outer whorl larger, broadly lanceolate to ovate, dorsal inclined over stamens, 53–58 × 25–32 mm, upper laterals 50–60 × 25–27 mm, spreading distally, lower 3 tepals joined to upper laterals for ± 3 mm, 45–48 × 23–25 mm. *Filaments* 30–42 mm long, exserted 20–32 mm from tube; anthers ± 13 mm long, yellow with purple lines on sutures of thecae or uniformly dark purple; pollen cream-coloured. *Style* arching over filaments, dividing opposite lower ⅓ of anthers, branches 10–12 mm long. *Capsules* oblong-ellipsoid, 18–25 mm long. *Seeds* oval, broadly and evenly winged, 6.5–8.0 × ± 5.5 mm. *Flowering time*: early March to mid-April.



Distribution of ***Gladiolus sempervirens***.



Distribution of ***Gladiolus stefaniae***.

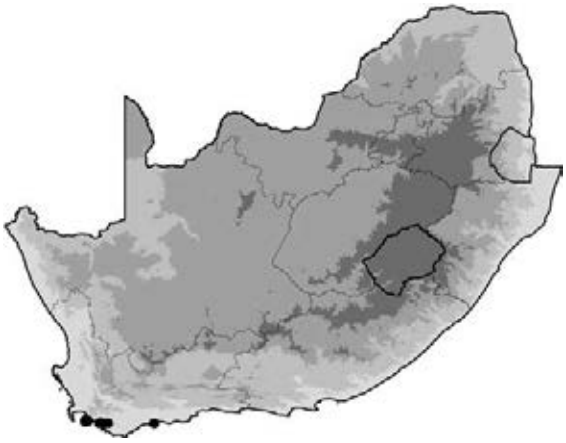
Distribution and ecology: a local endemic of Western Cape, South Africa, with a disjunct distribution in the Langeberg near Montagu between 700 and 1 400 m elevation, and on the Potberg west of Cape Infanta; on rocky, south-facing slopes in fynbos, flowering in autumn.

Diagnosis: distinguished from *Gladiolus cardinalis* and *G. sempervirens* with similar, large red flowers by the upright habit, mottled cataphylls and reduced leaves with the blades shorter than the sheaths or lacking. Typical populations from the Langeberg are bright scarlet but those from the Potberg are carmine. The latter form especially resembles *G. carmineus* from coastal scrub between Pringle Bay and Cape Infanta and has been identified as that species in the past, but *G. carmineus* has smaller, more cupped flowers with perianth tube ± 30 mm long, dorsal tepal ± 35 mm long, and filaments 21–26 mm long.

54. **Gladiolus carmineus** *C.H.Wright* in Curtis's Botanical Magazine 132: t. 8068 (1906). Type: South Africa, [Western Cape], cliffs at Hermanus, cultivated at Royal Botanic Gardens, Kew, *Abercrombie Smith s.n.*, illustration in Wright: t. 8068 (1906), lecto., designated by Goldblatt & Manning: 145 (1998); K [flower fragment], isolecto.

Plants (160–)300–500 mm high, with cataphylls dark purple mottled with cream-coloured or green. *Corm* globose, 20–25 mm diam.; tunics membranous layers becoming fibrous, extending upward in collar around base. *Stem* erect, flexed outward above sheaths of 2 upper leaves, unbranched. *Leaves* 3 to 5, all cauline, lowermost with vestigial lanceolate blade shorter than sheath, up to 50 mm long, upper leaves smaller, usually bladeless; non-flowering plants usually with 2 long, trailing, falcate leaves, these dry and decaying at flowering, 8–10 mm wide, glaucous, main vein lightly thickened. *Spike* erect, flexuose, 2- to 6-flowered; bracts pale green or flushed grey, outer 30–40 mm long, inner shorter. *Flowers* pale to deep pink, lower 3 tepals each with a median whitish streak surrounded by a pale mauve halo, occasionally upper lateral tepals similarly marked, unscented; perianth tube 30–35 mm long, narrowly funnel-shaped; tepals broadly lanceolate, outer 3 larger and ± as long, dorsal 35–45 × 18–27 mm, upper laterals and lower median 33–48 × 16–28 mm, lower 3 tepals joined to upper laterals for up to 4 mm, spreading ± horizontally. *Filaments* 21–26 mm long, exserted 10–15 mm from tube; anthers 10–14 mm long, usually yellow; pollen cream-coloured. *Style* arching over stamens, dividing opposite lower half of anthers, branches ± 10 mm long. *Capsules* narrowly obovoid, 20–22 mm long. *Seeds* ovate, 8 × 6–7 mm, broadly and evenly winged. *Flowering time*: mid-February to late March.

Distribution and ecology: a local endemic of coastal cliffs and rock outcrops in southern Western Cape, South Africa, from Pringle Bay to Hermanus, Gansbaai and Cape Infanta; in low coastal scrub, flowering in late summer to autumn.



Distribution of ***Gladiolus carmineus***.

Diagnosis: an autumn-flowering species recognised by the reduced foliage and moderately large, funnel-shaped, carmine flowers with perianth tube 30–35 mm long. It has been confused with vegetatively similar *Gladiolus stefaniae* on the Potberg, but that species has larger, usually red flowers with perianth tube 35–45 mm long, dorsal tepal 53–58 mm long and filaments 30–42 mm long.

Ser. **Floribundi** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus floribundus* Jacq.

Plants moderate-sized to large. *Corm* tunics firm-papery to coarsely fibrous, accumulating in a thick mass. *Stems* short and mostly concealed by leaves. *Leaves* ± firm-textured, in a distinct fan, firm-textured with thickened margins and main vein; bracts leathery, glabrous. *Spike*s secund. *Flowers* moderate-sized to large, zygomorphic, pink to cream-coloured or yellow-green, with lozenge-, spade- or spear-shaped median markings on lower tepals outlined with red; perianth tube shorter or longer than dorsal tepal.

55. **Gladiolus rudis** *Licht. ex Roem. & Schult.*, Systema vegetabilium secundum 1: 408 (1817). *G. floribundus* subsp. *rudis* (Licht. ex Roem. & Schult.) Oberm. in Lewis et al.: 108 (1972). Type: South Africa, Cape, without precise locality or collector, but possibly *M. Lichtenstein* [B: Herb. *Willdenow 917* [photo at NBG], lecto., designated by Lewis et al.: 108 (1972)].

Gladiolus vomerculus Ker Gawl.: 142 (1827). Type: South Africa, Western Cape, without precise locality or collector, cultivated in Great Britain by William Herbert, illustration in Ker Gawler: t. 1564 (1813) as '*G. hastatus* Thunb.'.

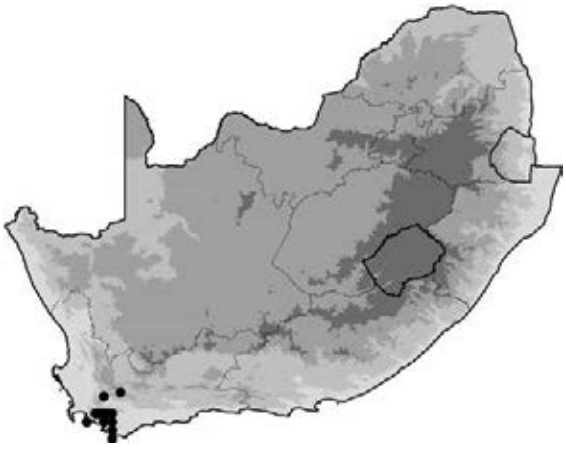
[*Gladiolus tigrinus* Eckl. ex Baker: 173 (1877), invalid name only in synonymy under *G. hastatus* Thunb.]

Plants 150–550 mm high, with purple cataphylls mottled with green or white, roughly textured on mottling. *Corm* ± globose, 20–40 mm diam.; tunics firm-papery

becoming medium to coarsely fibrous, accumulating in a thick mass. *Stem* flexed outward above sheaths of two upper leaves, usually unbranched. *Leaves* 4 to 7, lower 3 to 5 basal and reaching base of spike or often shortly exceeding it, sheaths often mottled purple and green below, sword-shaped, 7–15(–20) mm wide, margins and main vein and 1 or 2 vein pairs lightly or sometimes moderately thickened, margins occasionally minutely crisped, cauline leaves shorter. *Spike* strongly inclined, sometimes horizontal, lightly flexuose, 2- to 5-flowered; bracts green or flushed brownish or purple, 35–50(–65) mm long, sometimes lightly folded in upper midline, inner shorter. *Flowers* cream-coloured, whitish or pale pink, lower half of tepals darker coloured on reverse, lower lateral tepals with yellowish spade-shaped longitudinal mark outlined in red or purple, throat yellow, unscented; perianth tube obliquely funnel-shaped, 18–21 mm long, lower cylindric part 8–10 mm long, emerging from middle of bracts, occasionally reaching bract apices; tepals lanceolate to elliptic, acute, subequal, dorsal slightly larger, ascending, arching upward distally, 32–36 × 18–20 mm, upper laterals 29–32 × 18–22 mm, spreading distally, lower tepals united for 2–3 mm, 26–32 × 13–15 mm. *Filaments* 12–14 mm long, exserted 5–7 mm from tube; anthers 9–12 mm long, white; pollen white. *Style* usually arching over stamens, rarely suberect, dividing opposite lower ½ of anthers, branches 6–8 mm long. *Capsules* and *seeds* unknown. *Flowering time*: early September to mid-October.

Distribution and ecology: a local endemic of Western Cape, South Africa, from the lower slopes of the Riviersonderend and Bredasdorp Mtns and south of Elim; on stony sandstone slopes in fynbos.

Diagnosis: distinguished from other species in the series with similar short stems and thickly fibrous tunics accumulating in a mass by the short-tubed flowers with perianth tube 18–21 mm long and lower tepals with a yellowish, spade-shaped marking outlined with red or purple, and the short filaments 12–14 mm long. The raised white mottling on the cataphylls is also distinctive.



Distribution of ***Gladiolus rudis***.

56. **Gladiolus grandiflorus** *Andrews*, The Botanist's Repository 2: t. 118 (1800). Type: South Africa, Cape, without precise locality or collector, cultivated in Great Britain, illustration in Andrews: t. 118 (1800).

Gladiolus milleri Ker Gawl.: t. 632 (1803b). *G. floribundus* subsp. *milleri* (Ker Gawl.) Oberm. in Lewis et al.: 104 (1972). Type: South Africa, without precise locality or collector, cultivated in Great Britain at Kensington, illustration in Ker Gawl.: t. 632 (1803b).

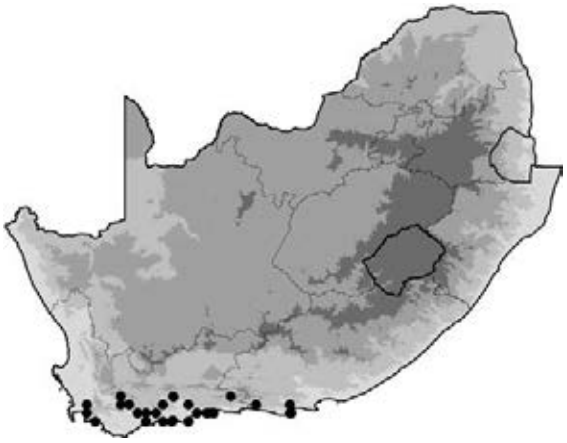
Gladiolus fasciatus Roem. & Schult.: 429 (1817), new name for *G. vittatus* Hornem.: 950 (1815), illegitimate homonym, not *G. vittatus* Zuccagni (1806). *G. floribundus* subsp. *fasciatus* (Roem. & Schult.) Oberm. in Lewis et al.: 107 (1972). Type: South Africa, without precise locality or collector (C, holo.).

Geissorhiza grandis Hook.f.: t. 5877 (1870b). Type: South Africa, [Eastern Cape], probably Port Elizabeth District, cultivated in Great Britain, *Wilson s.n.*, illustration in Hook.f.: t. 5877 (1870b).

Gladiolus scaphochlamys Baker: 217 (1892). Type: South Africa, [Western Cape], Swellendam District, Sparrbos near Buffeljags River, 30 July 1831, *Drège 8427* (K, lecto., designated by Goldblatt & Manning: 147 (1998); BM, G, K, L, MO, P, S, isolecto.).

Gladiolus socium L.Bolus: 14 (1931a). Type: South Africa, [Western Cape], George District, cultivated in Cape Town, Oct. 1929, *De Mole & Kisch s.n.* (BOL [*BOL 19083*], lecto., designated by Goldblatt & Manning: 147 (1998); BOL, K, isolecto.).

Plants (250–)350–500 mm high, with cataphylls purple, lightly mottled with green or white. *Corm* ± globose, 20–40 mm diam.; tunics papery, decaying into medium to coarsely textured fibres, accumulating in a thick mass. *Stem* erect below, flexed outward above sheaths of upper 2 leaves, usually unbranched. *Leaves* 4 to 7, lower 3 to 5 basal, reaching to base or often shortly exceeding spike, lanceolate, 6–15(–20) mm wide, margins and main vein and 1 or 2 other veins lightly or sometimes moderately thickened, margins occasionally minutely crisped, cauline leaves shorter. *Spike* strongly inclined to almost horizontal, lightly flexuose, (2)3- to 6(9)-flowered; bracts green or flushed brownish or purple, (30–)35–50(–65) mm long, sometimes lightly folded in upper midline, inner shorter. *Flowers* cream-coloured, whitish or pale pink, lower ½ of tepals darker coloured on reverse, upper lateral and lower tepals with pink to reddish median streak, throat yellow, sometimes with red at base, occasionally lightly scented; perianth tube obliquely funnel-shaped, (22–)27–35(–55) mm long, lower cylindric part 13–22(–40) mm long, reaching to between the middle and apices of bracts, rarely slightly longer; tepals obovate to oblanceolate, margins sometimes undulate or lightly crisped, obtuse to retuse, subequal or unequal, then upper 3 slightly larger or dorsal



Distribution of ***Gladiolus grandiflorus***.

largest, ascending, arching upward distally, 35–40(–44) × 13–20 mm, upper laterals 30–36 × 13–18 mm, curving outward distally, lower tepals united for 2–3 mm, 23–31(–37) × 8–13 mm. *Filaments* 14–22 mm long, exserted 4–12 mm from tube, cream-coloured or pink; anthers 7–11 mm long, white, cream-coloured, or purple; pollen white or mauve. *Style* usually arching over stamens, rarely suberect, dividing between middle and apex of anthers or slightly exceeding them, branches 5–9 mm long. *Capsules* narrowly obovoid to elliptic, 30–40 mm long. *Seeds* oval, 12–14 × 8–10 mm, broadly and evenly winged. *Flowering time*: August to mid-October.

Distribution and ecology: relatively widespread through the southern coastal and near-interior parts of South Africa, from Bot River in Western Cape to Port Elizabeth in Eastern Cape; often on clay soils, but also calcareous sands.

Diagnosis: separated from short-tubed *Gladiolus rudis* by the slightly longer perianth tube, usually 27–35(–50) mm long, the longer filaments, 14–22 mm long, and the different markings on the lower tepals, reddish median streaks rather than yellowish spade-shaped blotches outlined with red or purple. The white mottling on the cataphylls is not raised. *Gladiolus grandiflorus* may be difficult to separate from shorter-tubed forms of *G. floribundus* but that species usually has a longer perianth tube, 40–70 mm long, with the lower tepals markedly shorter than the upper.

Populations from calcareous sands along the coast near Stilbaai with pink flowers with crispulate tepals were treated as *G. fasciatus* but we regard them as a local form of *G. grandiflorus*. Populations from near Port Elizabeth, described as *Geissorhiza grandis*, have almost actinomorphic flowers.

57. **Gladiolus floribundus** *Jacq.*, Collectanea 4: 162 (1791). Type: South Africa, Cape, without precise locality or collector, illustration in Jacq.: t. 251 (1791 [1788–1795]) '*Gladiolus undulatus* L.'.

Antholyza spicata Mill.: 2 (1768) [not *Gladiolus spicatus* Linnaeus (1753)]. Type: South Africa, Western Cape, without precise locality or collector, cultivated in Great Britain, illustration in Miller, Figures of Plants 1: t. 40 (1755).

Gladiolus striatus Andrews: t. 111 (1800), illegitimate homonym, not *G. striatus* Jacq. (1791). *G. floribundus* var. *striatus* Pers.: 45 (1805). Type: South Africa, without precise locality or collector, cultivated at Hammersmith, London, illustration in Andrews: t. 111 (1800).

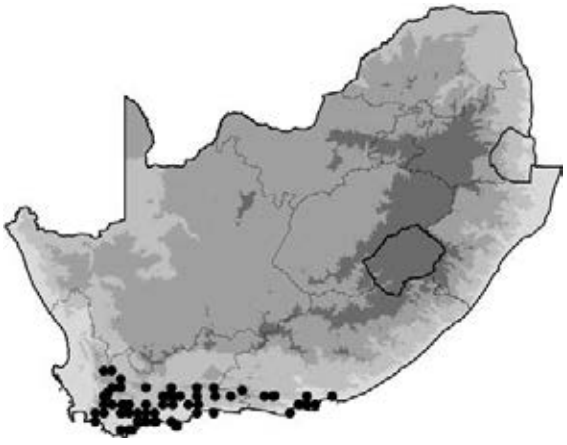
Gladiolus bowkeri G.J.Lewis: 26 (1941), as a replacement name for *Montbretia pauciflora* Baker: 336 (1876b) [not *G. pauciflorus* Baker in Oliver (1887)]. *Tritonia pauciflora* (Baker) Klatt: 358 (1882). *Acidanthera pauciflora* (Baker) Benth.: 706 (1883). Type: South Africa, Eastern Cape, Somerset East, without date, *Bowker s.n.* (K, holo., photo at BOL and PRE).

Acidanthera graminifolia Baker: 338 (1876b). *Gladiolus graminifolius* (Baker) G.J.Lewis in Lewis: 26 (1941). Type: South Africa, [Western Cape], plains between Swellendam and Gouritz River, in 1818 or 1819, *Bowie s.n.* (BM, holo.).

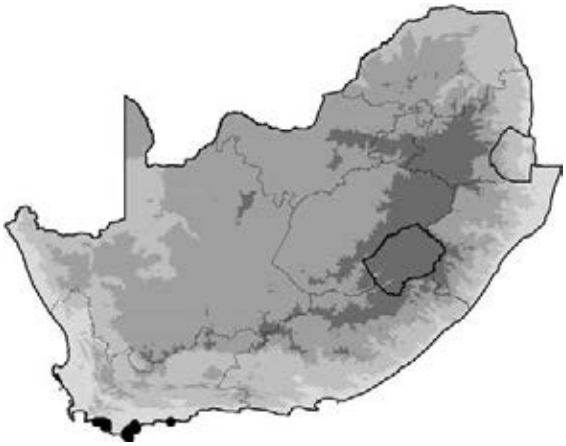
Acidanthera forsythiana Baker: 186 (1892). Type: South Africa, without precise locality, or collector (K: 'Herb. Forsyth', holo.).

?*Gladiolus vittatus* Zuccagni: 9, n. 16 (1806) [reprinted from J.J. Roemer, Collecteana: 121 (1806). Type: unknown.

Plants 250–450 mm high, with dull purple cataphylls usually mottled with green or white. *Corm* ± globose, 20–40 mm diam.; tunics of medium to coarsely textured fibres, accumulating in a mass. *Stem* flexed outward above sheath of uppermost leaf, inclined above, usually 1- or 2-branched. *Leaves* 6 to 8, lower 4 to 6 basal, reaching to ± base of spike but often flaccid and arching downward, lanceolate 12–20 mm wide, cauline leaves decreasing in size. *Spike* strongly inclined to nearly horizontal, flexuose, 3- to 8(13)-flowered; bracts dull green to grey-purple, outer (34–)40–50(–65) mm long, inner shorter or ± as long, minutely notched apically. *Flowers* cream-coloured or pale greenish yellow to ivory-coloured, rarely pale pink, all tepals or excepting dorsal with a broad streak of darker colour along midline, unscented; perianth tube obliquely funnel-shaped, 40–60(–70) mm long, cylindric lower part 25–35(–55) mm long; tepals lanceolate to elliptic, obtuse to retuse, margins usually undulate, dorsal largest, inclined over stamens, 30–45 × 16–20 mm, upper laterals 25–46 × 13–18 mm, lower tepals 18–29 × 7.5–10.0 mm, lower median slightly longer than laterals, up to 38 mm long. *Filaments* 20–22 mm long, exserted 4–10 mm from tube; anthers 6–9 mm long, purple; pollen cream-coloured to purple-brown. *Style* arching over stamens, dividing between middle and apex of anthers, branches ± 6 mm long. *Capsules* oblong-ellipsoid, 3-sided, 30–40 mm long. *Seeds* oval, 9–14 ×



Distribution of ***Gladiolus floribundus***.



Distribution of ***Gladiolus miniatus***.

7–10 mm, broadly and evenly winged. *Flowering time*: late September to November.

Distribution and ecology: widespread through the Cape Floristic Region of South Africa, mainly from Worcester in Western Cape to Port Elizabeth in Eastern Cape but as far east as Port Alfred and north into the Cederberg; mainly on sandstone but also limestone outcrops in drier situations. Pollinated by long-proboscid flies.

Diagnosis: distinguished from allied species by the pale flowers with longer, narrowly funnel-shaped perianth tube, 40–60(–70) mm long, and lower tepals markedly shorter than the upper. *Gladiolus miniatus* with salmon-pink to orange flowers has a differently shaped perianth, 50–65 mm long, divided into a narrow lower part and a broader cylindric upper part ± 30 mm long, and much longer filaments, 35–37 mm long.

58. **Gladiolus miniatus** *Eckl.*, Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon: 40 (1827). *G. floribundus* subsp. *miniatus* (Eckl.) Oberm. in Lewis et al.: 103 (1972). Type: South Africa, without precise locality, probably from near Cape Agulhas, 25 Nov., *Ecklon 323* [S, lecto., designated by Lewis et al.: 103 (1972)].

Plants 150–400 mm high, with cataphylls dull purple usually lightly mottled with green or white. *Corm* ± globose, 20–30 mm diam.; tunics of medium to coarsely textured fibres, accumulating in a mass. *Stem* flexed outward above sheathing part of uppermost or upper 2 leaves, then strongly inclined to horizontal, simple or with a short branch. *Leaves* usually 6, lower 4 basal and longest, reaching or slightly exceeding spike, lanceolate, 7–18 mm wide, margins and main vein lightly thickened, cauline leaves shorter. *Spike* flexed outward at base and nearly horizontal, 3- to 7-flowered; bracts dull to greyish green often flushed purple, 40–55(–65) mm long, inner shorter, minutely notched. *Flowers* cream-coloured to light salmon on opening but soon becoming deep salmon-orange, reverse of tube reddish, tepals darker along midlines decurrent on tube, unscented; perianth tube 50–65 mm long, narrow and cylindric in lower 20–35 mm, curving outward in middle and broadly cylindric in upper 30 mm, 6–8 mm diam.; tepals lanceolate, margins lightly undulate, unequal, dorsal arching slightly above horizontal, 32–39 × ± 15 mm, upper laterals spreading distally, 30–37 × 10–13 mm, lower 3 tepals smaller, 28–34 × 8–9 mm, lower median sometimes slightly longer than laterals. *Filaments* 35–37 mm long, exserted 8–11 mm from tube; anthers 5–7 mm long, purple; pollen purple. *Style* arching over stamens, dividing opposite anther apices, branches ± 5 mm long. *Capsules* ovoid-ellipsoid, 25–30 mm long. *Seeds* ovate, ± 9 × 7 mm, broadly winged. *Flowering time*: October to mid-November, occasionally in December.

Distribution and ecology: a local endemic of coastal southern Western Cape, South Africa, from Hawston to Agulhas and The Downs near Riversdale; in calcareous sands and limestone outcrops.

Diagnosis: recognised by the distinctive flowers, pale to deep salmon-orange with darker tepal midlines and a distinctively shaped perianth tube, 50–65 mm long and divided into a narrow lower part and a broader cylindric upper part ± 30 mm long, and the relatively long filaments, 35–37 mm long. Related *Gladiolus floribundus* has a narrowly funnel-shaped perianth tube, cream-coloured to yellow-green flowers and shorter filaments, 20–22 mm long.

Sect. 4. **Linearifolii** *(M.P.de Vos) Goldblatt & J.C.Manning, Gladiolus* in southern Africa: 153 (1998) [as *Linearifolius*]. *Homoglossum* sect. *Linearifolii* M.P.de Vos: 336 (1976) [as *Linearifolius*]. Type species: *Gladiolus merianellus* (L.) Thunb.

Plants small to medium-sized. *Stem* unbranched. *Corm* tunics leathery to fibrous. *Leaves* several, either mostly basal in a fan or all cauline, sometimes much reduced on flowering stem, narrowly lanceolate to lanceolate, firm-textured, plane with thickened midrib and margins, usually at least 4 mm wide, usually villous or puberulous. *Spike* mostly few-flowered; bracts smooth, margins of inner bracts free. *Flowers* small to medium, weakly or more strongly bilabiate, nectar guides usually of streaks or spots, sometimes scented; perianth tube usually obliquely funnel-shaped, shorter or longer than dorsal tepal; lower tepals narrower but usually ± as long as upper. *Anthers* never tailed. *Capsules* oblong to subglobose and retuse above. *Seeds* broadly and evenly winged.

The section includes 17 southern African species plus several from tropical Africa.

Ser. **Pubigeri** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus pubiger* G.J.Lewis

Plants from the summer-rainfall region, flowering in spring. *Corm* tunics papery to fibrous. *Stems* erect but inclined above the upper leaf, smooth. *Leaves* reduced and mostly without blades on flowering stem. *Flowers* small, lower tepals often strongly clawed. *Capsules* subglobose, 3-lobed above and retuse.

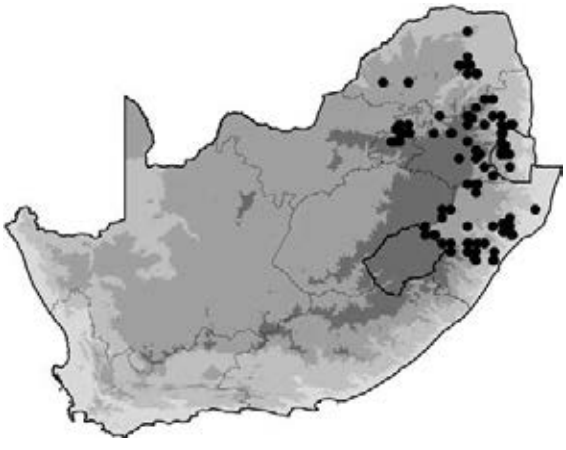
59. **Gladiolus woodii** *Baker*, Handbook of the Irideae: 207 (1892). Type: South Africa, [KwaZulu-Natal], Inanda, Oct. 1880, *Wood 618* (K, holo.; BM, SAM, iso.).

Gladiolus trichostachys Baker: 1007 (1904a). Type: South Africa, [Gauteng], Irene, date unknown, *Conrath 579* (GZU, holo.).

Gladiolus nudus N.E.Br.: 298 (1921). Type: South Africa, [Mpumalanga], Barberton (flowers yellow), Oct. 1919, *Thorncroft 1067* (K, holo.).

Plants 200–450(–900) mm high, with cataphylls sparsely to densely villous. *Corm* globose, 12–15 mm diam.; tunics of fine to moderately coarse-textured fibres, rarely accumulating. *Stem* lightly flexed outward above sheath of upper leaf, then inclined, unbranched. *Leaves* 2 or 3(4), lowermost basal and sheathing lower ½ of stem, blade lacking or linear to sword-shaped, 50(100) mm long, sparsely pilose, occasionally overlapping next leaf, cauline leaves sheathing, upper often bract-like, 20–28 mm long, glabrous; non-flowering plants with solitary, narrowly lanceolate leaf, 70–100 mm long at flowering but much longer later in season, densely pilose, margins and main and sometimes a second vein pair thickened and raised. *Spike* drooping in bud but straight and lightly flexed below base at anthesis, secund, (4)6- to 11-flowered; bracts pale grey-green to dark green or dorsal surface flushed brown to dull purplish, sometimes ± dry above at flowering, outer 12–16 mm long, inner slightly longer to shorter. *Flowers* either pale yellow, pale lilac or oyster-coloured, lower lateral tepals usually with longitudinal dark purple to brown streak along midline, rarely without markings, or maroon to reddish brown and lower laterals partly to entirely yellow with maroon median line, sometimes marked with purple spots at tepal sinuses, lower median tepal without markings, with a faint metallic odour (maroon flowers), a faint daffodil-like odour (oyster-coloured or lilac flowers), or evidently odourless (yellow flowers); perianth tube obliquely funnel-shaped, (4–)7–9(–12) mm long; tepals narrowly to broadly ovate, usually conspicuously apiculate, dorsal largest, inclined over stamens, 17–27 × 12–19 mm, margins sometimes lightly crisped, upper laterals nearly straight or spreading distally, margins undulate to strongly crisped, lower 3 tepals united with upper laterals for ± 2 mm and together for 2–3 mm, narrowed below into claws 2.5–4.0 mm long, becoming channelled toward base, lower laterals abruptly expanded into limbs 10–12 × 4–7 mm, auriculate at base, lower median limb 12–15 × 6–9 mm, often less strongly clawed, margins of lower tepal limbs lightly undulate to lightly crisped. *Filaments* 9–10(–13) mm long, exserted 5.5–8.0 mm from tube; anthers 6–9 mm long, blackish; pollen cream-coloured to pale yellow. *Style* arching over stamens, dividing between middle and apex of anthers, branches 3.5–5.0 mm long. *Capsules* ± globose, broadly 3-lobed above and retuse, 9–12 mm long. *Seeds* ovate to oblong, 6–7 × 4 mm, evenly winged. *Flowering time*: mainly September to early November, occasionally until mid-December.

Distribution and ecology: widespread through the higher-lying parts of Eswatini and eastern South Africa, from the Midlands and Drakensberg of southern KwaZulu-Natal



Distribution of ***Gladiolus woodii***.

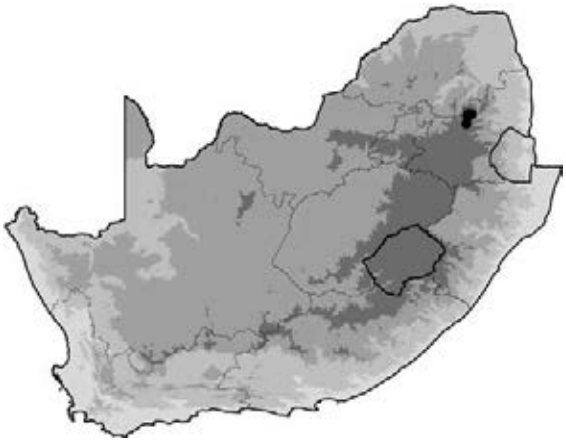
through Gauteng and Mpumalanga to the Soutpansberg in Limpopo; in low, stony grassland, often on clay soils, flowering best after fire, mostly early in the season soon after the first spring rains. The leaves on the flowering stem remain green and photosynthetic long after the seeds have been shed.

Diagnosis: recognised by the villous cataphylls and basal leaf sheaths, and the strongly bilabiate flowers with the upper tepals 17–27 mm long, the dorsal more-or-less hooded, and the lower tepals shortly clawed with auriculate limbs. Taller *Gladiolus malvinus* has sparsely hairy or glabrous leaves and larger, blue-mauve flowers with the upper tepals 28–30 mm long.

The species is highly polymorphic for flower colour, with an associated variation in floral scent. The distribution of the colour forms has no clear geographic pattern.

60. **Gladiolus malvinus** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 155 (1998). Type: South Africa, Mpumalanga, dolerite mountain slopes north of Dullstroom, 29 Oct. 1994, *Goldblatt & Manning 10075* (NBG, holo.; K, MO, iso.).

Plants 550–700 mm high, with thinly villous cataphylls. *Corm* globose, 30–40 mm diam.; tunics of moderately coarse fibres, accumulating in a thick mass. *Stem* flexed lightly above sheaths of upper 2 leaves and inclined above, unbranched. *Leaves* (2)3, lowermost basal and sheathing lower ⅓ of stem, sheath usually sparsely villous or not, 10–50 mm long, narrowly lanceolate, overlapping second leaf, this entirely sheathing and glabrous, uppermost leaf shortest and bract-like; non-flowering plants with solitary, narrowly lanceolate leaf up to 300 mm long (probably longer later in season), pubescent, margins, main vein and one or more other vein pairs lightly thickened, margins not raised. *Spike* inclined, ± straight, 9- to 15-flowered; bracts grey-green, usually flushed purplish, becoming dry as flowers open, outer 20–25 mm long, inner slightly shorter. *Flowers* pale blue-mauve, lower lateral tepals with dark purple streak in midline and lightly to darkly shaded with purple in lower half, unscented; perianth tube obliquely funnel-shaped, ± 10 mm long; tepals broadly lanceolate, apiculate, dorsal largest, inclined over stamens, 28–30 × 14–16 mm, upper laterals directed forward, curving outward little or not at all distally, lower 3 tepals joined to upper laterals for ± 2 mm and together for ± 3 mm, lower laterals strongly clawed, claws ± 2.5 mm long, limbs oblong, ± 14 × 6 mm, channelled toward base, lower median obscurely clawed, ± 20 × 12 mm. *Filaments* ± 10 mm long, exserted ± 8 mm from tube; anthers ± 7 mm long, blackish; pollen cream-coloured. *Style* arching over stamens, dividing between middle and upper ⅓ of anthers, branches 2.5–3.0 mm long. *Capsules* obovoid, broadly 3-lobed above and retuse, (10–)12–14 mm long. *Seeds* ovate, ± 6 × 5–6 mm, evenly winged. *Flowering time*: October to early November.



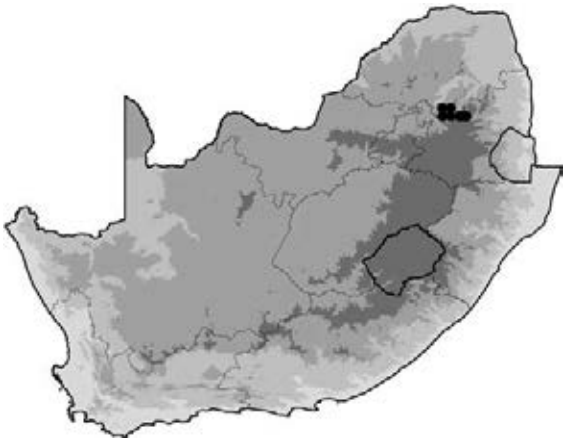
Distribution of ***Gladiolus malvinus***.

Distribution and ecology: a local endemic of the eastern escarpment of Mpumalanga, South Africa, between Dullstroom and Belfast; on dolerite slopes in grassland and flowering after fire in spring soon after the first rains.

Diagnosis: very similar to *Gladiolus woodii* and co-occurring with it at the type locality but taller, 550–700 mm high, with sparsely villous or glabrous lower leaf sheaths and slightly larger, blue-mauve flowers with the upper tepals 28–30 mm long. The tunics accumulate in a mass around the stem base. *Gladiolus woodii* is usually less than 500 mm tall, often with more densely villous leaves, and smaller, lilac, yellow or brownish flowers with the upper tepals 17–27 mm long. The corm tunics do not accumulate.

61. **Gladiolus pardalinus** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 157 (1998). Type: South Africa, Mpumalanga, 6 km (4 miles) northeast of Stoffberg, dolerite koppie, 2 Nov. 1994, *Goldblatt & Manning 10094* (NBG, holo.; K, MO, iso.).

Plants 350–550 mm high, with lightly villous cataphylls. *Corm* ovoid to broadly conic, 18–22 mm diam.; tunics cartilaginous, decaying into fairly coarse vertical fibres, often accumulating in a dense mass. *Stem* erect, ± straight, unbranched. *Leaves* usually 3(4), entirely sheathing, lowermost basal, sheathing lower ¼ of stem, glabrous, normally not overlapping next leaf, second leaf inserted on lower ⅓ of stem, 100–150 mm long, uppermost leaf inserted on upper ⅓ of stem, 200–400 mm long; non-flowering plants ultimately with three leaves, 200–300 mm at flowering but later up to 500 mm long, sheaths sparsely villous, blades linear, 5–6 mm wide, lightly to fairly densely villous, margins and main vein moderately raised and thickened, secondary veins not or barely thickened. *Spike* drooping in bud, becoming straight as flowers open, 10- to 15-flowered; bracts pale grey-green often flushed grey-purple, outer 16–20 mm long, inner slightly shorter, notched apically. *Flowers* pale yellow, tepals of outer whorl densely speckled on lower ½ of limbs and on claws, lower lateral tepals irregularly



Distribution of ***Gladiolus pardalinus***.

streaked with dark purple lines, with a faint acrid odour; perianth tube obliquely funnel-shaped, ± 8 mm long; tepals narrowed below into claws, strongly apiculate, dorsal largest, inclined over stamens, 22–24 × ± 10 mm, upper laterals spreading distally, margins lightly crisped, 19–21 × ± 9 mm, limbs 11–12 mm long, lower 3 tepals united with upper laterals for ± 2 mm and together ± 3.5 mm, claws ± 4 mm long, abruptly expanded, lower laterals with limbs ± oblong, 10–11 × 4 mm, becoming channelled below and auriculate at base, lower margins raised and almost vertical, lower median ± 16 mm long, limb also abruptly expanded and auriculate at base, limb 11 × ± 7 mm. *Filaments* ± 15 mm long, exserted ± 11 mm from tube; anthers ± 6.5 mm long, dark red-purple; pollen cream-coloured. *Style* arching over stamens, dividing between base and lower third of anthers, branches ± 3 mm long. *Capsules* obovoid, 3-lobed above and retuse, 14–20 mm long. *Seeds* ovate–oblong, 7–8 × 4–5 mm, evenly winged. *Flowering time*: mid-October and November.

Distribution and ecology: endemic in the bushveld of Mpumalanga and Limpopo, South Africa, from Groblersdal to Nylstroom; in dolerite outcrops among boulders, flowering best after fire in spring after the first rains.

Diagnosis: distinguished from yellow-flowered forms of *Gladiolus woodii* by the glabrous lower leaf sheaths and the strongly clawed upper tepals. Non-flowering plants ultimately develop three leaves, unlike the solitary leaf developed in *G. woodii.* The two species are allopatric, with *G. woodii* occurring east and south of the range of *G. pardalinus*.

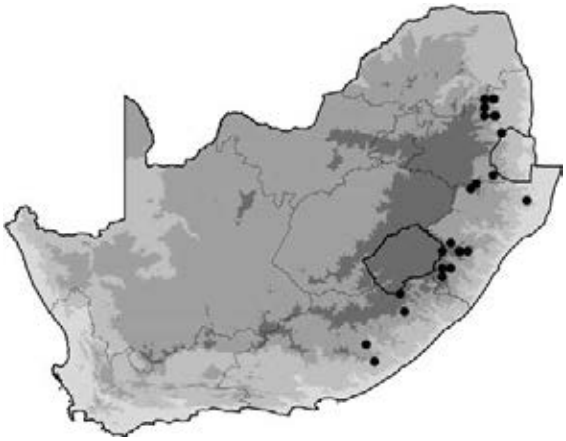
62. **Gladiolus pubiger** *G.J.Lewis* in Annals of the South African Museum 40: 132 (1954) [as *pubigerus*], replacement name for *G. pubescens* Baker: 333 (1876b), illegitimate homonym, not *G. pubescens* Lam. (1791). Type: South Africa, [Eastern Cape], as 'British Kaffraria', Oct. 1860, *Cooper 458* (K, holo.).

Gladiolus pugioniformis Hilliard & B.L.Burtt: 299 (1979). Type: South Africa, KwaZulu-Natal, Impendle District, Farm Umgeni Vlei, 27 Oct. 1976, *Hilliard & Burtt 9077* (NU, holo.; E, K, MO, PRE, iso.).

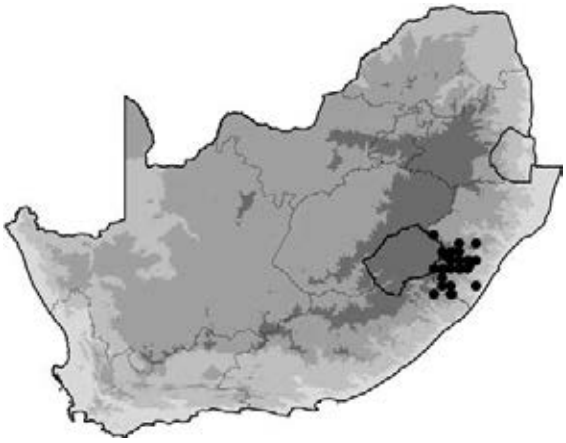
Plants (200–)300–500 mm high, with densely villous cataphylls often tipped purple. *Corm* globose, 12–20 mm diam.; tunics softly leathery, decaying into fine to coarse flat vertical fibres, usually accumulating in a dense mass. *Stem* flexed outward above apex of upper leaf, then inclined, unbranched. *Leaves* 2 or 3, lowermost basal and sheathing lower ½ of stem, ± bladeless or with blade up to 50(–100) mm long, sheath pubescent below or throughout but more densely so below, lightly ribbed, slightly inflated and compressed, thus elliptic in section, blade narrowly lanceolate, 3–4 mm wide, villous, margins thickened and hyaline, main vein raised, second leaf inserted on upper ⅓ stem, 15–45 mm long, entirely sheathing, glabrous, third leaf, if present, like second but shorter; leaves of non-flowering plants evidently solitary, linear and villous. *Spike* deflexed at base, lightly to strongly inclined, weakly flexuose to nearly straight, 4- to 9-flowered; bracts pale grey-green or flushed grey-purple or pink, outer (12–)15–18 mm long, inner shorter, minutely notched. *Flowers* blue-mauve or pale lemon-yellow tinged with green, sometimes tepals lightly flushed reddish brown, horizontal to drooping, tepals unmarked or lower median with a dark streak in lower midline, often with strong fruity and waxy scent in mornings; perianth tube narrowly trumpet-shaped, flared evenly, 7–8 mm long, emerging between bracts; tepals nearly equal, narrowly lanceolate-attenuate, upper 3 slightly larger than lower and held slightly apart from them, all slightly spreading distally, 3 upper 17–23 × 6–10 mm, lower 3 joined to upper laterals for 1–2 mm, 17–22 × 5–9 mm. *Filaments* 5–10 mm long, exserted 1–5 mm from tube but enclosed by tepals; anthers 6–7 mm long, dull yellow or purple; pollen cream-coloured. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches 3.0–4.5 mm long. *Capsules* globose, lightly 3-lobed above, 8–10 mm long. *Seeds* oblong, 5–6 × 3.0–3.5 mm, evenly winged. *Flowering time*: September to November, occasionally as late as December at high elevations or in late seasons.

Distribution and ecology: scattered through the higher elevations of eastern South Africa, from Pilgrim's Rest in Mpumalanga through Eswatini and along the KwaZulu-Natal Drakensberg, with additional records from the Amatole Mtns and Katberg in Eastern Cape; in stony montane grassland. The recorded distribution is somewhat disjunct, with no records from the northern KwaZulu-Natal Drakensberg or Transkei [northern Eastern Cape].

Diagnosis: diagnosed by the two (rarely three), largely or entirely sheathing leaves, the lowermost villous and sheathing the lower half of the stem and the remaining one or two hairless and much smaller, and the almost actinomorphic perianth with lanceolate-attenuate tepals and the short stamens well concealed in the flower. Mauve-pink-flowered *Gladiolus parvulus* from southern KwaZulu-Natal is a smaller species with the upper leaf reduced to a bract-like scale inserted at the base of the spike, and smaller, acute but not attenuate tepals.



Distribution of ***Gladiolus pubiger***.



Distribution of ***Gladiolus parvulus***.

Gladiolus pubiger typically has lemon-yellow flowers, but the Eswatini and some Mpumalanga populations have blue-mauve, slightly larger flowers.

63. **Gladiolus parvulus** *Schltr.* in Botanische Jahrbücher für Systematik 40: 91 (1907). Type: South Africa, [KwaZulu-Natal], Umzinto District, short-grass slopes along the Umtwalumi near Fairfield, ± 750 m, Oct. 1905, *Rudatis 122* [as *132* in protologue] (B, holo.).

Geissorhiza gracilis Baker: 155 (1892), illegitimate homonym, not *G. gracilis* Jacq. (1791). Type: South Africa, [KwaZulu-Natal], Umzimkulu District, Zuurberg, between Kokstad and Clydesdale, Oct. 1883, *Tyson 1872* (K, holo.; BOL, MO, SAM, iso.).

Ixia brevifolia Baker: 165 (1892). Type: South Africa, [KwaZulu-Natal], East Griqualand, Oct. 1883, *Tyson 1892* (K, holo.).

Gladiolus subaphyllus N.E.Br.: 53 (1909). Type: South Africa, [KwaZulu-Natal], Pietermaritzburg, Swartkop, 4 000–5 000 ft [1 200–1 500 m], 17 Nov. 1906, *Wylie sub Wood 10153* (K, holo.; BOL, NH, PRE, Z, iso.).

Plants 150–350(–470) mm high, cataphylls not or barely reaching above ground. *Corm* globose, 7–14 mm diam.; tunics leathery to almost woody, decaying into wiry vertical fibres usually somewhat claw-like below. *Stem* slender and wiry, thickened for a short distance from below base of upper leaf to base of spike, flexed outward above sheath of upper sheathing leaf, unbranched. *Leaves* 2, lower 1 basal and sheathing lower ½ of stem, sheath ribbed and lightly villous, often slightly inflated, blade vestigial, 5–25 mm long, villous, margins and main vein thickened, upper leaf minute, scale-like, inserted just below spike, sometimes reaching base of lower floral bract, (4.0–)5.5–7.0 mm long; non-flowering plants with a single linear leaf 80–100 × ± 2 mm, sparsely villous, main vein and margins moderately thickened and hyaline. *Spike* flexed outward at base and inclined, lightly flexuose, 2- to 5-flowered; bracts greyish purple, sometimes dry and brownish toward apices, outer 9–11 mm long, inner narrower but slightly longer, minutely notched. *Flowers* with tepals equal in size and disposition but stamens unilateral and arcuate, pale pink, throat with narrow paired red lines below tepal bases, unscented; perianth tube funnel-shaped, 5–7 mm long, flared upper part ± 3.5 mm long; tepals lanceolate, subequal or upper slightly wider, 12–17 × 5.0–6.7 mm, flaring outward distally. *Filaments* 5–6 mm long, exserted ± 2 mm from tube but enclosed by tepals; anthers 4–6 mm long, pale pink; pollen creamy yellow. *Style* arching over stamens, dividing between upper ⅓ and just beyond anther apices, branches 2–3 mm long. *Capsules* globose to oblong, 3-lobed above and retuse, ± 7 mm long. *Seeds* oval, broadly winged. *Flowering time*: October to early December, rarely in September or as late as January.

Distribution and ecology: an inconspicuous species from southern KwaZulu-Natal, South Africa, and eastern Lesotho, from the Zuurberg and Ngeli Mtns in the south to Pietermaritzburg and Howick in the Midlands and along the eastern Drakensberg from Sehlabathebe to Cathedral Peak; in montane grassland in thin soil on sandstone pavement or crevices in sandstone outcrops.

Diagnosis: a dwarf species with wiry stems and reduced foliage, the lowermost leaf sheathing the lower half of the stem with a villous, often slightly inflated sheath and vestigial blade, and the upper leaf reduced to a minute scale inserted just below the spike. The flowers are pale pink with a sub-actinomorphic perianth and short tube 5–7 mm long. Similar *Gladiolus pubiger* is a taller plant with two or three leaves, the upper not inserted immediately below the spike, and larger flowers with attenuate tepals and slightly longer tube, 7–8 mm long.

Ser. **Linearifolii** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus merianellus* (L.) Thunb.

Plants from the winter-rainfall region, flowering in spring or in autumn. *Corm* tunics papery to fibrous. *Stems* erect or inclined above the upper leaf, smooth.

Leaves well-developed or reduced and without blades on flowering stem and then the foliage leaf solitary and produced separately. *Flowers* mostly small to medium, lower tepals never strongly clawed. *Capsules* ellipsoid, obtuse.

64. **Gladiolus hirsutus** *Jacq.*, Collectanea 4: 161 (1791). Type: South Africa, without precise locality or collector, ex hort. Vienna, illustration in Jacq.: t. 250 (1794 [1788–1795]).

Gladiolus tristis var. *purpureus* Thunb.: 12 (1784). *G. laccatus* Thunb.: 186 (1800), replacement name at species rank for *G. tristis* var. *purpureus* Thunb. and illegitimate homonym, not *G. laccatus* Jacq. (1791). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* (UPS-THUNB 1037, holo.).

Gladiolus hirsutus var. *villosiusculus* Ker Gawl.: sub t. 727 (1804). Type: South Africa, without precise locality, grown in Great Britain, *Auge s.n.* (BM, holo.).

Gladiolus biflorus Roem. & Schult.: 416 (1817), illegitimate homonym, not *G. biflorus* Thunb. (1784). Type: South Africa, without precise locality or collector, ex hort. Hibbert, illustration in Ker Gawl.: t. 823 (1805).

Gladiolus punctulatus Schrank: 216 (1822). Type: South Africa, [Western Cape], without precise locality, *Brehm s.n.* (BRU: Herb Schrank, holo.).

Gladiolus villosus Ker Gawl.: 133 (1827), illegitimate homonym, not *G. villosus* Burm.f. (1768). Type: South Africa, Cape without precise locality, grown in Great Britain, *Masson s.n.* (BM, holo.).

Gladiolus pilosus Eckl.: 38 (1827). Type: South Africa, Western Cape, Cape Flats near Wynberg, Aug., *Ecklon s.n.* (S, holo.; SAM, iso.).

Gladiolus punctulatus var. *autumnalis* G.J.Lewis in Lewis et al.: 211 (1972). Type: South Africa, [Western Cape], Riversdale District, south side of Garcia's Pass, 3 Apr. 1959, *Lewis 5380* (NBG, holo.; K, MO, iso.).

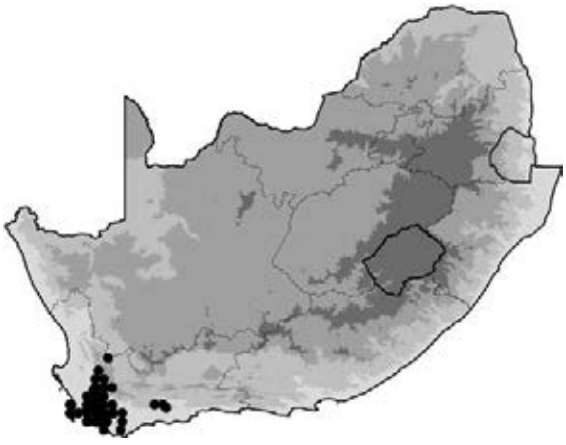
[*Gladiolus rubromarginatus* Schrad. ex Roem. & Schult.: 415 (1817), invalid name only in synonymy.]

[*Gladiolus villosiusculus* Sol. in Herb. Banks ex Ker Gawl. et ex Baker: 174 (1877), invalid name only in synonymy.]

Plants 350–500 mm high, with cataphylls usually pubescent, often dry at flowering time. *Corm* ± globose, 18–30 mm diam.; tunics coarsely fibrous, often accumulating in a mass. *Stem* flexed outward above sheath of second leaf and inclined, unbranched, 1.0–1.5 mm diam. below base of spike. *Leaves* 3(4), lower 2 basal, second leaf sheathing lower ½ of stem, pubescent throughout or only on sheaths, blades relatively short, lowermost reaching upper ½ of stem or sometimes top of spike, lanceolate, 3–8(–13) mm wide, main vein and margins lightly thickened, secondary veins also evident, uppermost leaf inserted on upper ⅓ of stem, pubescent or not, margins united around stem. *Spike* inclined, lightly flexuose, 3- to 6(8)-flowered; bracts green or flushed greyish or purple, outer 18–26 mm long, inner shorter, acute. *Flowers* pale to deep pink or mauve, occasionally almost white, lower 3 tepals cream-coloured to pale yellow below with nectar guides irregularly spotted or streaked lines in lower ⅔, lines decurrent on tube, occasionally lightly scented; perianth tube obliquely funnel-shaped, 15–26(–40) mm long, cylindric lower part enclosed in tube; tepals obovate to broadly lanceolate, dorsal largest, arching over stamens, 19–27(–35) × 13–20 mm, spreading distally, upper laterals 17–23(–34) × 10–15 mm, lower 3 tepals joined to upper laterals for 2–5 mm and together for up to 3 mm, narrowly lanceolate, not clearly clawed below, subequal, 15–20(–23) × 7–12 mm. *Filaments* 11–13 mm long, exserted 4–6 mm from tube; anthers 6–9 mm long, pink; pollen white. *Style* arching over stamens, dividing opposite anther tips, branches 2–4 mm long. *Capsules* ovoid to ± ellipsoid, 20–24 mm long, ± as long as bracts. *Seeds* broadly oval, 6.0–7.5 × ± 5 mm, evenly winged or wing lacking on one side. *Flowering time*: Mostly mid-July to September, sometimes as early as June and rarely in March or April.

Distribution and ecology: relatively common in the southwestern Western Cape, South Africa, from the Cold Bokkeveld to the Cape Peninsula and eastward to the Potberg and along the Langeberg to Riversdale; on stony granite or sandstone slopes, flowering best in the first years after fire. Plants in the eastern part of the range where rainfall is less seasonal may flower as early as March or April but this is unusual.

Diagnosis: recognised by the hairy, superposed leaves, usually with relatively short, lanceolate blades 3–8(–13) mm wide, and the moderate-sized, weakly scented, pink to mauve flowers with red-streaked and spotted nectar guides on the lower tepals and perianth tube 15–26(–40) mm long. The filaments are 11–13 mm



Distribution of ***Gladiolus hirsutus***.

long. A collection from the Kogelberg is anomalous in its large flowers, 75 mm long with perianth tube 40 mm long. *Gladiolus caryophyllaceus* has broader leaves, 10–27 mm wide, with the margins thickened and often flushed pink or red, and large, strongly scented flowers with perianth tube 35–40 mm long and longer filaments 22–27 mm long.

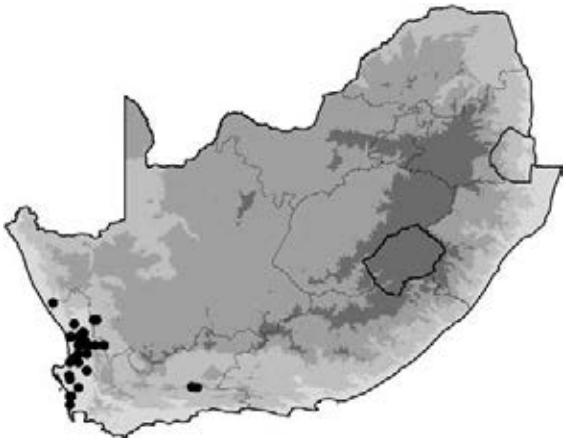
65. **Gladiolus caryophyllaceus** *(Burm.f.) Poir.* in Lamarck, Encyclopedie Méthodique Botanique, Suppl. 2: 795 (1812). *Antholyza caryophyllacea* Burm.f.: 1 (1768). *Anisanthus caryophyllaceus* (Burm.f.) Klatt: 344 (1882). *Homoglossum caryophyllaceum* (Burm.f.) N.E.Br.: 279 (1932a). Type: South Africa, without precise locality or collector, grown in Holland, *Houttuyn s.n.* [G: Herb. Burman [photo at K], lecto., designated in Lewis et al.: 114 (1972)].

Gladiolus roseus Andrews: t. 11 (1796), illegitimate homonym, not *G. roseus* Jacq. (1795) [1788–1795]. *Watsonia amoena* var. *rosea* Pers.: 43 (1805). Type: South Africa, without precise locality of collector, illustration in Andrews: t. 11 (1796).

Gladiolus hirsutus var. *roseus* Ker Gawl.: t. 574 (1802d). Type: South Africa, without precise locality of collector, illustration in Ker Gawl.: t. 574 (1802d).

Gladiolus similis Eckl.: 40 (1827). Type: South Africa, [Western Cape], without precise locality, cultivated in Cape Town, *Ecklon s.n.* [S, lecto., designated by Nordenstam: 292 (1972)].

Plants (0.45–)0.6–1.1 m high, with cataphylls usually pilose and often dry at flowering. *Corm* globose, 20–40 mm diam.; tunics of coarse vertical fibres. *Stem* unbranched, inclined above. *Leaves* 4 or 5, lower 1 to 3 basal, usually quite short and sometimes forming a loose fan, pilose, particularly on sheaths, lanceolate, 10–27 mm wide, margins, main and secondary veins raised and thickened, often flushed pink or purple, margins sometimes somewhat crisped, upper 2 leaves cauline, similar to basal but shorter. *Spike* (2)4- to 8-flowered; bracts pale green or greyish, 30–45(–70) mm long, inner slightly shorter, twisted, acute. *Flowers* pale to deep pink or mauve or cream-coloured, then more intensely pigmented along tepal midline, lower tepals and throat streaked with broken longitudinal lines and spots of white to cream-coloured and dark pink, usually sweetly carnation-scented; perianth tube obliquely funnel-shaped, 30–40 mm long, lower cylindric part 16–25 mm long; tepals lanceolate to elliptic or ovate, dorsal largest, ascending or weakly hooded over stamens, broadly oblanceolate, 37–45 × (13–)21–30 mm, upper laterals 30–35 × 18–25 mm, spreading gradually from base and flared outward distally, margins undulate, lower 3 tepals joined to upper laterals for 7–8 mm and together for 2–3 mm, 25–30 × 15–18 mm, not distinctly clawed, wider in distal ½, margins undulate. *Filaments* 22–27 mm long, exserted 8–9 mm from tube; anthers 10–14 mm long, cream-coloured; pollen yellow. *Style* arching over filaments, dividing slightly below to slightly beyond anther apices, branches 4–5 mm long. *Seeds* ovate, ± 10 × 7–8 mm, broadly and evenly winged. *Flowering time*: mid-August to end of September.



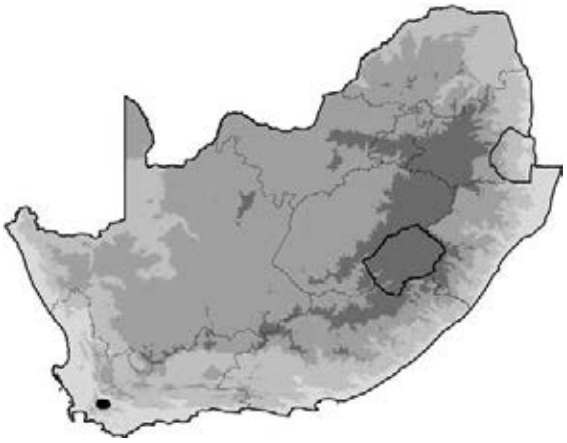
Distribution of ***Gladiolus caryophyllaceus***.

Distribution and ecology: centred on the West Coast of South Africa, from Hondeklipbaai in southern Namaqualand and the Bokkeveld Escarpment in Northern Cape to near Atlantis in Western Cape, with isolated populations in the Swartberg to the east; on open flats and stony plateaus in deep sands, typically among restios. The species is naturalised in Western Australia.

Diagnosis: resembling *Gladiolus hirsutus* in its superposed, villous leaves but with broader blades 10–27 mm wide, the margins thickened and often flushed pink or red, and the large, strongly scented flowers with perianth tube 35–40 mm long and longer filaments 22–27 mm long.

66. **Gladiolus rhodanthus** *J.C.Manning & Goldblatt* in Manning et al. in Bothalia 29: 217 (1999). Type: South Africa, Western Cape, Villiersdorp District, summit of Stettynsberg, 12 Jan. 1999, *Manning & Paterson-Jones 2207* (NBG, holo.; K, MO, PRE, iso.).

Plants 300–500 mm high. *Corm* globose, 18–25 mm diam., tunics of medium-textured to fine fibres, accumulating around. *Stem* flexed outward above sheath of second leaf and inclined, unbranched. *Leaves* 3, lower 1 or 2 basal, the second sheathing lower ½ of stem, pubescent throughout, lowermost with blade reaching to between base and apex of spike, sometimes becoming dry at flowering time, the second with blade rather short and reaching upper ⅓ of stem, ± linear, 3–6 mm wide, main vein thickened and raised and a second pair of veins lightly thickened, margins scarcely thickened, uppermost leaf with vestigial blade. *Spike* inclined, lightly flexuose, 2- to 5-flowered; bracts green or flushed brownish above, outer 26–45 mm long, acute, shorter 3 or rarely ± as long, lightly notched. *Flowers* deep pink, lower 3 tepals with



Distribution of ***Gladiolus rhodanthus***.

spear-shaped whitish median streak in lower half edged in dark pink, especially in upper half, sometimes darker edging expanded transversely across entire width of upper laterals, throat white with dark pink streaks, unscented; perianth tube 25–36 mm long, cylindric below for 20–28 mm, obliquely expanded in upper 5–7 mm, shortly exceeding bracts; tepals lanceolate, dorsal largest, inclined over stamens, 35–40 × 19–24 mm, upper laterals slightly shorter, 30–38 × 13–19 mm, recurved distally, lower 3 tepals joined to upper laterals for 5 mm and to one another for 1–2 mm, 27–30 × 12–13 mm. *Filaments* 15–17 mm long, exserted 8–10 mm from tube; anthers 8–9 mm long, light mauve; pollen cream-coloured. *Style* arching over stamens, opposite or slightly beyond anther apices, branches 5–7 mm long. *Capsules* ellipsoid, 20–22 × 8–9 mm. *Seeds* ovate, 5.5–7.0 × 4 mm, broadly and evenly winged, golden-brown. *Flowering time*: late December to mid-January.

Distribution and ecology: a high altitude endemic of the mountains near Villiersdorp in Western Cape, South Africa, recorded from the summit of Stettynsberg and from Jonaskop at the western end of the Riviersonderend Mtns; on north-facing, broken sandstone cliffs at 1 800 m elevation.

Diagnosis: allied to *Gladiolus caryophyllaceus* and *G. hirsutus* and distinguished by its summer-flowering habit and long-tubed flowers with perianth tube 25–36 mm long and cylindric for most of its length, flaring only in the upper 5–7 mm, and the more definitely lozenge-shaped nectar guides on the lower tepals.

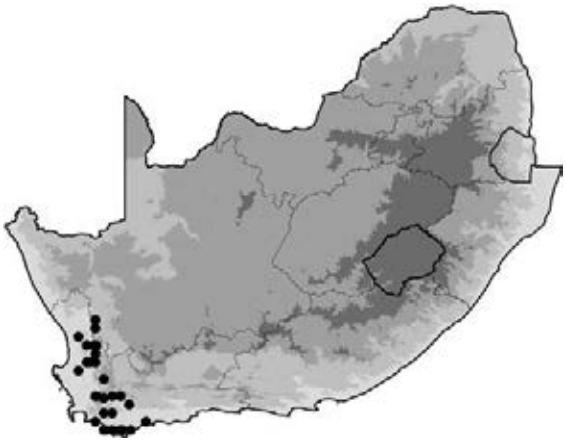
67. **Gladiolus guthriei** *F.Bolus* in Annals of the Bolus Herbarium 2: 101 (1917). Type: South Africa, Western Cape, Bredasdorp District, Elim, July 1895, *Guthrie 3821* (BOL, holo.).

Gladiolus eulophioides F.Bolus: 99 (1917). Type: South Africa, [Western Cape], Caledon [District], Oct., *Pappe 461* (GRA, holo.).

Gladiolus odoratus L.Bolus: 294 (1927b). Type: South Africa, [Northern Cape], Calvinia District, Grasberg near Nieuwoudtville, grown at Kirstenbosch, 27 Apr. 1927, *Buhr s.n. Natl. Bot. Gard. 460/26* (NBG, holo.).

Plants 400–700 mm high, with cataphylls usually brownish purple, sometimes finely pubescent. *Corm* globose, 20–35 mm diam.; tunics of coarse vertical fibres, accumulating in a dense mass. *Stem* erect or inclined, unbranched. *Leaves* 3(4), sometimes hairy on sheaths, lower 2 ± basal, lowermost with short, rigid, lanceolate blade 20–80 × 3–6 mm, margins moderately and main and often a second vein pair lightly thickened, blades of remaining leaves vestigial or lacking; non-flowering plants with solitary leaf, sword-shaped to lanceolate, 12–20 mm wide, often trailing, sometimes pubescent, margins strongly thickened, main and 2 or more other vein pairs also prominent, juvenile leaves always pubescent. *Spike* usually lightly inclined, 3- to 9(13)-flowered; bracts dull green to greyish, soft-textured, outer 20–40 mm long, inner shorter. *Flowers* dull pink to brownish purple, upper laterals and lower 3 tepals dull yellow with broad irregular brownish median streak and lightly speckled with brown, margins lightly crisped, with strong sweet clove-like scent day and night; perianth tube obliquely funnel-shaped, 20–27 mm long, lower cylindric part 12–15 mm long, enclosed or exserted from bracts, abruptly curved above into flared part; tepals oblanceolate or dorsal obovate, largest, 22–30 × 14–19 mm, inclined over stamens, upper laterals 20–30 × 10–13 mm, spreading distally, lower 3 tepals joined to upper laterals for 3–5 mm and together for 1–2 mm, free parts 18–25 × 8–11 mm, lower median as long or slightly longer. *Filaments* 12–16 mm long, exserted 5–7 mm from tube; anthers 8–11 mm long, brownish; pollen yellow. *Style* arching over stamens, dividing opposite upper ½ of anthers, branches 3–4 mm long. *Capsules* ellipsoid, ± 20 mm long. *Seeds* broadly ovate, (5–)7–8 × 4–6 mm, broadly and evenly winged. *Flowering time*: April to June.

Distribution and ecology: relatively widespread through the mountains in the western part of the Cape Floristic Region in South Africa, from the Bokkeveld Escarpment



Distribution of ***Gladiolus guthriei***.

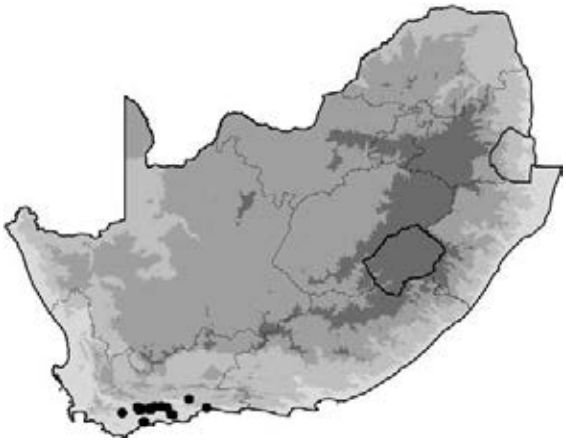
in Northern Cape to Bredasdorp and Potberg in Western Cape; on rocky sandstone outcrops and pavement, flowering in autumn and winter.

Diagnosis: flowering in autumn and winter, *Gladiolus guthriei* is recognised by the superposed, glabrous or villous leaves and relatively long-tubed, strongly clove-scented, dull pink to brownish flowers, with the perianth tube ± as long as the dorsal tepal and 20–27 mm long. The northern populations have glabrous or sparsely hairy leaves whereas those from the south are relatively densely hairy.

68. **Gladiolus emiliae** *L.Bolus* in Journal of Botany, British and foreign 71: 124 (1933b). Type: South Africa, [Western Cape], flats near Riversdale, rocky outcrop, 5 Apr. 1931, *Ferguson s.n. BOL19608* (BOL, holo.).

Plants (300–)450–600 mm high, with cataphylls sparsely hairy below or glabrous, apex often becoming dry and brown. *Corm* globose to depressed-globose, 20–25 mm diam.; tunics papery breaking irregularly and becoming fibrous. *Stem* lightly flexed outward above sheath of uppermost leaf, gently inclined above, unbranched. *Leaves* 2, both entirely sheathing, lower inserted shortly above ground, 60–80 mm long, upper inserted on upper ⅓ of stem, margins partially or completely united around stem; leaves of non-flowering plants and seedlings solitary, linear or narrowly lanceolate, ultimately 600–750 × 7 mm, pubescent, margins and main vein lightly thickened, emerging soon after flowering and growing during winter and spring. *Spike* inclined, 3- to 8(10)-flowered; bracts green, sometimes red to purple on upper margins, outer 20–25 mm long, obtuse to ± truncate, inner slightly longer or shorter, usually notched. *Flowers* brownish or pale to dull yellow and lightly to heavily dotted or streaked with reddish brown to maroon, or tepals almost uniformly dark red-brown, usually more intensely coloured along tepal midlines, lower tepals each with dark red streak in lower midline, spicy-sweet-scented day and night; perianth tube 32–45 mm long, slender lower part 25–35 mm long, sharply curved at apex of cylindric part into a flared upper part 7–10 mm long; tepals ovate-lanceolate, spreading distally, dorsal slightly larger than others, upper 3 tepals 14–18 × 8–10 mm, lower 3 tepals joined to upper laterals for 2–4 mm and together for up to 1–2 mm, 14–20 × 5–8 mm. *Filaments* 9–12 mm long, exserted 3–5 mm from tube; anthers 5–7 mm long, brownish dorsally, dark yellow ventrally; pollen cream-coloured. *Style* dividing between middle and apices of anthers, branches ± 3 mm long. *Capsules* obovoid to ellipsoid, 20–27 mm long, *Seeds* oval to oblong, 8–9 × 5–6 mm, broadly and evenly winged. *Flowering time*: March and April, rarely as early as mid-February.

Distribution and ecology: restricted to the foothills of the Riviersonderend Mtns and Langeberg along the southern coast of Western Cape, South Africa, with one collection from George; on rocky lower slopes in clay or loamy soils, usually at the junction between the basement shales and overlying sandstone, flowering in autumn.

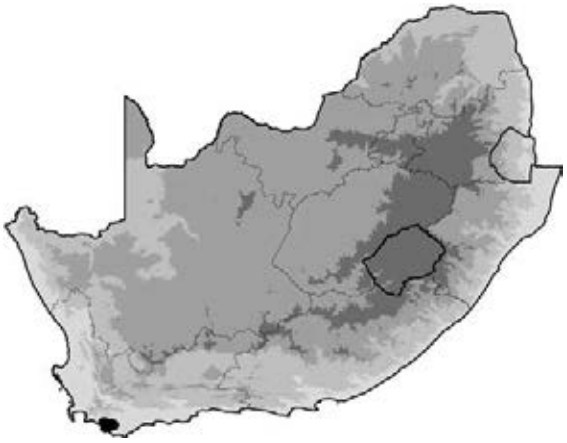


Distribution of ***Gladiolus emiliae***.

Diagnosis: an autumn-flowering species with the foliage reduced to two sheathing cauline leaves and distinctive, long-tubed, fragrant flowers with a slender perianth tube 32–45 mm long abruptly curved or bent near the top. The flowers are pollinated by night-flying moths.

69. **Gladiolus overbergensis** *Goldblatt & M.P.de Vos* in Adansonia 11: 421 (1990), replacement name for *Antholyza guthriei* L.Bolus: 12 (1920) [not *G. guthriei* F.Bolus (1917)]. *Petamenes guthriei* (L.Bolus) N.E.Br.: 276 (1932a). *Homoglossum guthriei* (L.Bolus) L.Bolus: 47 (1933a). Type: South Africa, [Western Cape], Elim, 250 ft [76 m], July 1895, *Guthrie 3827* (BOL, lecto., designated by M.P.de Vos: 336 (1976); K, isolecto.).

Plants 350–500 mm high, with cataphylls green, firm-textured and pilose. *Corm* globose, 15–20 mm diam.; tunics leathery to woody, fragmenting into coarse woody fibres. *Stem* straight or slightly flexed above sheathing parts of 2 upper leaves but becoming erect again, occasionally branched. *Leaves* 4, lower 3 basal, lower 2 longest reaching to ± middle of stem, sheaths and blades with minute, recurved, prickly-scabrid hairs on veins, narrowly lanceolate to nearly linear, 2.5–4.0 mm wide, main and one other vein pair lightly raised, margins not thickened, uppermost leaf inserted on ± middle of stem, usually entirely sheathing, usually channelled throughout, also with recurved prickles. *Spike* ± erect, 2- to 5-flowered; bracts pale green or flushed grey-purple, outer 28–42 mm long, inner slightly shorter to ± as long, minutely notched apically. *Flowers* scarlet or lower 3 tepals orange or yellow, upper three and sometimes lower lightly streaked and spotted with darker red toward base, unscented; perianth tube 46–55 mm long, lower part narrow for 18–20 mm, abruptly expanded into a wider cylindric horizontal upper part 24–35 mm long and ± 7 × 6 mm diam.; tepals broadly obovate to round, upper 3 larger than lower, dorsal largest, arched slightly above horizontal, 22–26 × 18–22 mm, upper laterals slightly smaller, 18–24 × 12–16 mm, much overlapping dorsal, lower



Distribution of ***Gladiolus overbergensis***.

lateral tepals 10–14 × 8–12 mm, lower median 13–16 × 8–10 mm, straight and tilted toward ground. *Filaments* 38–42 mm long, exserted ± 12 mm from tube; anthers 7–8 mm long, yellow; pollen pale yellow. *Style* extending horizontally over stamens, dividing shortly below anther tips, branches 3–4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: late July to mid-September.

Distribution and ecology: a rarely seen local endemic of Western Cape, South Africa, from the Klein River Mtns near Hermanus to Elim and Bredasdorp; in loamy soil on cooler sandstone slopes, flowering only after fire.

Diagnosis: an obligate pyrophile recognised by the unusual, abrasive leaves with minute recurved-scabrid hairs on the veins and the trumpet-shaped flowers with dimorphic perianth tube 46–55 mm long, the lower 18–20 mm narrow and abruptly expanded into a wider cylindric upper part 24–35 mm long. The lower tepals are significantly smaller than the upper, about half as long, and rarely more than 15 mm long.

70. **Gladiolus merianellus** *(L.) Thunb.*, Dissertatio de Gladiolo no. 14 (1784). *Antholyza merianella* L.: 77 (1774) [name misapplied by Curtis, Botanical Magazine 13: t. 441 (1799) to *W. aletroides*, and to *Watsonia humilis* Mill. by others]. *Homoglossum merianellum* (L.) Baker: 161 (1877) [misapplied to *W. humilis* Mill.]. Type: South Africa, without precise locality or collector, *LINN 60.7* [LINN, lecto., designated by J.C.Manning & Goldblatt: 806 (2012)].

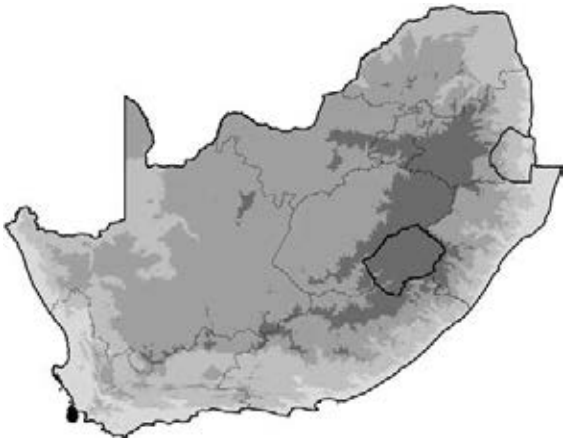
Gladiolus bonaspei Goldblatt & M.P.de Vos: 421 (1990) [as *bonaespei*], replacement name for *Watsonia pilosa* Klatt: 200 (1885) [not *Gladiolus pilosus* Eckl.]. *Petamenes pilosus* (Klatt) Goldblatt: 144 (1989). Type: South Africa, Western Cape, near Simonstown, May 1882, *MacOwan 2510* (B, holo.; G, iso.).

Homoglossum merianellum var. *aureum* G.J.Lewis in Barker et al.: 34 (1948). Type: South Africa, Western Cape, Cape Peninsula, between Scarborough and Klaasjagersberg, burnt marshy ground, Oct. 1945, *Linley s.n.* (SAM [*SAM58293*], holo.; SAM, iso.).

Gladiolus hirsutus var. *tenuiflorus* Ker Gawl.: sub t. 574 (1802d). Type: South Africa, [Western Cape], Cape Peninsula, without precise locality, *Thunberg s.n.* (UPS-THUNB 1047, holo.).

Plants (250–)350–500 mm high, with villous cataphylls. *Corm* globose, 15–20 mm diam.; tunics leathery to woody, fragmenting into coarse vertical fibres. *Stem* erect, flexed above sheathing parts of 2 upper leaves but becoming erect again, unbranched. *Leaves* 3, lower 2 basal, lowermost rarely reaching middle of stem, sheaths villous, blades linear, (2.0–)4.0–5.5 mm wide, pubescent, margins and main vein lightly thickened, uppermost leaf inserted on ± middle of stem, short and bract-like, often sparsely pubescent, margins of sheath united. *Spike* ± erect, lightly flexuose, 2- to 7-flowered; bracts pale green or flushed grey-purple, outer 15–20(–23) mm long, inner slightly shorter or slightly longer, minutely notched. *Flowers* bright orange, lower 3 tepals sometimes deep yellow and then usually minutely speckled with scarlet toward bases, rarely entirely yellow, unscented; perianth tube 35–43 mm long, with lower part narrow for 11–18 mm, abruptly expanded into a wide horizontal cylindric upper part 22–25 mm long, ± 7 × 6 mm diam.; tepals broadly obovate to ± orbicular, subequal or upper 3 larger, dorsal typically largest, horizontal, 18–23 × 14–18 mm, upper laterals slightly smaller, 15–18 × 14–15 mm, much overlapping dorsal, lower 3 tepals 12–20 × 10–18 mm, straight and tilted toward ground. *Filaments* 28–32 mm long, exserted 6–9 mm from mouth of tube; anthers 6–8 mm long, dark purple; pollen pale yellow. *Style* extending horizontally over stamens, dividing between middle or slightly beyond anther apices, branches 3–4 mm long. *Capsules* ovoid, subacute, 15–20 mm long. *Seeds* ovate, 8–10 × 6–7 mm, broadly winged with seed body asymmetrically placed. *Flowering time*: mainly July to September, occasionally as early as April.

Distribution and ecology: endemic to the southern Cape Peninsula in Western Cape, South Africa, from



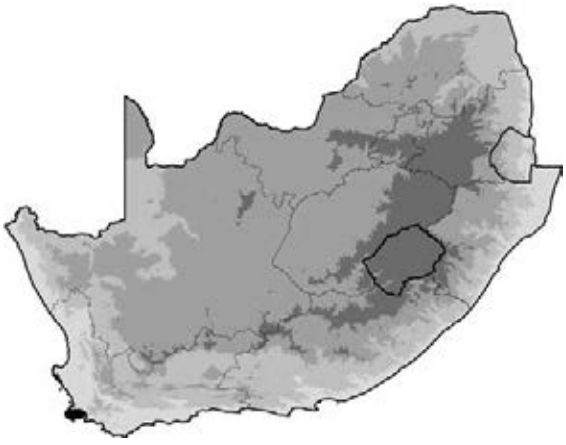
Distribution of ***Gladiolus merianellus***.

Silvermine to Cape Point; on seasonally wet flats and plateaus in peaty soils, flowering well after fire.

Diagnosis: distinctive in its pubescent leaves and orange or yellow, trumpet-shaped flowers with dimorphic perianth tube 35–43 mm long, the lower part narrow for 11–18 mm and abruptly expanded into a wide horizontal cylindric upper part 22–25 mm long, with subequal, broadly obovate to suborbicular tepals.

71. **Gladiolus aureus** *Baker* in Flora capensis 6: 530 (1897a). *Homoglossum aureum* (Baker) Oberm. in Lewis et al.: 299 (1972). Type: South Africa, [Western Cape], Cape Peninsula, near Kommetjie in wet places at foot of mountains, 300 ft [90 m], Aug. 1894, *Fair sub BOL 7951* (K, presumed holo.; B, BOL, GRA, PRE, Z, iso.).

Plants 350–500 mm high, with villous cataphylls. *Corm* globose, 12–18 mm diam.; tunics leathery to woody, fragmenting into coarse woody fibres. *Stem* erect, flexed above sheathing parts of two upper leaves but becoming erect again, unbranched. *Leaves* 3, lower 2 basal, lowermost usually slightly exceeding spike, lower leaves villous, linear, 3.0–5.5 mm wide, several ribbed, margins lightly thickened, uppermost leaf inserted on upper ⅓ of stem, short and bract-like, usually channelled throughout, sparsely pubescent or glabrous. *Spike* ± erect, 3- to 8-flowered; bracts pale green or flushed dull red or brown, outer 15–22 mm long, inner slightly shorter or slightly longer, minutely notched apically. *Flowers* bright yellow, upper part of tube and base of tepals flushed red on fading, without contrasting markings, unscented; perianth tube 19–24 mm long, filiform below for 10–15 mm, ascending, barely exserted from bracts, abruptly expanded into a slightly flared, ± horizontal upper part; tepals obovate to elliptic, slightly unequal, dorsal 20–24 × 12–15 mm, lower 3 tepals joined to upper laterals for 3–4 mm, 20–22 × 9–12 mm. *Filaments* 9–12 mm long, reaching to mouth of tube or exserted up to 5 mm and enclosed by tepals; anthers 7.5–8.8 mm long, cream-coloured; pollen white.



Distribution of ***Gladiolus aureus***.

Style arching over stamens, dividing opposite or just beyond anther apices, branches ± 4 mm long. *Capsules* oblong, ± 18 mm long. *Seeds* oval, ± 9 × 7 mm, broadly and evenly winged. *Flowering time*: September, sometimes in late August.

Distribution and ecology: a highly localised endemic of the southern Cape Peninsula in Western Cape, South Africa, recorded historically near Kommetjie and Simonstown but now known only from from a single locality at Ocean View; in seasonal seepages in peaty soils, flowering best after fire.

Diagnosis: distinctive in its superposed, hairy leaves and small, bright yellow flowers with funnel-shaped perianth tube 19–24 mm long with the lower part filiform, and nearly equal tepals about as long as the tube, with the filaments just reaching the top of the tube or shortly exserted.

72. **Gladiolus brevifolius** *Jacq.*, Collectanea 4: 156 (1791). *Antholyza brevifolia* (Jacq.) Steud.: 105 (1840). *G. hirsutus* var. *brevifolius* (Jacq.) Ker Gawl.: sub t. 574 (1802d). Type: South Africa, Cape, without precise locality, illustration in Jacq.: t. 249 (1794 [1788–1795]).

Watsonia amoena Ehrh. ex Pers.: 412 (1805), illegitimate superfluous name for *Gladiolus brevifolius* Jacq. Type: unknown.

Gladiolus tristis var. *aphyllus* Thunb.: 12 (1784). *G. hirsutus* var. *aphyllus* (Thunb.) Ker Gawl.: sub. t. 727 (1804). *G. aphyllus* (Thunb.) Ker Gawl.: 134 (1827). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* (UPS-THUNB 1010, holo.).

Gladiolus tristis var. *ruber* Thunb.: 12 (1784). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* (UPS-THUNB 1011, holo.).

Gladiolus orobanche DC. in Redouté: t. 125 (1805). *G. brevifolius* var. *orobanche* (DC.) Baker: 174 (1877). Type: South Africa, without precise locality or collector, grown in France, illustration in Redouté: t. 125 (1805).

Gladiolus festivus Herb.: 89 (1844). Type: South Africa, without precise locality or collector, ex hort. Kew (BM, holo.).

Gladiolus spilanthus Spreng. ex Klatt: 711 (1864). *G. andrewsii* Klatt: 340 (1882), illegitimate superfluous name for *G. spilanthus* Spreng. ex Klatt [based on same type]. Type: South Africa, Western Cape, without precise locality, or collector, grown in London, illustration in Andrews: t. 240 (1802) [as *G. carneus*].

Gladiolus brevicollis Klatt: 339 (1882). Type: South Africa, [Western Cape], without precise locality or collector, illustration in Ker Gawl.: t. 727 (1804) [as *G. hirsutus* var. *brevifolius*].

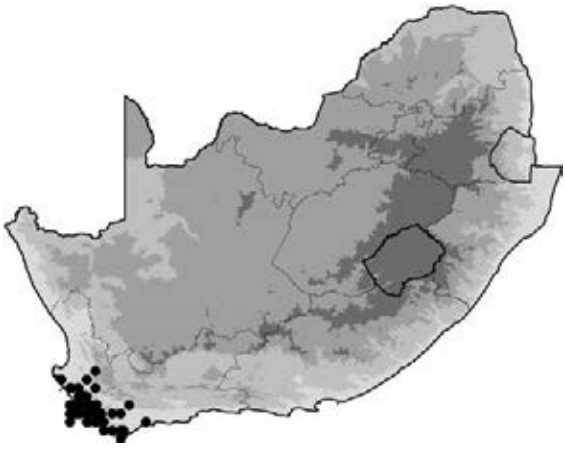
Gladiolus brevifolius var. *robustus* G.J.Lewis: 126 (1954). Type: South Africa, [Western Cape], near Saldanha Bay, 7 Jan. 1935, *Pole Evans s.n. BOL 21057* (BOL, holo).

Gladiolus brevifolius var. *minor* G.J.Lewis in Lewis et al.: 279 (1972). Type: South Africa, [Western Cape], Bredasdorp, 15 Apr. 1962, *Lewis 5948* (NBG, holo.).

Gladiolus brevifolius var. *obscurus* G.J.Lewis in Lewis et al.: 280 (1972). Type: South Africa, [Western Cape], Malmesbury Commonage, grown at Kirstenbosch, Apr. 1963, *Lewis 6131* (NBG, holo.).

[*Gladiolus amoenus* Herb. Banks ex Roem. & Schult.: 409 (1817), invalid name only in synonymy.]

Plants (120–)250–550(–850) mm high, with cataphylls usually dry and dull purple and minutely pubescent on veins. *Corm* globose, 18–35 mm diam.; tunics leathery, decaying into fairly coarse fibres, often thicker below. *Stem* lightly flexed outward above sheath of uppermost leaf, unbranched. *Leaves* (1)3, not overlapping, 40–70 mm long, all largely to entirely sheathing, occasionally with short blades up to 40 mm long, linear, smooth or sparsely and shortly pubescent; foliage leaf produced later in season, solitary, linear to narrowly lanceolate, pubescent (rarely glabrous), dry and decayed at flowering time or lacking. *Spike* slightly inclined, lightly flexuose, 8- to 12(16)-flowered; bracts grey-green, flushed purple, (15–)18–22 mm long, inner slightly shorter than outer, notched apically. *Flowers* pale to deep pink, sometimes cream-coloured, light mauve or greenish grey, usually tepals more darkly coloured distally, lower tepals with yellow transverse to obscure median band, sometimes edged in darker pink or with a median dark streak when tepals pale, unscented or with a strong sweet rose scent; perianth tube obliquely funnel-shaped, 11–13 mm long, narrow lower part 6–7 mm long; tepals lanceolate, dorsal largest, 19–29 × 10–20 mm, upper laterals 14–25 × 8–15 mm, lower tepals joined to upper laterals for 2–5 mm and together for 2.0–3.5 mm, free parts 12–22 × 5–6 mm. *Filaments* 10–15 mm long, exserted 7–9 mm from tube but enclosed by tepals; anthers (4–)6–8 mm long, cream-coloured; pollen pale yellow. *Style* dividing at or just beyond anther apices, branches ± 3 mm long. *Capsules* ellipsoid, 16–22 mm long. *Seeds* oval, 7–8 × 4 mm, broadly and evenly winged. *Flowering time*: March to April, occasionally in February.



Distribution of ***Gladiolus brevifolius***.

Distribution and ecology: relatively widespread through southwestern Western Cape, South Africa, from near Aurora to the Cape Peninsula, east to Bredasdorp and inland to Montagu; mainly on stony flats and slopes in a variety of soils, flowering in autumn.

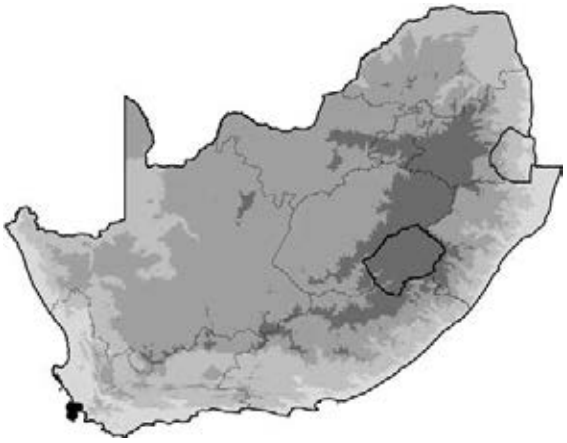
Diagnosis: recognised by the short, bladeless leaves on the flowering stem and relatively small, usually unscented pink to mauve flowers with short perianth tube 11–13 mm long. The solitary, linear-lanceolate and pubescent vegetative leaf produced in the winter is distinctive and dried remains from the previous season should always be sought for positive identification. In the absence of these remains the species is best separated from other superficially similar small-flowered species with bladeless leaves by the coarsely fibrous corm tunics. The species is most usually confused in flower with *Gladiolus martleyi*, typically from deep sands, which has almost identical but usually fragrant flowers and a soft, fleshy corm with softly membranous or finely fibrous tunics. The terete, 4-grooved leaf developed in *G. martleyi* later in the season is quite different from that of *G. brevifolius*.

73. **Gladiolus monticola** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 173 (1998). Type: South Africa, Western Cape, Table Mountain, rocky upper slopes, Mar. 1949, *Esterhuysen 15147* (BOL, holo.; BM, K, PRE, S, iso.).

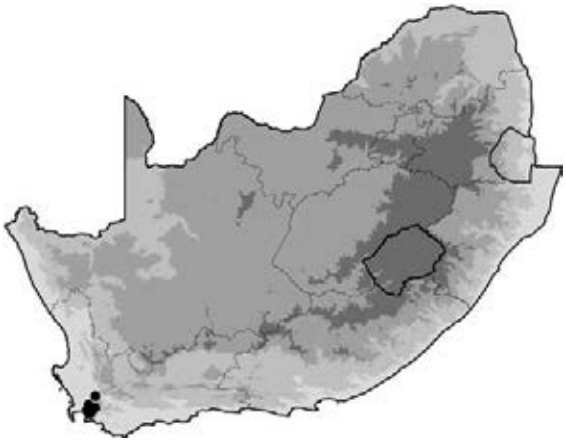
Gladiolus tabularis Eckl. ex Baker: 207 (1892), illegitimate homonym, not *G. tabularis* Pers. (1805) [= *Tritoniopsis unguicularis* (Lam.) G.J.Lewis]. Types: South Africa, Table Mtn., *Pappe s.n.* (K, SAM, syn.), *H. Bolus 7057* (BOL, K, syn.).

[*Gladiolus monticola* G.J.Lewis: 85 (1948) [as *monticolus*], invalid name without description; *G. monticola* G.J.Lewis in Lewis et al.: 257 (1972), invalid name without Latin diagnosis].

Plants 300–450 mm high. *Corm* globose, 20–25 mm diam.; tunics of fairly coarse to fine fibres. *Stem* erect, lightly flexed outward above sheath of uppermost leaf, unbranched. *Leaves* 2, not overlapping, largely to entirely sheathing, lowermost inserted shortly above ground, occasionally with short blade up to 30 mm long, linear, smooth or sparsely and shortly pubescent; foliage leaf produced later in season, solitary, linear to narrowly sword-shaped, pubescent, dry and decayed at flowering time or lacking. *Spike* slightly inclined, lightly flexuose, 3- to 9-flowered; bracts grey-green, flushed purple on upper surface, 15–24 mm long, inner shorter. *Flowers* pale apricot- to cream-coloured, upper tepals



Distribution of ***Gladiolus monticola***.



Distribution of ***Gladiolus nerineoides***.

flushed pale pink, lower tepals with yellow median stripe often outlined in dark pink, unscented; perianth tube 22–30 mm long, cylindric below, curved abruptly near apex, upper 6–8 mm horizontal and flaring outward; tepals lanceolate, unequal, dorsal largest, 20–25 × 10–12 mm, upper laterals 18–20 × 8–10 mm, lower 3 tepals united below for ± 5 mm, 15–18 × 6–8 mm. *Filaments* ± 12 mm long, exserted ± 4–5 mm from tube but enclosed by tepals; anthers 6–7 mm long. *Style* dividing at or just beyond anther apices, branches ± 4 mm long. *Capsules* ovoid-ellipsoid, 11–13 mm long. *Seeds* oblong, 6–7 × ± 4 mm, evenly winged. *Flowering time*: mid-December to February, occasionally in March.

Distribution and ecology: endemic to the Cape Peninsula in Western Cape, South Africa, from Table Mountain to Simonstown; in rocky sandstone outcrops, flowering mainly in mid- to late summer, rarely into autumn.

Diagnosis: related to but readily separated from *Gladiolus brevifolius* and other small-flowered, autumn-blooming species with reduced leaves and pale pink flowers by the longer perianth tube, 22–30 mm long and longer than the dorsal tepal.

74. **Gladiolus nerineoides** *G.J.Lewis* in Flowering Plants of Africa 25: t. 994 (1946). Type: South Africa, [Western Cape], Hottentot's Holland Mtns, Somerset Sneeukop, Mar. 1938, *Valpy s.n. SAM 54330* (SAM, holo.).

Plants 350–600 mm high, with cataphylls pubescent. *Corm* globose, 15–20 mm diam.; tunics of pale, finely netted fibres, often forming a collar around base. *Stems* generally inclined, unbranched. *Leaves* (1)2, inserted on middle and upper part of stem, widely spaced and entirely sheathing, lowermost 40–70 mm long, pubescent, upper 20–35 mm long; foliage leaf solitary, produced later in season, linear to narrowly lanceolate, 250–300 × 3–6 mm, lightly pubescent, dry at flowering but often remaining attached to corm, main and a pair of secondary veins lightly thickened, margins not thickened. *Spike* usually flexed outward at base and inclined to nearly horizontal, 3- to 5(10)-flowered, flowers crowded on upper side and subcapitate; bracts green, outer 14–18 mm long, obtuse, inner ± as long, minutely forked. *Flowers* scarlet red (rarely orange), lower 3 tepals sometimes with darker median streak toward base, unscented; perianth tube ± straight, cylindric below, widened somewhat in upper ½, 25–31 mm long; tepals subequal, narrowly ovate, held somewhat apart, lower three directed downward distally, somewhat undulate, upper sometimes recurving, 19–22 × 7–9 mm. *Filaments* 8–10 mm long, entirely included in tube; anthers 6–7 mm long, with upper third exserted from tube. *Style* dividing at or shortly beyond anther apices, branches 3–4 mm long, filiform and notched apically. *Capsules* obovoid, obtuse to subacute, ± 12 mm long. *Seeds* unknown. *Flowering time*: mostly December to February, occasionally in March.

Distribution and ecology: a local endemic of the mountains between Stellenbosch and Somerset West in Western Cape, South Africa; on cooler, rocky slopes mostly above 1 000 m elevation, flowering in mid-summer.

Diagnosis: recognised by the crowded, subcapitate spike of scarlet or reddish orange, funnel-shaped flowers with subequal tepals 19–22 mm long and ± straight perianth tube 25–31 mm long, almost entirely including the stamens.

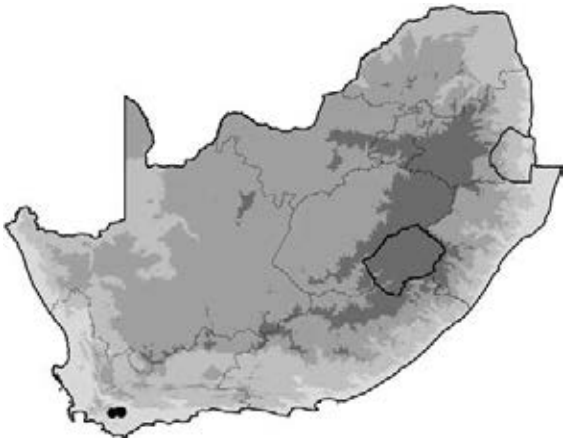
75. **Gladiolus stokoei** *G.J.Lewis* in Flowering Plants of Africa 26: t. 1004 (1947). Type: South Africa, [Western Cape], Caledon District, Riviersonderend Mtns, Mar. 1945, *Stokoe s.n.* (SAM [*SAM 56457*], holo.; BOL, iso.).

Plants 300–450 mm high. *Corm* globose, 12–15 mm diam.; tunics of fine fibres, forming collar around base. *Stem* erect, unbranched, straight. *Leaves* (1)2, not overlapping, largely sheathing, up to 12 mm long, uppermost with margins sometimes united around stem; foliage leaf solitary, produced after flowering, linear, ultimately to 250 mm long or more, 2.0–3.5 mm wide, with 1 or 2 lightly raised veins, lightly pilose, margins and main vein

lightly raised. *Spike* erect, nearly straight, 1- to 3-flowered; bracts green and firm-textured, often reddish on margins, outer 25–30 mm long, inner slightly shorter or slightly longer, minutely forked. *Flowers* bright scarlet, nodding, tepals symmetrically disposed and forming a slightly compressed bowl with apices curving inward, lower 3 tepals with darker red median streak, unscented; perianth tube obliquely funnel-shaped, 30–35 mm long, lower cylindric part ± 20 mm long; tepals subequal, outer 3 suborbicular, ± 28–30 × 22–28 mm, inner 3 obovate, ± 25–27 × 15 mm. *Filaments* ± 20 mm long, exserted ± 11 mm from tube; anthers 10–12 mm long, yellow; pollen yellow. *Style* arching over stamens, dividing slightly below or beyond anther tips, branches 5–7 mm long. *Capsules* and *seeds* unknown. *Flowering time*: February to April.

Distribution and ecology: a local endemic of the Riviersonderend Mtns in Western Cape, South Africa; on cooler, southern slopes from 700 to 1 400 m elevation, flowering in autumn.

Diagnosis: unmistakable in its nodding, scarlet flowers with obovate, cupped tepals. The reduced, bract-like and softly hairy leaves on the flowering stem distinguishes it from the unrelated, summer-flowering *Gladiolus insolens* from the Piketberg, which has remarkably similar flowers but a basal fan of smooth, well-developed leaves.



Distribution of ***Gladiolus stokoei***.

Sect. 5. **Heterocolon** *Kuntze*, Revisio generum plantarum 3: 66 (1898). Type species: *Gladiolus pretoriensis* Kuntze

Plants small to medium-sized. *Stem* occasionally unbranched. *Corm* tunics coarsely fibrous. *Leaves* several, either mostly basal in a fan or all cauline, sometimes much reduced on flowering stem, narrowly lanceolate linear, firm-textured, plane with thickened main vein and margins or terete and grooved, usually < 4 mm wide, rarely villous or puberulous. *Spike* mostly few-flowered; bracts glabrous, margins of inner bracts free. *Flowers* small to medium, strongly bilabiate, nectar guides usually of transverse bands edged in darker colour, usually unscented; perianth tube usually obliquely funnel-shaped, shorter or longer than dorsal tepal; lower tepals narrower and usually clawed. Anthers never tailed. *Capsules* oblong to subglobose and retuse above. *Seeds* evenly or unevenly winged, or wings vestigial.

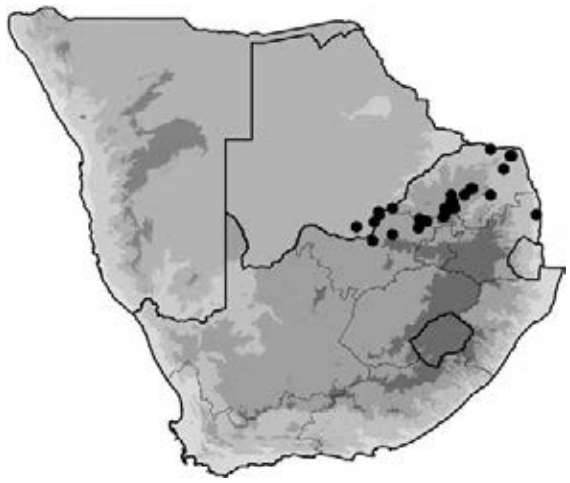
The section includes 8 southern African species plus several from tropical Africa.

Ser. **Unguiculati** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus unguiculatus* Baker

Plants from the summer-rainfall region, flowering in spring. *Leaves* reduced on flowering stem, with short blades, margins and midrib thickened. *Flowers* small, lower tepals often strongly clawed. *Capsules* ellipsoid. *Seeds* broadly and evenly winged.

76. **Gladiolus oatesii** *Rolfe* in Oates, Matabeleland and the Victoria Falls, edn. 2: 410 (1889). Type: Zimbabwe, Matabeleland, in 1874, *Oates s.n.* (K, holo.).

Plants 400–500 mm high, with purple or purple-veined cataphylls, drying dark brown. *Corm* globose to obconic, 10–16 mm diam.; tunics of matted, fine fibres usually extending upward for a short distance. *Stem* erect, ± straight, unbranched. *Leaves* (2)3, lowermost sheathing lower ¼ of stem with blade vestigial to short, lanceolate, (10–)20–40 × 2.3–4.0 mm, margins and main vein moderately thickened and hyaline, second leaf inserted shortly above basal leaf, blade vestigial, uppermost leaf entirely sheathing, 20–50 mm long, margins overlapping around stem; non-flowering plants with solitary, narrowly lanceolate leaf emergent, at flowering 70–100 mm long but ultimately at least 200 mm long, grey-green, 3–4 mm wide, margins and main vein lightly thickened and raised. *Spike* erect, barely flexuose, 5- to 12-flowered; bracts pale green, apices and upper margins often flushed reddish purple, outer 11–18(–21) mm long, inner ± as long or slightly shorter. *Flowers* whitish to pale mauve with upper tepals flushed with purple and darker toward apices, lower lateral tepal limbs with transverse chevron of white (or yellow) edged with purple, unscented; perianth tube obliquely funnel-shaped, 10–11 mm long, cylindric lower part ± 4 mm long; tepals with upper lanceolate-elliptic, dorsal largest, extended horizontally over stamens, curving upward distally, 18–20 × 10–12 mm, upper laterals directed forward throughout or weakly spreading distally, ± 15 × 7 mm, sometimes narrowly windowed between bases of dorsal and upper lateral tepals, lower 3 tepals united with upper laterals for ± 4 mm and together for ± 3 mm, strongly clawed, limbs flexed downward and those of lower laterals



Distribution of ***Gladiolus oatesii***.

diverging, lower laterals 12–14 mm long, claws ± 6 mm long, limbs 6–8 × 3.5–4.5 mm, lower median ± 14 mm long, claw ± 4 mm long, limb ± 10 × 5 mm. *Filaments* 12–15 mm long, exserted 5–8 mm from tube; anthers ± 6.5 mm long, greenish or mauve with dark lines on ventral sides; pollen yellow. *Style* arching over stamens, dividing opposite lower third of anthers, branches 2.0–2.5 mm long. *Capsules* ellipsoid, 12–15 mm long. *Seeds* oval, ± 5 × 3.5 mm, broadly and evenly winged. *Flowering time*: mid-October to early December.

Distribution and ecology: scattered across northern southern Africa, from Botswana through North West Province and Limpopo to the southern Kruger National Park in South Africa, also in southern Zimbabwe and southern Mozambique; in open bushveld or grassland in rocky places, flowering in spring.

Diagnosis: recognised by the reduced foliage, the flowering stem bearing two or three glabrous leaves with reduced or vestigial blades, and the erect spike of pale mauve, strongly bilabiate flowers, the lower tepals clawed with oblong blades and usually slightly shorter than the median, the nectar guides transverse median chevrons of pale colour edged with purple. The species is closely allied to *Gladiolus atropurpureus* from tropical Africa but pale-flowered forms of that species can be distinguished from *G. oatesii* by their broader, spade-shaped lower tepals, the laterals ± as long as or slightly longer than the median and with nectar guides a solid, median blotch, and the shorter filaments 6–8 mm long.

Ser. **Heterocolon** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus pretoriensis* Kuntze

Plants from the summer-rainfall region, flowering in summer and autumn. *Leaves* slender, often terete and 4-grooved with heavily thickened main vein and margins. *Flowers* small, lower tepals often strongly clawed. *Capsules* ovoid. *Seeds* weakly and unevenly winged or wings vestigial.

77. **Gladiolus rubellus** *Goldblatt* in Flora Zambesiaca 12(4): 74 (1993). Type: Botswana, Molepolole, 20 May 1984, *Plowes 7085* (UCBG, holo.; MO, PRE, iso.).

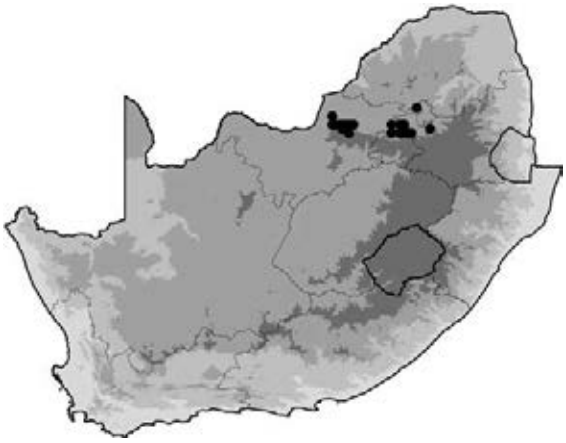
Plants 250–450 mm high. *Corm* obconic, 15–20 mm diam.; tunics of medium-textured to fairly fine fibres, often forming neck around base of stem. *Stem* often with one or occasionally two branches, ± 1.2 mm diam. below base of spike. *Leaves* 3 or 4, at least lower 1 or 2 basal, usually slightly longer than stem, linear, (1.8–)3.0–4.5 mm wide, midrib and margins strongly thickened with margins raised at right angles to surface, cauline leaves shorter, uppermost sometimes entirely sheathing. *Spike* inclined, 10- to 16-flowered; bracts green, 12–14(–16) mm long, inner usually shorter. *Flowers* bright orange-red, lower lateral tepals with transverse yellow band outlined in dark red across distal half; perianth tube obliquely funnel-shaped, ± 14 mm long; tepals lanceolate, dorsal largest, 16–20 mm long, upper laterals slightly smaller, lower 3 tepals joined to upper laterals for 2–4 mm and together for ± 3 mm, 12–14 mm long, narrowed below into claws, limbs abruptly expanded, flexed downward distally. *Filaments* 12–14 mm long, exserted 8–10 mm from tube; anthers ± 6.5 mm long, yellow. *Style* arching over stamens, dividing between middle and apex of anthers, branches 2.5–3.0 mm long. *Capsules* obovoid, 3-lobed apically and retuse, 12–14 × 6 mm. *Seeds* oval, 3.5–5.0 × ± 3 mm, unevenly winged, sometimes ± ridged on angles rather than winged. *Flowering time*: January to March.

Distribution and ecology: originally known only from southeastern Botswana between Lobatse and Molepolole but now also recorded from the Baynes Mtns in northwestern Namibia; in stony ground in dry savanna, flowering in late summer.

Diagnosis: recognised by the linear leaves with stringy thickened midrib and margins, and the small, bright orange-red flowers with yellow markings on the lower tepals.

78. **Gladiolus pretoriensis** *Kuntze*, Revisio generum plantarum 3(2): 308 (1898). Type: South Africa, [Gauteng], Transvaal, Pretoria, Feb. 1894, *Kuntze s.n.* (NY, holo.; K, iso.).

Plants 400–700 mm high. *Corm* 14–18 mm diam.; tunics of medium-textured fibres, not extending upward in a collar. *Stem* simple or up to 2-branched, usually flexed above sheath of uppermost leaf, ± 1 mm diam. at base of spike. *Leaves* 3 to 5(7), lower 1 or 2 basal, reaching at least to base of spike or longer, terete or oval in section and narrowly 4-grooved, ± 1.5–2.0 mm diam., midrib and margins thickened and raised, cauline leaves progressively shorter and thinner, becoming almost filiform, upper 1 or 2 cauline leaves often with vestigial blades, sheaths of cauline leaves sometimes overlapping and concealing stem up to base of spike.



Distribution of ***Gladiolus pretoriensis***.

Spike inclined, lightly flexuose, (5)9- to 13-flowered; bracts green below or purplish, becoming dry and brownish in upper half at flowering and completely dry and rusty brown in fruit, 9–12(–15) mm long, inner shorter to slightly longer, forked at apex. *Flowers* pale lilac to pink, upper three tepals darker in midline, lower lateral tepals each with yellow spade-shaped mark outlined in purple, unscented; perianth tube obliquely funnel-shaped, 11–14 mm long, curved outward above; tepals oblanceolate, dorsal largest, hooded over stamens, 14–18(–24) × 10–14 mm, upper laterals curving outward distally, 12–16(–23) mm long, lower 3 held close together and ± horizontal or tilted downward, united with upper laterals for 5–8 mm, free parts 11–15(–20) mm long, narrowed below into claws, limbs of lower laterals 2.5–4.0 wide, lowermost 4.5–6.5 mm wide. *Filaments* 10–13 mm long, exserted 5–7 mm from tube; anthers 4–6 mm long, yellow; pollen yellow. *Style* arching over filaments, dividing between lower third and apex of anthers, branches 1.5–2.0 mm long. *Capsules* globose-ovoid, 8–10 mm long. *Seeds* angular-prismatic, 1.7–2.0 mm long. *Flowering time*: mid-January and February.

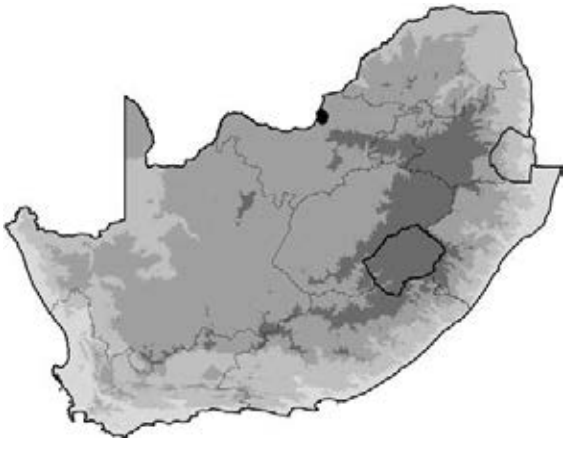
Distribution and ecology: restricted to interior South Africa north of the Vaal River, from Zeerust and Rustenburg in North West to Pretoria and Krugersdorp in Gauteng; on stony, often clay hillsides in grassland and open woodland.

Diagnosis: recognised by its slender, terete and 4-grooved leaves and small, short-tubed, lilac to pink flowers, the lower tepals with a pale, transversely spade-shaped mark outlined with purple, and the subglobose capsules with completely wingless seeds. The relatively shorter perianth tube, 11–14 mm long separates it from *Gladiolus filiformis* from around Zeerust, characterised by its longer perianth tube, 25–40 mm long and longer than the dorsal tepal. *Gladiolus rubellus* from eastern Botswana and northern Namibia has linear leaves with thickened midrib and margins, bright orange-red flowers, and partially winged seeds.

79. **Gladiolus filiformis** *Goldblatt & J.C.Manning, Gladiolus* in southern Africa: 182 (1998). Type: South Africa, [North West], Gopane Mtns, 29 Dec. 1977, *Peeters, Gericke & Burelli 509* (PRE, holo.).

Plants 350–500(–720) mm high. *Corm* obconic, 20–30 mm diam.; tunics of medium-textured fibres, accumulating in a dense mass. *Stem* lightly flexed outward above sheaths of upper 2 leaves, simple or 1-branched, 1.5–2.0 mm diam. at base of spike. *Leaves* 3 or 4, lower 2 basal, reaching to ± base of spike, terete and narrowly 4-grooved, 1.0–2.5 mm diam., main vein and margins thickened and raised, second leaf sheathing lower third of stem, cauline leaves entirely sheathing. *Spike* ± straight and erect, 5- to 10(12)-flowered; bracts tinged reddish, ± dry and brown after flowering, outer (8–)10–25 mm long, inner slightly shorter. *Flowers* pale mauve or pinkish, lower tepals with white markings outlined with purple, unscented; perianth tube narrowly and obliquely funnel-shaped, 25–35(–40) mm long, narrow and cylindric below, widening in upper 6–10 mm, curved outward above; tepals oblanceolate, dorsal largest, hooded over stamens, 20–25 × 15–22 mm, upper laterals curving outward distally, 15–22(–25) × 9–13 mm, lower 3 held close together, shortly united with upper laterals, free parts 15–20 mm long, narrowed below into claws, limbs of lower laterals 6–10 mm wide, lowermost 7–12 mm wide. *Filaments* (9–)10–14 mm long, exserted 5–7 mm from tube; anthers 5–9 mm long, pale yellow. *Style* arching over stamens, dividing opposite anther tips, branches 3–6 mm long. *Capsules* ellipsoid, 8–12 mm long. *Seeds* angular-prismatic and unevenly winged, lateral and lower wings reduced or vestigial. *Flowering time*: mainly December, but as early as October and as late as February depending on rains.

Distribution and ecology: a highly localised endemic of North West Province west of Zeerust, South Africa, and adjacent eastern Botswana; on rocky slopes in grassland and open woodland.



Distribution of ***Gladiolus filiformis*** .

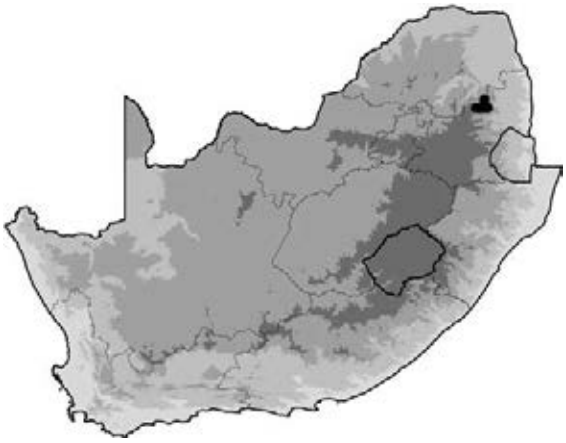
Diagnosis: recognised by its slender, terete and 4-grooved leaves and long-tubed mauve to pinkish flowers, the lower tepals with pale, spade-shaped markings outlined with purple, and the perianth tube 25–40 mm long and longer than the dorsal tepal. The seeds are unevenly winged with the lateral and lower wings reduced or vestigial. *Gladiolus pretoriensis* is separated by the shorter perianth tube, 11–14 mm long, and subglobose capsules with wingless, angular-prismatic seeds.

Ser. **Verni** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus vernus* Oberm.

Plants from the summer- and winter-rainfall regions, flowering from autumn to spring. *Leaves* slender, linear and 2-grooved on each surface or narrowly to widely 4-grooved and thus X-shaped in section, with thickened and sometimes raised midrib and margins. *Flowers* small to medium-sized, lower tepals joined to upper laterals and strongly clawed, lower laterals ± spathulate and often twisted outward, perianth often speckled. *Capsules* ellipsoid. *Seeds* usually broadly and evenly winged, rarely unevenly.

80. **Gladiolus rufomarginatus** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 145 (1972), replacement name for *G. marginatus* F.Bolus: 108 (1917), illegitimate homonym, not *G. marginatus* L.f. (1782) nor *G. marginatus* F.Bolus (1917). Type: South Africa, [Mpumalanga], Lydenburg, Jan. 1895, *Wilms s.n.* (PRE, holo.; BOL [tracing and flower], iso.).

Plants 300–500 mm high. *Corm* obconic, 15–18 mm diam.; tunics papery becoming ± fibrous. *Stems* flexed above sheaths of upper leaves, minutely scabrid, simple or occasionally 1-branched. *Leaves* usually 5, lower 2 or 3 basal, shortly exceeding stem, linear, 2–3 mm wide, ± oval in section and 2-grooved on each side with margins and main vein heavily thickened, a pair of secondary veins often evident, cauline leaves decreasing in size above, uppermost bract-like, mostly sheathing. *Spike* straight and erect, 8- to 20(30)-flowered; bracts pale-membranous, brown above at anthesis, margins rusty brown, outer lightly folded along midline, 14–18 mm long, inner shorter, forked. *Flowers* cream-coloured irregularly mottled with dark red, lower 3 tepals flushed yellow-green in lower ⅔ with veins showing dark red, tips of limbs flushed bright pink to red, unscented; perianth tube obliquely funnel-shaped, ± 9 mm long, lower cylindric part ± 4 mm long; tepals lanceolate, all distinctly clawed, dorsal largest, inclined over stamens, 18–20 × 12 mm, upper laterals ± 15 × 5 mm, limbs spreading, usually windowed between claws of dorsal and upper laterals tepals, lower tepals joined to upper laterals for ± 1.5 mm and together for ± 2 mm, free parts ± 8 mm long, claws ± 4 mm long, abruptly expanded at base of limbs. *Filaments* ± 13 mm long, exserted ± 9 mm from tube, spotted with dark red; anthers ± 5 mm long, tilting downward distally, olive-green; pollen white. *Style* arching over stamens, dividing opposite lower half of anthers, branches ± 2 mm long. *Capsules* oblong, 3-lobed above and retuse, 9–12 mm long. *Seeds* oblong, ± 5 × 2.5 mm, unevenly winged. *Flowering time*: mainly March and April, sometimes in May.



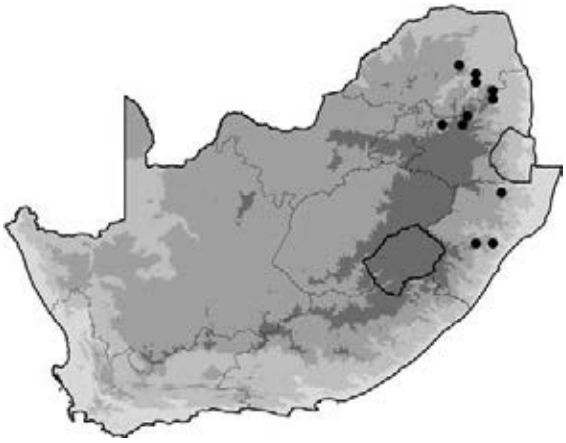
Distribution of ***Gladiolus rufomarginatus***.

Distribution and ecology: a narrow endemic of Mpumalanga, South Africa, between Lydenburg and Ohrigstad; on stony shale banks and outcrops in dry grassland and open woodland.

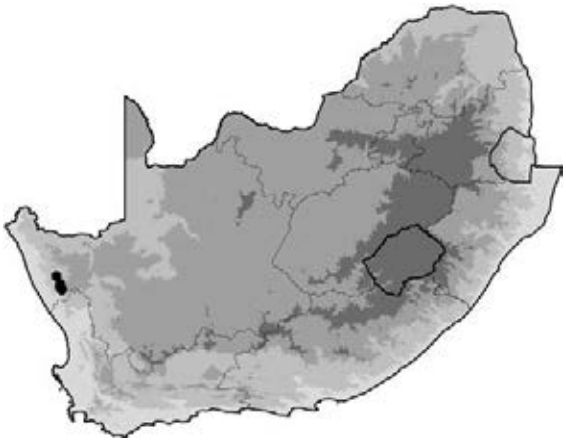
Diagnosis: a very distinctive species, with narrow, 4-grooved leaves, pale bracts with brown tips and margins, and pale, short-tubed flowers densely speckled with red. The spikes bear up to 30 flowers.

81. **Gladiolus vernus** *Oberm.* in Lewis et al. in Journal of South African Botany, Suppl. 10: 138 (1972). Type: South Africa, [Mpumalanga], Blyde River Canyon, lookout point ± 6.3 miles [10 km] north of Bourke's Luck, 23 Aug. 1963, *Leistner, Thom, & Gillham 3314* (PRE, lecto., designated by Goldblatt & Manning: 184 (1998); BOL, K, PRE, isolecto.).

Plants (350–)450–750 mm high. *Corm* ± globose, 20–40 mm diam.; tunics of moderately coarse fibres, accumulating in a thick mass. *Stem* inclined above, simple or with up to 2 branches. *Leaves* usually 6, lower 4 basal, partly or completely dry at flowering, up to 450 mm long, stiff and gently curving, linear, 2–3 mm wide, ± oval in section, 2-grooved on each side with margins and main vein raised and thickened, uppermost 2 leaves largely to entirely sheathing, ± dry and often flushed pink. *Spike* inclined, lightly flexuose, usually 12- to 18-flowered; bracts partly dry at flowering, often flushed pink above, 10–15(–22) mm long, inner shorter to as long, broad and enclosing flower. *Flowers* slightly laterally compressed, pale to deep pink or cream-coloured, upper tepals more darkly pigmented above, lower lateral or all lower tepals pale yellow in middle third sometimes edged dark pink or purple, basal ½ of lower tepals speckled with pink, unscented; perianth tube obliquely funnel-shaped, 8–13 mm long; tepals with dorsal largest, inclined over stamens, (17–)20–30 × 10–18 mm, upper laterals obliquely spathulate, narrow



Distribution of ***Gladiolus vernus***.



Distribution of ***Gladiolus kamiesbergensis***.

at base, 15–26 × 8–11 mm, usually windowed between dorsal and upper lateral tepals, lower 3 united with upper laterals for 5–8 mm and together for 1.5–3.0 mm, clawed, lower laterals 10–13 mm long, claws linear-channelled, 2–3 mm long, abruptly expanded into broadly oval-auriculate limbs ± 7 × 6 mm, lower median 11–15 × 6–8 mm long, claw 1–3 mm long. *Filaments* 10–16 mm long, exserted ± 8–10 mm from tube; anthers 6–8 mm long, purplish; pollen whitish. *Style* arching over stamens, dividing opposite base to upper ⅓ of anthers, branches 2–3 mm long. *Capsules* obovoid, 3-lobed above and retuse, 10–12 mm long. *Seeds* oval, ± 6 × 4 mm, evenly winged. *Flowering time*: July and August.

Distribution and ecology: scattered along the eastern escarpment of South Africa, from the Wolkberg in Limpopo through Mpumalanga to Hermannsburg in KwaZulu-Natal but poorly documented, especially in KwaZulu-Natal; in rocky grassland in quartzite, flowering in winter when the leaves are dry.

Diagnosis: a winter-flowering species with linear, grooved leaves dry at flowering, and pale pink to cream-coloured flowers with yellow markings on the lower tepals, and obliquely spathulate upper lateral tepals.

82. **Gladiolus kamiesbergensis** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 128 (1972). Type: South Africa, [Northern Cape], Kamiesberg, Farm Welkom, 16 Oct. 1954, *Esterhuysen 23716* (BOL, holo.; BOL, K, iso.).

Plants 450–900 mm high. *Corm* globose, 18–22 mm diam.; tunics leathery, breaking into moderately thick vertical fibres. *Stem* ± erect, unbranched. *Leaves* usually 4, lowermost often exceeding spike, ± 1.3 mm diam., terete and finely 4-grooved with main vein and margins raised and strongly thickened, second leaf much shorter and more slender, sheathing stem below, upper 2 leaves entirely sheathing or with vestigial blades, lower margins overlapping or rarely sheaths closed near base. *Spike* ± erect or lightly flexed at base and barely inclined, 4- to 9(12)-flowered; bracts pale with hyaline margins, outer 13–18 mm long, inner shorter to ± as long. *Flowers* pale blue-lilac with minute purple dots on tepals, especially toward apices, lower lateral tepals yellow on lower half of limbs, sweetly apple-scented; perianth tube obliquely funnel-shaped, 12–13 mm long; tepals with dorsal largest, arching to hooded over stamens, 16–21 × 10–12 mm, upper laterals obliquely ovate, curving outward apically, 16–18 × 8–10 mm, windowed between bases of dorsal and upper laterals, lower tepals united with upper laterals for 5 mm and together for 1–2 mm, lower laterals twisted obliquely, narrowed below into linear, channelled claws 3–4 mm long, abruptly expanded into oval limbs ± 7 × 7 mm, limbs spooned, lower median lanceolate, ± 9 × 7 mm. *Filaments* arched below dorsal tepal, ± 12 mm long, exserted ± 9 mm from tube; anthers ± 6 mm long, lilac; pollen whitish. *Style* arching over stamens, dividing opposite middle of anthers, branches ± 2 mm long. *Capsules* obovoid, obtuse, 15–18 mm long. *Seeds* ovate, ± 5.5 × 6 mm, broadly and evenly winged. *Flowering time*: mainly October, sometimes in late September.

Distribution and ecology: endemic to the Kamiesberg in Northern Cape, South Africa, above 1 200 m elevation on Rooiberg, Sneeuberg and other peaks; in rocky sites, usually in fynbos.

Diagnosis: recognised by the long basal leaf with terete, finely 4-grooved blade, and pale blue-lilac flowers with darker speckling, the narrowly clawed lower tepals with abruptly expanded limbs coloured pale yellow at the base, and the obliquely ovate upper laterals forming a window with the dorsal tepal.

83. **Gladiolus marlothii** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 141 (1972). Type: South Africa, [Northern Cape], Farm Driefontein, north of Sutherland, 1 400 m, Oct. 1920, *Marloth 9757* (PRE, holo.; BOL, iso.).

Plants 450–600 mm high, with cataphylls often purple, velvety when young. *Corm* globose, 16–22 mm

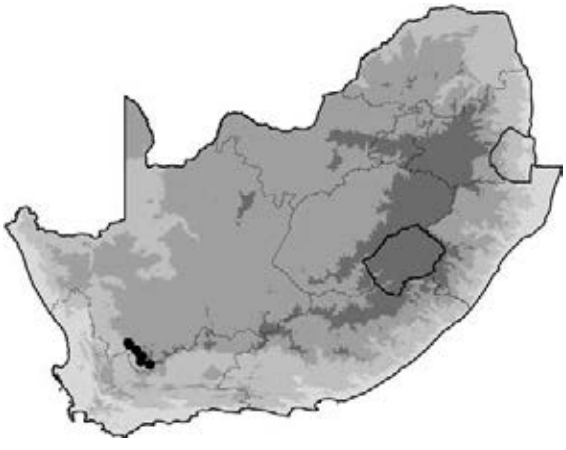
diam.; tunics of coarsely textured fibres, accumulating in a dense mass. *Stem* normally erect or slightly inclined, unbranched. *Leaves* 4, sheaths villous and deflexed-scabrid on edges of ribs, blades ciliate and scabrid on margins of wings, lowermost sheathing lower ⅓ of stem, blade reaching or exceeding spike, centric and X-shaped in section, 3–4 mm wide, main vein raised and forming flanges either side of blade, margins and edges of main vein flanges thickened and shortly villous on edges, second leaf with a well-developed blade often reaching at least base of spike, upper leaves progressively shorter, blades sometimes reduced, uppermost leaf usually entirely or largely sheathing. *Spike* flexed at base and inclined, almost straight, 3- to 5-flowered; bracts pale green or becoming pale and dry toward apices, eventually ± entirely membranous, 16–24 mm long, inner bracts slightly shorter than outer. *Flowers* pale blue, often slightly darker toward tips of upper tepals, lower lateral tepals with transverse yellow band just above base of limb, fairly densely speckled with dark purple at edges, lower median tepal with yellow blotch in lower midline, lower part of throat also speckled, tepals forming a slightly inflated bell, unscented; perianth tube 9–10 mm long, obliquely funnel-shaped, lower ½ erect and cylindric, ± 4 mm long, upper ½ bent at right angles and flaring outward; tepals ± ovate, dorsal largest, arched over stamens and ± horizontal, 24–30 × 18–20 mm, upper laterals curving outward near apices, ± 20 × 17 mm, slightly concave just above base, lower tepals united with upper laterals for 5–8 mm and to one another for ± 2 mm, lower laterals spathulate, clawed below, claws ± 6 × 1.3 mm, expanded abruptly into a broadly ovate or oblong limb 12 × 10 mm, lower median tepal ± 14 mm long, narrowly clawed in lower 1–2 mm. *Filaments* ± 13 mm long, exserted ± 9 mm from tube but included in flower; anthers ± 9 mm long, lilac; pollen cream-coloured. *Style* arched over stamens, dividing opposite upper ⅓ of anthers, branches ± 4.5 mm long. *Capsules* obovoid, 3-lobed above and retuse, 16–19 mm long. *Seeds* ± ovate, 6–7 × 4–5 mm, broadly and evenly winged. *Flowering time*: mid-September to early October.

Distribution and ecology: a local endemic of the Roggeveld Escarpment and Klein Roggeveld in Northern Cape, South Africa, between Rooiwal and Sneeukrans at about 1 800 m elevation and below Komsberg Pass; in dolerite outcrops in open renosterveld scrub.

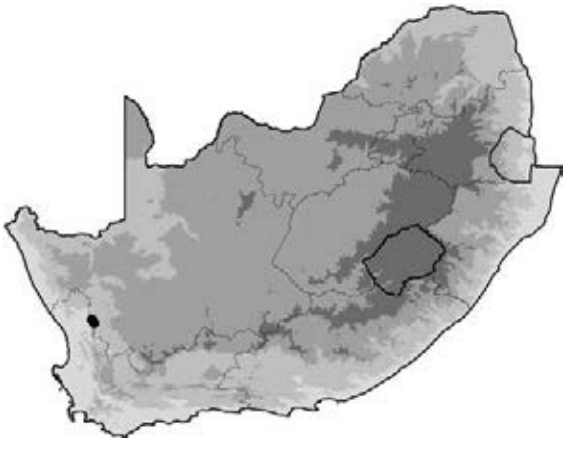
Diagnosis: an unmistakable species with villous leaves, the blades X-shaped, and pale blue, bell-shaped flowers with darker speckles and strongly clawed lower tepals with pale yellow nectar guides outlined with darker speckles on the limbs.

84. **Gladiolus mostertiae** *L.Bolus* in Annals of the Bolus Herbarium 3: 142 (1922). Type: South Africa, [Northern Cape], Calvinia District, Cloudskraal near Nieuwoudtville, cultivated at Kirstenbosch Gardens, Nov. 1921, *Mostert s.n. Natl. Bot. Gard. 1609/20* (BOL, holo.).

Plants (200–)300–500 mm high. *Corm* globose, ± 12–14 mm diam.; tunics papery to softly leathery, soon becoming finely fibrous. *Stem* erect, moderately to strongly flexed above sheathing parts of upper leaves and flexuose, usually 1(3)-branched. *Leaves* (3)4, lower 2 basal and reaching to between base and middle of spike, linear or narrowly lanceolate, 2.5–4.0 mm wide, lightly to densely villous, veins strongly thickened and ridged, margins lightly thickened, cauline leaves progressively smaller, usually channelled throughout and shortly sheathing. *Spike* ± straight or lightly flexuose, 4- to 10-flowered; bracts bright green or flushed dull purple, firm-textured, broadly truncate, upper margins usually dull purple, outer 10–14 mm long, inner shorter, minutely notched. *Flowers* pale to deep pink, darker toward tips of upper tepals, lower lateral tepal limbs cream-coloured with heart-shaped yellow mark with a greenish centre toward base, lower tepal claws and wide part of tube with minute reddish dots, with a faint acrid metallic odour; perianth tube obliquely funnel-shaped, ± 11 mm long; tepals ± ovate, dorsal largest, arching to hooded over stamens, ± 20 × 12 mm, upper laterals directed forward, curving outward only toward apices,



Distribution of ***Gladiolus marlothii***.



Distribution of ***Gladiolus mostertiae***.

± 15 × 9 mm, sometimes windowed between bases of dorsal and upper lateral tepals or these overlapping, lower tepals united with upper laterals for ± 10 mm and together for ± 1 mm, lower laterals twisted obliquely, ± 11 mm long, narrowed below into linear channelled claws ± 4 mm long, abruptly expanded into broadly oval limbs ± 7 × 6 mm, lower median tepal broadly lanceolate, not clawed, ± 9 × 8 mm. *Filaments* ± 15 mm long, strongly arched, exserted ± 8 mm from tube; anthers ± 4 mm long, lilac; pollen whitish. *Style* arching over stamens, dividing opposite middle of anthers, branches ± 3.5 mm long. *Capsules* ellipsoid-trigonous, (14–)18–20 mm long. *Seeds* ovate, 4–5 × ± 3 mm, broadly and evenly winged. *Flowering time*: mid-November to mid-December.

Distribution and ecology: a rare and local endemic of the edge of the Bokkeveld Plateau near Nieuwoudtville in Northern Cape, South Africa; in seasonally wet marshy flats on sandstone, flowering in early summer.

Diagnosis: readily recognised by the linear, villous leaves with thickened veins, and usually branched stem with pale pink flowers with clawed tepals, the lower laterals with a yellowish green, heart-shaped blotch at the base of the limb.

Sect. 6. **Hebea** *(Pers.) Bentham & Hook.f.*, Genera plantarum 3(2): 710 (1883). *Gladiolus* group *Hebea* Pers.: 44 (1805). *G.* subg. *Hebea* (Pers.) Baker: 177 (1877). Type species: *Gladiolus alatus* L., lecto., designated by Goldblatt: 169 (1996).

Plants small to medium-sized. *Stem* often branched, sometimes compressed and angled to winged. *Corm* tunics membranous or papery to fibrous, leathery or woody. *Leaves* several or few, usually mostly basal in a fan, linear to narrowly lanceolate, soft or firm-textured, plane with thickened main vein or ridged or corrugate, rarely terete, margins usually unthickened. *Spike* few- to many-flowered; bracts glabrous, margins of inner bracts free. *Flowers* small to medium, weakly to strongly bilabiate, nectar guides usually of solid yellowish colour darker along distal edge, usually scented, often strongly; perianth tube usually obliquely funnel-shaped, usually shorter than dorsal tepal (or longer); lower tepals usually narrowed or clawed. *Anthers* not tailed. *Capsules* oblong-ellipsoid to subglobose, retuse. *Seeds* broadly and evenly winged, seed body dark.

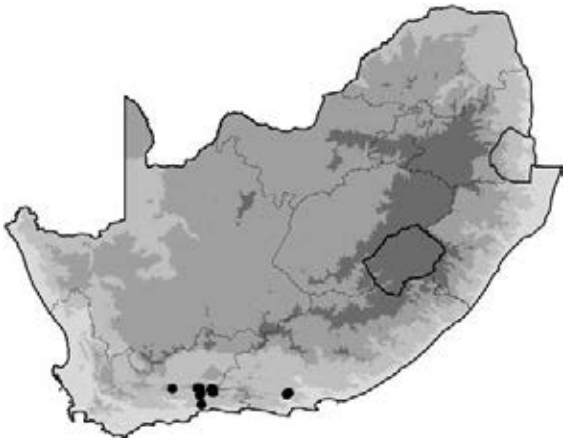
Species 32: southern Africa, mainly winter-rainfall parts.

Ser. **Involuti** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus involutus* D.Delaroche.

Plants mainly from winter-rainfall region. *Corms* often with slender stolons; tunics papery to fibrous. *Leaves* green at flowering, linear to lanceolate, plane, firm or soft-textured. *Flowers* small to medium, lower lateral tepals often involute or otherwise modified, sometimes highly reduced, usually much shorter than lower median, unscented.

85. **Gladiolus leptosiphon** *F.Bolus* in Annals of the Bolus Herbarium 1: 195 (1915). *Radinosiphon leptosiphon* (F.Bolus) N.E.Br.: 263 (1932a). Type: South Africa, [Western Cape], without precise locality, Cape Town Wild Flower Show, among plants probably from the Oudtshoorn or Riversdale Districts, Oct. 1914 (BOL [*BOL 13754*], holo.; K, PRE, iso.).

Plants 250–450 mm high. *Corm* 14–18 mm diam.; tunics of fairly coarse fibres, often claw-like below. *Stem* erect, flexed outward above sheath of uppermost leaf, simple or branched. *Leaves* ± 6, lower 4 basal and reaching to ± top of spike, linear, 2.0–2.5 mm wide, thickened in central area, margins not thickened, upper cauline leaves much shorter. *Spike* inclined, ± straight, 4- to 9-flowered; bracts fairly soft-textured, becoming pale and dry above, (15–)18–22 mm long, inner bract slightly shorter or longer than outer, forked apically. *Flowers* cream-coloured to pale yellow, lower 3 tepals with dark red to purple median streak in lower ½ extending to base of throat, unscented; perianth tube 45–50 mm long, lower part 40–45 mm long, cylindric, curving gently outward, expanding into a wider throat ± 5 mm long; tepals lanceolate-attenuate, upper 3 largest, 25–35 × 9–12 mm, arching outward distally, dorsal arched over stamens, lower 3 tepals united with upper laterals for ± 3 mm, lower laterals ± linear, 18–22 × ± 3.5 mm, lower median curving below lower laterals and exceeding them, 25–32 × 4–5 mm. *Filaments* ± 10 mm long, exserted 4–5 mm from tube, usually light purple; anthers 7–8 mm long, dark blue-purple; pollen purplish. *Style* arching over stamens, dividing close to anther apices, branches ± 2 mm long. *Capsules* obovoid-ellipsoid,



Distribution of ***Gladiolus leptosiphon***.

obtuse, ± 15 mm long. *Seeds* ovate, ± 4.5 × 3 mm, broadly and evenly winged, seed body blackish. *Flowering time*: mid-September to late October.

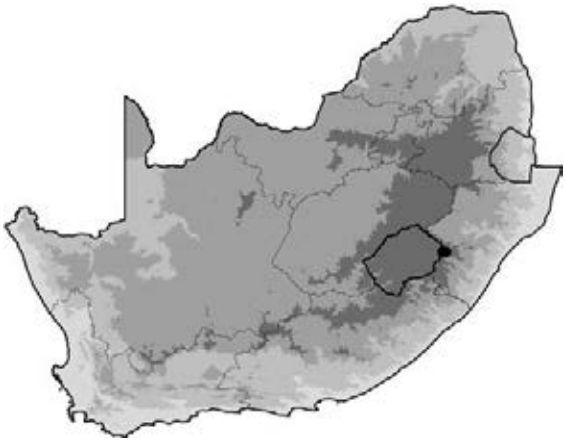
Distribution and ecology: restricted to the Little Karoo and Long Kloof in South Africa, from the Klein Swartberg near Ladismith in Western Cape to the Kouga and Baviaanskloof Mtns in Eastern Cape; on stony, often shale slopes in drier renosterveld and arid fynbos shrubland.

Diagnosis: distinctive in its slender, whip-like leaves and long-tubed, cream-coloured to pale yellow flowers with attenuate tepals, the lower lateral tepals much smaller and marked with a median purple streak, and a slender perianth tube, 45–50 mm long, more than twice as long as the bracts and longer than the dorsal tepal.

86. **Gladiolus loteniensis** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 43: 206 (1986). Type: South Africa, [KwaZulu-Natal], Loteni Nature Reserve, Loteni River Valley near Ash Cave, ± 6 000 ft [1 800 m], 13 Jan. 1982, *Hilliard & Burtt 15134* (NU, holo.; E, iso.).

Plants 300–600 mm high. *Corm* poorly developed, ± 5–8 mm diam., producing several long white stolons; tunics papery becoming finely fibrous. *Stem* erect, flexed outward above sheath of uppermost leaf, simple or 1-branched. *Leaves* 4 to 7, lower 3 basal, reaching to between middle of stem and base of spike, narrowly lanceolate, 4–8 mm wide, soft-textured, main vein lightly thickened and raised, margins hyaline, not thickened, cauline leaves progressively shorter. *Spike* flexed outward near base of spike, (3)6- to 12-flowered; bracts soft-textured, pale green flushed purple, 14–16 mm long, inner shorter, usually twisted to lie almost under outer, notched apically. *Flowers* pale lilac-pink flushed darker along tepal midline on reverse, lower 3 tepals cream-coloured to pale yellow below with dark purple veins, sinuses with dark purple spot, unscented; perianth tube obliquely funnel-shaped, ± 5 mm long; tepals oblanceolate-attenuate, dorsal largest, horizontal over stamens, 19–27 × 16–18 mm, upper laterals twisted upward, appressed to dorsal tepal below, obliquely spreading above, 17–19 × ± 13 mm, lower 3 tepals united for ± 1.5 mm, lower laterals 12.0–13.5 × ± 5 mm, narrowed below into claws ± 2 mm long, limbs abruptly expanded, channelled in lower ⅓, lower median 15–18 × 5.5–7.0 mm. *Filaments* ± 7 mm long, exserted ± 5 mm from tube; anthers ± 6 mm long, violet; pollen lilac. *Style* arching over the stamens, dividing between middle and upper ⅓ of anthers, branches ± 2 mm long. *Capsules* obovoid-ellipsoid, obtuse, 8–10 mm long. *Seeds* ovate, ± 6 × 3 mm, broadly and evenly winged, seed body not dark. *Flowering time*: early December to mid-January.

Distribution and ecology: a narrow endemic of the Drakensberg in KwaZulu-Natal, South Africa, known only from the upper Loteni River Valley at 1 800 m elevation; in peaty soil in damp grassland near the river, often in the lee of boulders or cliffs.



Distribution of ***Gladiolus loteniensis***.

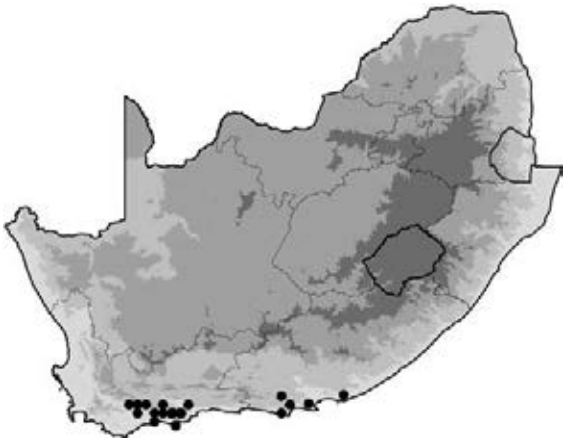
Diagnosis: a summer-flowering species from the KwaZulu-Natal Drakensberg with poorly developed corm, recognised by the soft-textured leaves without thickened margins, and the small, pale lilac-pink flowers with prominent, dark veining on the lower lateral tepals, these much shorter than the lower median tepal, and a very short perianth tube ± 5 mm long. The slender stolons are characteristic of several species in the series.

87. **Gladiolus involutus** *D.Delaroche*, Descriptiones plantarum aliquot novarum: 28 (1766). Type: South Africa, without precise locality or collector (L: Herb. van Royen 904, 137-90, holo.).

Gladiolus bimaculatus Lam.: 727 (1788). Type: South Africa, without precise locality or collector, illustration without binomial in Miller: 158 & t. 236 f. 1 (1758).

Gladiolus muirii L.Bolus: 132 (1915). Type: South Africa, Western Cape, Riversdale District, Tweekuilen, Oct. 1913, *Muir 588* (BOL, holo.; K, SAM, iso.).

Plants 200–500 mm high, with cataphylls purple, usually mottled white. *Corm* depressed-globose, 12–17 mm diam., with large cormlets on slender white stolons; tunics softly papery or rarely somewhat fibrous. *Stem* usually erect below, sometimes inclined, flexed outward above sheathing part of each cauline leaf, simple or 2- or 3-branched. *Leaves* 7 to 9, lower 4 or 5 basal, reaching to base of spike or sometimes much longer, linear, 1.7–3.0 mm wide, thickened toward the midline, margins hyaline but not thickened, cauline leaves progressively smaller, uppermost not or barely clasping stem. *Spike* lightly inclined, barely flexuose, 4- to 7-flowered; bracts pale green flushed greyish purple, outer 25–35(–40) mm long, inner shorter, obtuse or minutely notched apically. *Flowers* white flushed pink or pale pink, lower 3 tepals pale greenish yellow below, edged with a narrow pink or purple line, entire flower and especially nectar



Distribution of ***Gladiolus involutus***.

guides turning pink with age, unscented; perianth tube obliquely funnel-shaped, curving outward near apex of slender part, 16–18 mm long, emerging between bracts; tepals lanceolate-attenuate, upper laterals longest, 25–28 × 12.0–13.5 mm, directed forward below and twisted to lie over dorsal, curving outward distally, dorsal hooded over stamens, 20–24 × ± 13 mm, lower 3 tepals united below for 3–5 mm, lower laterals linear, 15–19 × 3–5 mm, narrowly clawed below for ± 2 mm, limb channelled-involute in lower ⅔, lower median 22–28 × 6–7 mm, obscurely clawed in lower 1 mm. *Filaments* 12–15 mm long, exserted 6–7 mm from tube; anthers 8–10 mm long, dull purplish; pollen pale orange. *Style* arching over stamens, dividing opposite middle of anthers, branches ± 3 mm long. *Capsules* obovoid-ellipsoid, 20–25 mm long, acute or obtuse. *Seeds* ovate, 6–7 × ± 4 mm long, broadly and evenly winged, seed body often dark brown. *Flowering time*: mid-August to late September, occasionally in October.

Distribution and ecology: extending along the coastal forelands south of the Langeberg–Outeniqua Mtns in South Africa, from Suurbraak to Mossel Bay and in the Little Karoo in Western Cape, and then further east from the Baviaanskloof and Van Stadens River Mtns to East London in Eastern Cape; on stony clay flats in grassy renosterveld shrubland.

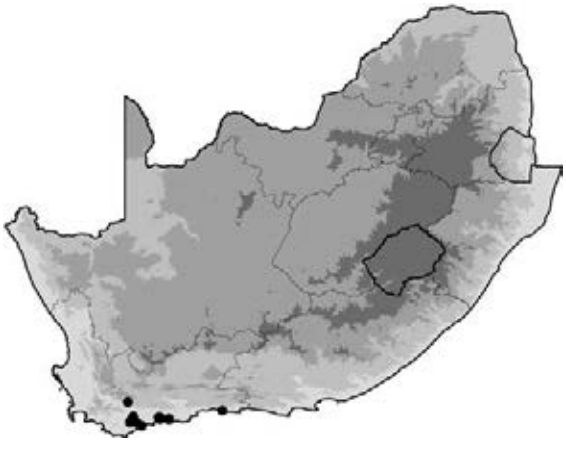
Diagnosis: recognised by the rather triangular, white to pale pink flowers, the outer whorl of tepals lanceolate-attenuate and much larger than the inner whorl (including the dorsal tepal), and the lower lateral tepals narrowly involute with a broad greenish yellow band. The slender stolons are characteristic of several species in the series.

88. **Gladiolus vandermerwei** *(L.Bolus) Goldblatt & M.P.de Vos* in Adansonia 11: 421 (1990). *Antholyza vandermerwei* L.Bolus: 14 (1931a). *Homoglossum vandermerwei* (L.Bolus) L.Bolus: 47 (1933a). Type: South Africa, [Western Cape], Swellendam District, cultivated in Cape Town by P. Ross Frames, 19 Sept. 1929, *Van der Merwe s.n.* (BOL [BOL 19084], holo.; BOL, K, iso.).

Plants 300–600 mm high, with cataphylls purple mottled white or cream-coloured. *Corm* globose, 8–12 mm diam., with 2 to several slender stolons; tunics papery to membranous, decaying irregularly. *Stem* flexed outward and inclined above, simple or 1- to 3-branched. *Leaves* 5 to 7 or more if stem branched, lower sheaths mottled purple and cream-coloured, lower 4 to 6 basal, reaching to ± base or shortly exceeding spike, linear to narrowly lanceolate, 2–5 mm wide, main vein lightly raised, margins not thickened, cauline leaves smaller, uppermost leaf often sheathing only near base. *Spike* usually erect, lightly flexuose, (2)3- to 8-flowered; bracts dull green to somewhat purplish, outer 35–50(–60) mm long, inner shorter, acute or apically notched. *Flowers* bright scarlet, lower 3 tepals yellow in lower ½, unscented; perianth tube 35–45 mm long, narrow and cylindric in lower 15–22 mm, gradually expanded into wider cylindric, horizontal upper part, 20–23 mm long, ± 7 × 6 mm diam.; tepals with upper 3 lanceolate, dorsal largest, 23–28 × 8–10 mm, inclined slightly above horizontal, upper laterals joined to dorsal for 2–3 mm, 20–30 × 9–11 mm, lower tepals linear, laterals spreading at right angles to tube, straight or twisted, 12–19 × 2–3 mm, lower median slightly longer. *Filaments* 35–40 mm long, extended horizontally, exserted 8–12 mm from tube; anthers 7–9 mm long, dark purple; pollen pale yellow. *Style* extended horizontally, dividing opposite upper ⅓ of anthers, branches 3–5 mm long. *Capsules* ovoid-ellipsoid, rounded, ± 20 mm long. *Seeds* irregularly ovate, ± 6 × 5 mm, evenly or unevenly winged, seed body blackish. *Flowering time*: September and October, occasionally in August.

Distribution and ecology: restricted to the lower Breede River Valley in Western Cape, South Africa, from near Bonnievale to Vermaaklikheid and Still Bay; in stony shale in renosterveld shrubland.

Diagnosis: recognised by the almost tubular, bright red flowers with elongate perianth tube 35–45 mm long, cylindric in the upper part, with ± connivent upper tepals and small, linear lower tepals. The mottled cataphylls and slender stolons are characteristic of several species in the series.



Distribution of ***Gladiolus vandermerwei***.

89. **Gladiolus cunonius** *(L.) Gaertn.*, De fructibus et seminibus plantarum 1: 31 (1788). *Antholyza cunonia* L.: 37 (1753). *Anisanthus cunonius* (L.) Sweet: 397 (1826). *Anomalesia cunonia* (L.) N.E.Br.: 271 (1932a). *Petamenes cunonia* (L.) E.Phillips: 44 (1941). *Gladiolus papilionaceus* Salisb.: 41 (1796), illegitimate superfluous name for *G. cunonius* L. Type: South Africa, without precise locality or collector, illustration in Cuno (1750).

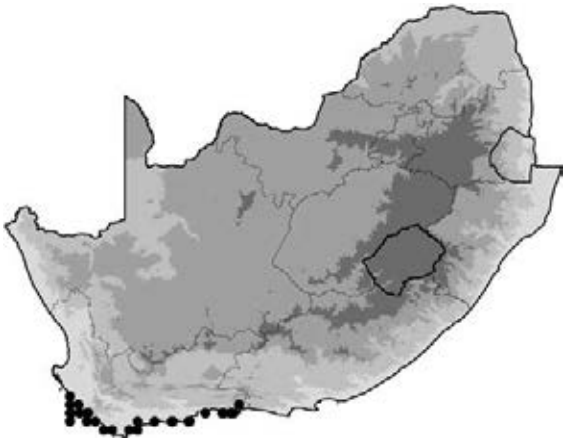
Cunonia antholyza Mill. (1768). Type: South Africa, Western Cape, without precise locality, figure in Miller, Figures of Plants 75: t. 113 (1756).

?*Antholyza coccinea* Spreng.: 253 (1820). Type: unknown.

Plants (120–)300–700 mm high. *Corm* depressed-globose, 6–9 mm diam.; tunics papery to membranous, rapidly decaying and fragmenting irregularly, with numerous slender stolons. *Stem* erect, flexed outward above the sheaths of the cauline leaves and inclined above, simple or 1- or 2-branched. *Leaves* (5)6 to 8, mostly basal, reaching to ± base of spike or shortly exceeding it, narrowly lanceolate, 5–12 mm wide, main veins evident but not or only lightly thickened, cauline leaves smaller, uppermost leaf usually sheathing only near base. *Spike* inclined, lightly flexuose, (3)5- to 8-flowered; bracts soft-textured, green to greyish purple, 20–35(–45) mm long, inner shorter, acute or notched. *Flowers* bright red, lower tepals and tube initially green fading to yellow and later turning reddish, unscented; perianth tube 12–15 mm long, slender below for 10–12 mm, abruptly expanded into short, ± cylindric upper part; tepals with dorsal spathulate, 26–29 mm long, extended horizontally, with a linear claw 10–13 mm long, limb obovate-concave, 13–18 × 11 mm, upper laterals joined to dorsal for 8–12 mm, free part directed forward and upward, ovate-concave, 10–13 × 8 mm, lower tepals united for ± 2 mm, much reduced, free parts 1–4 mm long, lower laterals curving upward distally to partially block mouth of tube. *Filaments* ± 30 mm long, exserted ± 27 mm from tube, median filament with enlarged flattened horny tooth at base in front thus dividing tube in half; anthers 5–7 mm long, attached to filaments near middle with thecae free below filament insertion, red; pollen yellow. *Style* extended horizontally over stamens, dividing shortly below anthers, branches 7–8 mm long, conduplicate, expanded and stigmatic only at apices. *Capsules* oblong-ellipsoid and 3-sided, 27–32 mm long. *Seeds* ovate to oblong, 7–8 × ± 5 mm, broadly and evenly winged. *Flowering time*: September to mid-November.

Distribution and ecology: extending from Blaauwberg just north of Cape Town to Knysna in Western Cape, South Africa; on dunes in sand or calcareous soils, sometimes just above the beach, in clearings and along the margins of coastal bush.

Diagnosis: distinctive in its scarlet flowers with spathulate-concave dorsal tepal flanked by suberect, ear-like lateral tepals, and highly reduced, scale-like lower tepals

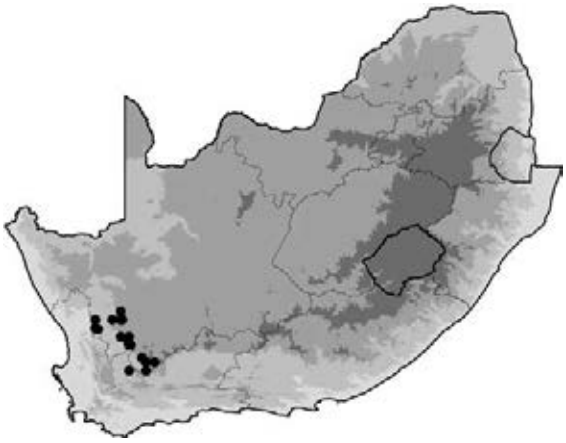


Distribution of ***Gladiolus cunonius***.

flexed upward to form a small cup-like structure enclosing a tooth-like projection at the base of the median filament. Allied to and allopatric with *Gladiolus splendens* and *G. saccatus*, all sharing similar, bright red, highly bilabiate flowers with an enlarged, spathulate upper tepal partially adnate to the upper lateral tepals and reduced lower tepals with a thickened tooth or crest at the base of the median filament, ± versatile anthers, and involute style branches. All three are pollinated by sunbirds.

90. **Gladiolus splendens** *(Sweet) Herb.* in Edwards's Botanical Register 29 (Misc.): 46 (1843). *Anisanthus splendens* Sweet: t. 84 (1830b). *Antholyza splendens* (Sweet) Steud.: 106 (1840). *Anomalesia splendens* (Sweet) N.E.Br.: 271 (1932a). *Petamenes splendens* (Sweet) E.Phillips: 44 (1941). Type: South Africa, without precise locality or collector, illustration in Sweet: t. 84 (1830b).

Plants 0.5–1.1 m high, with cataphylls purple mottled with white. *Corm* globose, 15–22 mm diam., with 2 to several slender stolons from base; tunics papery to membranous, fragmenting irregularly. *Stem* erect, usually 1- or 2-branched, sometimes purplish. *Leaves* 5 to 7, lower 4 to 6 basal, reaching to base of spike, narrowly lanceolate to nearly linear, 4–9 mm wide, main and sometimes one other vein lightly raised, margins not thickened, cauline leaves smaller, often sheathing only near base. *Spike* usually erect, lightly flexuose, flowers in 2 ranks, (6)8- to 14-flowered; bracts usually purplish, outer 18–35 mm long, inner slightly shorter, acute or notched. *Flowers* bright scarlet, lower tepals and tube initially green or lower median tepal sometimes red distally, becoming red throughout on fading, unscented; perianth tube 16–18 mm long, narrow and cylindric in lower 8–9 mm, abruptly expanded into wider urn-shaped upper part ± 9 mm long; tepals with dorsal largest, spathulate, extended horizontally, 28–34 mm long, narrow lower part claw-like, 10–14 mm long, limb ovate-concave, 18–20 mm long, upper laterals joined to dorsal for 5–8 mm, free part ovate-concave, 16–17 × 10–12 mm, lower lateral tepals reduced, 4–6 × 1.5 mm,



Distribution of ***Gladiolus splendens***.

joined to upper lateral for ± 3 mm, free parts directed forward, lower flexed downward at right angles to tube, boat-shaped, 8–11 × ± 6 mm. *Filaments* 33–36 mm long, extended horizontally, exserted 25–29 mm from tube, median filament with enlarged flattened horny tooth at base in front thus dividing tube in half; anthers 5.5–8.0 mm long, attached to filaments near middle with thecae free below, red; pollen yellow. *Style* extended horizontally over stamens, dividing ± 5 mm below anthers, 9–10 mm long, conduplicate, expanded and stigmatic only at tips. *Capsules* ellipsoid to obovoid, 18–20 mm long, acute or ± truncate to retuse. *Seeds* ovate, 6–7 × 4–5, broadly and evenly winged. *Flowering time*: mainly October to mid-November, occasionally in September.

Distribution and ecology: restricted to the southwestern interior escarpment of Northern Cape, South Africa, from near Nieuwoudtville, the Hantamsberg at Calvinia along the Roggeveld Escarpment to the Moordenaars Karoo near Laingsburg; along seasonal streams and rivers or on damp rocky slopes in renosterveld and karroid shrubland.

Diagnosis: distinctive in its scarlet flowers with spathulate-concave dorsal tepal flanked by suberect, ear-like lateral tepals, the lower lateral tepals reduced and scale-like and the lower median boat-shaped and deflexed above the short, cup-like upper portion of the perianth tube enclosing a tooth-like projection at the base of the median filament.

Allied to and allopatric with *Gladiolus cunonius* and *G. saccatus*, the group sharing similar, bright red, highly bilabiate flowers with an enlarged, spathulate upper tepal partially adnate to the upper lateral tepals and reduced lower tepals with a thickened tooth or crest at the base of the median filament, ± versatile anthers, and involute style branches.

91. **Gladiolus saccatus** *(Klatt) Goldblatt & M.P.de Vos* in Adansonia 11: 424 (1990). *Anisanthus saccatus* Klatt: 300 (1867a). *Antholyza saccata* (Klatt) Baker: 180 (1877). *Kentrosiphon saccatus* (Klatt) N.E.Br.: 271 (1932a). *Petamenes saccata* (Klatt) E.Phillips: 44 (1941). *Anomalesia saccata* (Klatt) Goldblatt: 443 (1971). Type: South Africa, [Western Cape], near Hol River, Mierenkasteel, 5 Aug. 1830, *Drège 2646a* (K, P, syn.).

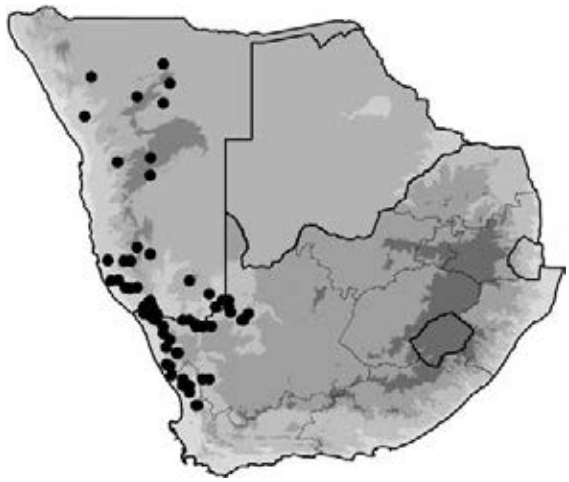
Antholyza steingroeveri Pax: 156 (1892). *Kentrosiphon steingroeveri* (Pax) N.E.Br.: 272 (1932a). *Petamenes steingroeveri* (Pax) E.Phillips: 44 (1941). *K. saccatus* subsp. *steingroeveri* (Pax) Oberm.: t. 1354 (1961). *Gladiolus saccatus* subsp. *steingroeveri* (Pax) Goldblatt & M.P.de Vos: 424 (1990). Type: Namibia, Halenberg, 29 Aug. 1929, *Dinter 6618* (K, syn.).

Antholyza duftii Schinz: 13 (1900). *Kentrosiphon duftii* (Schinz) N.E.Br.: 272 (1932a). *Petamenes duftii* (Schinz) E.Phillips: 44 (1941). Type: Namibia, near Rietfontein, Apr. 1899, *Duft 67* (Z, ?holo.).

Kentrosiphon propinquus N.E.Br.: 272 (1932a). *Petamenes propinqua* (N.E.Br.) E.Phillips: 44 (1941). Type: South Africa, [Western Cape], Knersvlakte, 600 ft [180 m], 16 July 1896, *Schlechter 8163* (K, holo.).

Kentrosiphon gracilis N.E.Br.: 272 (1932a). *Petamenes gracilis* (N.E.Br.) E.Phillips: 44 (1941). Type: Namibia, Otjiwarongo, stony koppie, 5 May 1929, *Bradfield 560* (K, holo.; PRE, iso.).

Plants (0.3–)0.4–0.6(–1.2) m high, with cataphylls purple mottled with white. *Corm* globose to conic, 12–15 mm diam., with large cormlets on short stolons; tunics papery, fragmenting irregularly or becoming ± fibrous. *Stem* flexed at each of upper nodes, inclined above, dark purplish green or purple, 2- or 3(6)-branched. *Leaves* 5 or 6(7), lower 3 basal, reaching to ± upper part of stem or rarely to base of spike, narrowly lanceolate, ± plane or lightly pleated, 3–15 mm wide, main and usually one other vein well developed, margins not thickened, cauline leaves shorter, diverging from stem, not or hardly sheathing. *Spike* inclined, 8- to 12(15)-flowered in 2 ranks; bracts ± succulent, purple-brown, outer 20–35(–42) mm long, inner shorter to ± as long. *Flowers* bright red, lower 3 tepals and spur green at anthesis becoming yellow to orange later, unscented; perianth tube 11–20 mm long, slender and cylindric in lower 6–12 mm, abruptly expanded into wider upper part, 5–8 mm long, with a sac-like spur 2–6 mm long at lower base; tepals markedly unequal, dorsal spathulate, extending horizontally, 30–45 mm long, claw 12–16 mm long, limb obovate-concave, 18–26 × 10–15 mm, upper laterals joined to dorsal for ± 5 mm, linear, free part 2–5 × 2–3 mm, lower tepals reduced, lower lateral tepals joined to upper laterals on one side, and together for ± 4 mm, free parts 1.5–3.0 mm long, lower median ± 1.5 mm long. *Filaments* 31–42 mm long, median filament with enlarged flattened horny crest at base in front projecting into spur thus dividing it in half; anthers 8–10 mm long, attached to filaments near middle with thecae free below, bright red; pollen yellow. *Style* arching over stamens,



Distribution of ***Gladiolus saccatus***.

dividing 2–3 mm below anthers, branches ± 10 mm long, conduplicate, expanded and stigmatic only at tips. *Capsules* ovoid, acute, (20–)25–30 mm long. *Seeds* ovate to oblong, 7–11 × 4.5–5.5 mm, broadly and sometimes unevenly winged, seed body blackish. *Flowering time*: in the winter-rainfall region July to mid-August, rarely later, occasionally in May when the first rains are early; in the summer-rainfall region mostly March to May.

Distribution and ecology: widespread through western southern Africa, from northern Namibia through the Richtersveld and Namaqualand in Northern Cape, South Africa to Vanrhynsdorp in Western Cape, and inland along the Orange River to Pofadder and Kakamas; on stony slopes and rock outcrops, often along drainage lines.

Diagnosis: distinctive in its scarlet flowers with only the dorsal tepal well developed and spathulate-concave, the remaining tepals reduced and scale-like. The upper portion of the perianth tube forms a sac-like spur enclosing a tooth-like crest at the base of the median filament. Allied to *Gladiolus cunonius* and *G. splendens,* all sharing similar, bright red, highly bilabiate flowers with an enlarged, spathulate upper tepal partially adnate to the upper lateral tepals and reduced lower tepals with a thickened tooth or crest at the base of the median filament, ± versatile anthers, and involute style branches.

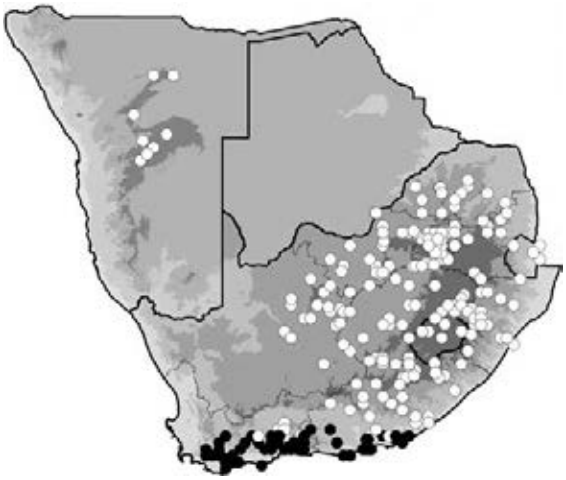
Ser. **Permeabili** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus permeabilis* D.Delaroche

Plants mainly from winter-rainfall region, usually slender. *Corm* tunics papery to fibrous. *Leaves* usually green at flowering, linear to lanceolate, plane, firm or soft-textured. *Spike* usually suberect, sometimes nodding in bud. *Flowers* small to medium, zygomorphic or actinomorphic, perianth tube long or short, usually scented. *Capsules* ellipsoid.

92. **Gladiolus permeabilis** *D.Delaroche,* Descriptiones plantarum aliquot novarum: 27, fig. 2 (1766). Type: South Africa, without precise locality or collector, cultivated in Holland (L 904,137: Herb. D. van Royen 45, lecto., designated by Goldblatt & Manning: 200 (1998) [photos at NBG, PRE]).

Plants 150–600 mm high. *Corm* globose to conic, 8–12 mm diam.; tunics medium to coarsely fibrous. *Stem* usually erect, flexed outward above sheath of third leaf, simple or 1- or 2(4)-branched. *Leaves* usually 4 to 7, more in highly branched plants, lower 4 to 6 basal in loose fan, usually reaching at least to middle or shortly exceeding spike, linear or subsucculent and oval in section, 1.0–2.0(–3.5) mm wide, rigid, central area moderately thickened, margins sometimes lightly thickened, cauline leaves shorter, often without blade, upper either sheathing below or diverging from base. *Spike* inclined, lightly flexuose, 4- to 8-flowered; bracts pale greyish green sometimes flushed purplish, often dry and pale near apices, outer (7–)12–18(–24) mm long, inner shorter to almost as long, acute or minutely forked. *Flowers* whitish to greenish cream-coloured, dull blue-grey, dull purple, or yellow-brown, upper tepals or at least upper laterals each with brown to purplish longitudinal median stripe, lower tepals and throat streaked reddish to purplish, limbs usually yellow in lower ½ often edged distally with darker colour, often strongly sweet-scented or scentless; perianth tube obliquely funnel-shaped, 9–13(–15) mm long, slender lower part 7–10 mm long; tepals narrowed below into claws and ± spade-shaped, attenuate, sometimes extremely so, dorsal largest, (16–)20–33 × 10–15 mm, inclined over stamens, spreading distally, upper laterals arching outward distally, 16–23 × 7–8 mm, windowed between bases of dorsal and upper lateral tepals, lower 3 tepals joined to upper laterals for 2–5 mm and together for 3–6 mm with small thickened knobs at sinuses, free parts 14–16 × 6–8 mm, narrowed below into claws 2–4 mm long, abruptly flexed downward into a broader limb. *Filaments* 12–16 mm long, exserted 8–13 mm from tube; anthers 5–9 mm long, dull cream-coloured to grey-purple; pollen whitish. *Style* arching over stamens, dividing between base and apex of anthers, branches 1.5–4.0 mm long. *Capsules* ovoid-ellipsoid, (6–)9–16 × 5–6 mm. *Seeds* oval, 4–6 × 3–4 mm, broadly and sometimes unevenly winged. *Flowering time*: mainly mid-August to early October in Western Cape and Eastern Cape, October to February in the rest of southern and southern tropical Africa, including Botswana, Namibia and Zimbabwe.

Distribution and ecology: widespread across southern and south tropical Africa, extending from the Caledon District in Western Cape, South Africa into Eastern Cape and through eastern interior South Africa, Lesotho, Eswatini and eastern Botswana and Namibia to Zimbabwe but absent from the Atlantic Coast and arid western interior of South Africa; in stony grassland and open, grassy shrubland.



Distribution of ***Gladiolus permeabilis*** subsp. ***permeabilis***, ●; subsp. ***edulis***, ○.

Diagnosis: recognised by the narrow leaves and small, short-tubed, usually dull-coloured flowers with a wide gap or window between the bases of the dorsal and upper lateral tepals when viewed in profile. The corm tunics are finely fibrous and the capsules are ovoid-ellipsoid. Similar flowers with longer tubes 22–35 mm long, distinguish *Gladiolus uitenhagensis* and *G. sekukuniensis*. In the extreme west of the range it can be confused with *G. scullyi* which has woody, clawed corm tunics and obovoid, retuse capsules.

Key to subspecies

1a Tepals long-attenuate; flowers white or cream-coloured to grey, scented or not; plants mainly east and north of Port Elizabeth . . . . . .92a. subsp. *edulis*

1b Tepals acute or barely attenuate; flowers often purple, mauve or greenish brown, sweetly scented; plants west of Port Elizabeth . . . . 92b. subsp. *permeabilis*

92a. subsp. **edulis** *(Burch. ex Ker Gawl.) Oberm.* in Lewis et al. in Journal of South African Botany, Suppl. 10: 135 (1972). *Gladiolus edulis* Burch. ex Ker Gawl.: t. 169 (1817). Type: South Africa, [Northern Cape], Pellat Plains, *Burchell 2240* (K, holo.; B, G, iso.).

Gladiolus remotifolius Baker: 867 (1901). Type: South Africa, 'Transvaal', between 'Poster' and Trigaardsfontein, *Rehmann 6618* (Z, holo.).

Plants up to 600 mm high, often slender. *Leaves* (3)4 to 6, at least lower 2 or 3 basal, shorter or longer than stem, margins sometimes lightly thickened. *Spike* usually 4- to 8-flowered; bracts 7–12 mm long. *Flowers* whitish to cream-coloured, sometimes grey or mauve, lower lateral tepals yellow in upper half, unscented or intensely sweet-scented; perianth tube 9–13(–15) mm long; tepals long-attenuate or with tailed appendages up to 11 mm long, twisted and undulate, dorsal (16–)20–25 mm long including appendages (often less when dry), lower 3 tepals joined for 1–2 mm with the upper laterals, and together for 3–5 mm, free parts 14–16 mm long, claws ± 4 × 1 mm. *Filaments* 13–15 mm long, exserted for 9–10 mm from tube; anthers 5–7 mm long. *Style* dividing between base and upper ⅓ of anthers, branches 1.5–2.0 mm long. *Capsules* nearly globose to obovoid, 6–10 mm long. *Flowering time*: mostly February to April, occasionally at other times.

Distribution and ecology: widespread through the summer-rainfall southern Africa extending as far south as Oudtshoorn, also in Zimbabwe.

Diagnosis: sometimes taller than subsp. *permeabilis* and distinguished by the mostly paler flowers with long-attenuate or tailed tepals. *Gladiolus sekukuniensis* has similar flowers but with a longer perianth tube, 22–35 mm long.

92b. subsp. **permeabilis**

[*Hebea zeyheri* Eckl.: 42 (1827), invalid name without description.]

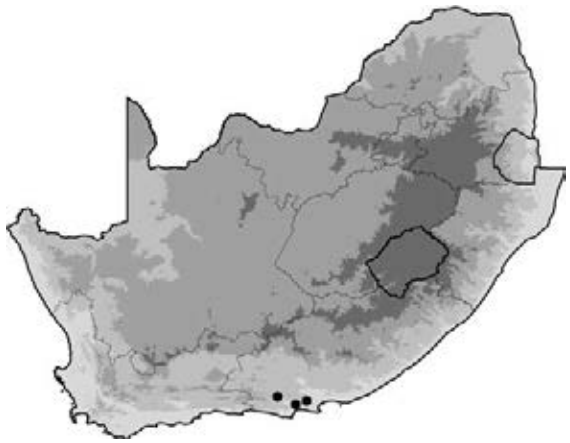
Plants 150–450 mm high. *Leaves* 5 to 7 (rarely more), usually shorter than stem, margins usually not thickened. *Spike* 5- to 8-flowered; outer bracts 15–24 mm long, inner shorter. *Flowers* dull blue-grey, dull purple, or yellow-brown, lower tepals and throat streaked reddish to purplish, limbs usually yellow in lower ½ often edged distally with darker colour, often strongly sweet-scented, occasionally unscented; perianth tube 10–13(–15) mm long; tepals spade-shaped, dorsal 28–35 × 10–15 mm, lower 3 tepals united with upper laterals for 3–5 mm and together for 2–6 mm, free parts 15–23 × 6–8 mm, claws 2–3 mm long. *Filaments* 12–16 mm long, exserted 8–13 mm from tube; anthers 6.5–9.0 mm long. *Style* dividing shortly below anther apices, branches ± 3–4 mm long. *Capsules* ovoid and obtuse or ellipsoid and acute, (12–)14–16 mm long. *Flowering time*: late August and September.

Distribution and ecology: restricted to the southern coastal plain from Caledon in Western Cape to Alexandria and Grahamstown in Eastern Cape.

Diagnosis: often shorter than subsp. *edulis* and distinguished by the mostly darker flowers with acute or very shortly attenuate tepals. *Gladiolus uitenhagensis* has very similar flowers, pale in colour with a longer perianth tube, 22–35 mm long.

93. **Gladiolus uitenhagensis** *Goldblatt & Vlok* in South African Journal of Botany 55: 263 (1989). Type: South Africa, [Eastern Cape], Uitenhage District, Groendal State Forest, track along Ten Stop Hill, 12 Sept. 1983, *Vlok 702* (NBG, holo.; MO, iso.).

Plants 350–600 mm high, with dry brown cataphylls. *Corm* 15–20 mm diam.; tunics of coarse, blackish fibres. *Stem* erect or inclined above, usually unbranched. *Leaves* 7 or 8, lower 4 or 5 basal, reaching to ± base of spike or



Distribution of ***Gladiolus uitenhagensis***.

sometimes slightly beyond, terete or oval in section, 1.5–2.0 mm wide, when dry main vein appearing strongly thickened, margins barely if at all raised, cauline leaves smaller, uppermost small and largely sheathing. *Spike* inclined, slightly flexuose, 5- to 11-flowered; bracts grey-green, soft-textured, becoming dry and brown above, outer 15–20 mm long, inner slightly shorter, shallowly notched. *Flowers* pale mauve to drab white, lower tepals with yellow spear-shaped mark outlined in purple in midline, not scented; perianth tube obliquely funnel-shaped, (22–)28–35 mm long, well exserted from bracts, lower cylindric part ± 20 mm long; tepals lanceolate, dorsal largest, inclined over stamens, 28–32 × ± 15 mm, upper laterals ± 19 × 8–12 mm, windowed between bases of dorsal and upper lateral tepals, lower 3 tepals joined to upper laterals for 2–3 and together for 3–6 mm, 18–20 × 4–8 mm. *Filaments* ± 15 mm long, exserted 8–10 mm from tube; anthers ± 8 mm long, yellow or purple; pollen creamy yellow. *Style* arching over stamens, dividing near apex of anthers, branches ± 2.5 mm long, *Capsules* and *seeds* unknown. *Flowering time*: September.

Distribution and ecology: from the Baviaanskloof Mtns near Hankey to the eastern Great Winterhoek Mtns in Groendal State Forest in Eastern Cape, South Africa; on stony sandstone slopes, flowering mainly after fire.

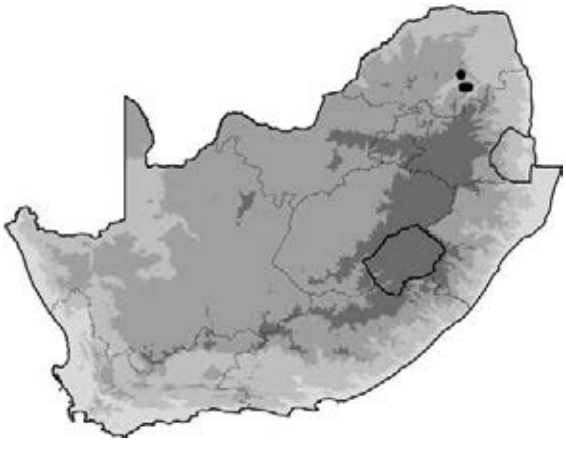
Diagnosis: a poorly collected taxon resembling *Gladiolus permeabilis* subsp. *permeabilis* in the form of the flower but with a larger dorsal tepal 28–32 × 15 mm and longer perianth tube (22–)28–35 mm long. The habitat on sandstone in fynbos, flowering after fire, also differs.

94. **Gladiolus sekukuniensis** *P.J.D.Winter* in Manning et al. in Bothalia 29: 220 (1999). Type: South Africa, Limpopo, Haenertsburg District, Sekhukhuneland, Leolo Mtns, foothills, Farm Dsjate 249 KT, 800 m E of Motse River, 3 Apr. 1999, *Winter 3283* (NBG, holo.; K, MO, PRE, UNIN, iso.).

Plants 600–1 100 mm high. *Corm* globose to conic, 8–12 mm diam., with slender stolons with scattered scales; tunics of fine to medium fibres. *Stem* erect, flexed outward above sheath of fourth leaf, simple or branched. *Leaves* usually 5 to 7, sometimes more, lower 3 or 4 basal, usually reaching to base of spike or exceeding it, linear, (1–)2–4 mm wide, rigid, main vein thickened and raised, margins sometimes lightly thickened, cauline leaves shorter, uppermost mostly sheathing. *Spike* inclined, lightly flexuose, 8- to 17-flowered; bracts pale grey-green flushed pinkish, dry and pale above, outer 18–19 mm long, inner shorter to ± as long, acute or shortly notched. *Flowers* white or cream-coloured to pale salmon-pink, tepals with narrow, dark red, longitudinal median streak, lower tepals sometimes yellow in centre of streak, unscented; perianth tube 25–35 mm long, cylindric below for 20–30 mm, curved and weakly flared in upper 5–6 mm, much exceeding bracts; tepals all narrowed below into claws and ± spade-shaped, attenuate with twisted and undulate tail-like tips, dorsal largest, inclined over stamens, spreading distally, 25–35 × 8–11 mm, upper laterals arching outward distally, 19–25 × 4.0–4.5 mm, lower 3 tepals joined to upper laterals for 2–3 mm and together for 3–4 mm, with small thickened knobs at sinuses, free parts 15–18 × 1.5 mm, narrowed below into channelled claws 3–4 mm long, abruptly flexed downward into a narrowly lanceolate limb. *Filaments* 11–12 mm long, exserted 6–8 mm from tube; anthers 5.0–6.5 mm long, dull grey-purple; pollen cream-coloured. *Style* arching over stamens, dividing opposite upper ½ of anthers, branches 1.5–2.0 mm long. *Capsules* ovoid to ellipsoid. *Seeds* unknown. *Flowering time*: March to April.

Distribution and ecology: a narrow endemic of the Strydpoortberge and nearby Leolo Mtns in Limpopo, South Africa; on rocky, dolomitic or alkaline slopes in open woodland.

Diagnosis: resembling *Gladiolus permeabilis* subsp. *edulis* in the habit and in the form of the flowers, but distinguished by the much longer perianth tube, 25–35 mm long and red streaks on the tepals. The scaly suckers produced by the corms are also distinctive and not present in *G. permeabilis*.



Distribution of ***Gladiolus sekukuniensis***.

95. **Gladiolus karooicus** *Goldblatt & J.C.Manning* in Bothalia 39: 39 (2009). Type: South Africa, Northern Cape, Klein Roggeveld, Komsberg Pass, along seasonal stream in damp gully, in shaly gravel, 8 September 2006, *Goldblatt & Porter 12804* (NBG, holo.; K, MO, PRE, iso.).

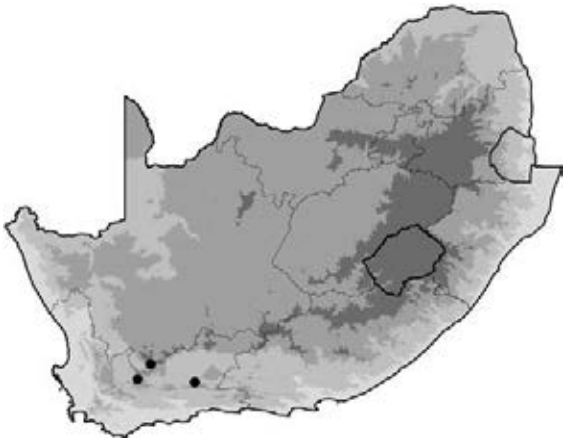
Plants 150–500 mm high. *Corm* conic-globose, 15 mm diam.; tunics papery, decaying into fine to medium-textured fibres. *Stem* suberect or inclined, flexed outward above sheath of third leaf, simple or with 1 or 2 branches. *Leaves* usually 4, more when branched, lower 2 basal, reaching to base shortly exceeding spike, linear, ± 2 mm wide, firm-textured, slightly twisted, main vein moderately thickened, margins not thickened, cauline leaves short and largely sheathing. *Spike* inclined, ± flexuose, 2- to 5-flowered; bracts grey-green sometimes flushed grey-purple, often dry and pale near tips, outer 20–25 mm long, inner shorter to ± as long, acute. *Flowers* yellow, dorsal and upper laterals flushed and veined grey-purple on reverse, lower laterals deep yellow in lower half turning dull purple on fading, violet-scented; perianth tube subcylindric, slightly wider near apex, ± 12 mm long; tepals lanceolate, all narrowed below into claws, dorsal largest, ± 25 × 10 mm, arched and hooded over stamens, spreading apically, upper laterals erect, arching over dorsal tepal with upper margins often contiguous, ± 25 × 7 mm, windowed between lower halves of dorsal and upper lateral tepals, lower 3 tepals joined to upper laterals for ± 2 mm and together for ± 3 mm, lower laterals with erect claws ± 1.5 mm long, limbs horizontal, ± 12 × 4 mm, expanded distally, lower margins half involute and forming a tube, extending backward as auricles, lower median ± 15 × 8 mm long. *Filaments* arched under dorsal tepal, ± 15 mm long, exserted 10 mm from tube; anthers ± 8 mm long, light purple; pollen creamy white. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches ± 2.5 mm long. *Capsules* obovoid to ellipsoid, obtuse, 15–20 mm long. *Seeds* ovate, 5–7 × 4–5 mm, broadly winged. *Flowering time*: mid-August to mid-September.

Distribution and ecology: known from a few localities in the semi-arid Klein Roggeveld in Northern Cape, South Africa and the northern foothills of the Witteberg in Western Cape; in damp gullies and along seasonal streams in shale soils in karroid shrubland.

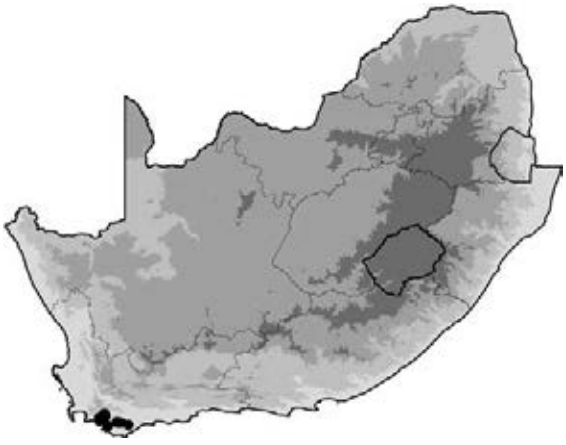
Diagnosis: recognised by its bright yellow, strongly windowed flowers with suberect upper lateral tepals and sharply deflexed lower tepals, the lower laterals strongly involute and auriculate at the base of the limb. The corm tunics are relatively soft-textured or papery. *Gladiolus venustus* has similar, mostly purple or pink flowers with yellow markings but woody corm tunics and obovoid-retuse capsules.

96. **Gladiolus acuminatus** *F.Bolus* in Annals of the Bolus Herbarium 2: 100 (1917). Type: South Africa, [Western Cape], without precise locality or collector, Caledon Wild Flower Show, Sept. 1916 (BOL [BOL 14793], lecto., designated by Goldblatt & Manning: 203 (1998); BM, BOL, G, K, PRE, SAM, Z, isolecto.).

Plants 250–500 mm high. *Corm* globose, 12–15 mm diam., often with short stolons 10–20 mm long; tunics papery, becoming finely fibrous. *Stem* erect below, flexed outward above sheaths of cauline leaves and inclined above, simple or occasionally branched. *Leaves* 5 or 6, or more when branched, lower 3 or 4 basal, reaching middle of stem or higher, linear, 0.8–1.5 mm wide, main vein somewhat thickened, tapering toward margins, cauline leaves usually channelled throughout, sheaths of all leaves open. *Spike* inclined or erect, ± straight, 3- to 10-flowered; bracts pale green, outer (13–)14–25(–35) mm long, acute to attenuate, inner shorter, entire or notched apically. *Flowers* cream-coloured to pale yellow or pale greenish, tepals often flushed brown to dull purple on reverse, especially outer, lightly sweet-scented; perianth tube 16–22(–30) mm long, cylindric, upper half curving outward and slightly wider; tepals lanceolate-acuminate, margins undulate, recurved distally, apices lightly twisted, dorsal slightly larger, 15–21 × 8–10 mm, remaining tepals 12–18 × 6–8 mm. *Filaments* 6–10 mm long,



Distribution of ***Gladiolus karooicus***.



Distribution of ***Gladiolus acuminatus***.

reaching to top of tube or exserted up to 2 mm; anthers 4–6 mm long, included in flower, white; pollen white. *Style* arched over stamens, dividing near anther apices, branches ± 3.5 mm long. *Capsules* ellipsoid, acute, 10–15 mm long. *Seeds* round to ovate, 3–4 mm diam. *Flowering time*: mid-August to late September.

Distribution and ecology: a rare endemic of the Overberg in Western Cape, South Africa, between Onrus and Bredasdorp; on damp shale slopes in renosterveld.

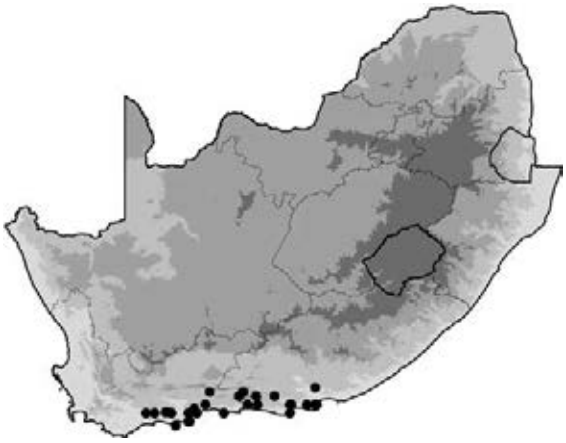
Diagnosis: distinctive in its small, tubular, pale greenish to white or yellowish flowers with strongly recurved tepals with tapering acuminate tips. The perianth tube 16–30 mm long is relatively long for so small a flower. The anthers are barely exserted from the perianth tube.

97. **Gladiolus stellatus** *G.J.Lewis* in Botaniska Notiser 119: 295 (1966), replacement name for *G. elongatus* Thunb.: 185 (1800), illegitimate homonym, not *G. elongatus* Salisb. (1796). Type: South Africa, [Western Cape], without precise locality, probably Oct. or Nov. 1772 or 1773, *Thunberg s.n.* (UPS-THUNB 1020, holo.; K, photo).

Geissorhiza patersoniae L.Bolus: 132 (1915). Type: South Africa, [Eastern Cape], Port Elizabeth District, Redhouse, Sept. 1912, *Paterson 47* (BOL, lecto., designated by Goldblatt & Manning: 204 (1998); GRA, K, isolecto.).

Plants 300–600 mm high. *Corm* globose, 9–15 mm diam., often with stolons from base; tunics of fine to fairly coarse fibres. *Stem* ± erect, inclined above sheath of uppermost basal leaf, usually with 1 or 2 branches. *Leaves* (4)6 to 9, lower 2 to 7 basal, shorter or slightly longer than stem, linear, (1–)2–3 mm wide, oval in section, margins not raised, cauline leaves shorter, usually entirely channelled. *Spike* slightly inclined, weakly secund, 5–12(–15)-flowered; bracts pale green, often becoming dry and light brown above, outer 10–15 mm long, inner slightly shorter. *Flowers* actinomorphic, star-like, white to cream-coloured or pale lilac, tepals with obscure narrow brown or purple median streak, reverse of tepals usually lightly feathered with greenish to brownish purple, intensely sweetly scented; perianth tube funnel-shaped, 5–7 mm long, included or shortly exserted from bracts; tepals subequal, spreading, elliptic, 14–20 × 5–8 mm. *Filaments* 5–7 mm long, exserted 3–4 mm from tube, parallel and contiguous; anthers (4–)5–6(–7) mm long, erect or diverging; pale yellow; pollen yellow. *Style* central, enclosed by filaments, dividing between base and upper ⅓ of anthers, branches 4–5 mm long. *Capsules* elongate-ellipsoid to oblong, 12–17 × 5 mm. *Seeds* ovate, ± 6 × 4 mm, broadly and evenly winged. *Flowering time*: mid-August to late October, occasionally in November; flowers opening ± 7:00 and closing 11:45 to 12:15.

Distribution and ecology: widespread along the southern coastal regions of South Africa, from just east of Swellendam in Western Cape to Bethelsdorp in Eastern Cape, extending inland in the Long Kloof; on stony ground in grassland and renosterveld shrubland, often on north-trending slopes. The flowers open only in the mornings, closing tightly at midday.



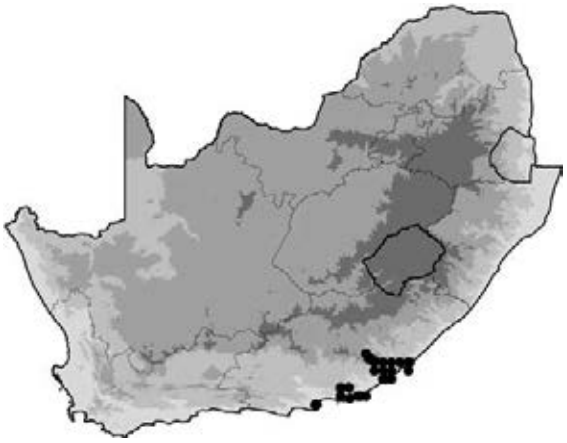
Distribution of ***Gladiolus stellatus***.

Diagnosis: distinctive in its drab white to pale lilac, radially symmetric flowers with a star-like perianth and erect, symmetrically arranged stamens and style. It is probably closely allied to *G. permeabilis* and *G. wilsonii*, both of which have bilabiate flowers with unilateral stamens.

98. **Gladiolus wilsonii** *(Baker) Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 206 (1998). *Tritonia wilsonii* Baker: 38 (1886). *G. permeabilis* subsp. *wilsonii* (Baker) G.J.Lewis in Lewis et al.: 133 (1972). Type: South Africa, [Eastern Cape], vicinity of Port Elizabeth (grown in Britain by J. Wilson of St Andrews), June 1886, *Wilson s.n.* (K, holo.).

Gladiolus fredericii L.Bolus: 368, t. A (1931c). Type: South Africa, [Eastern Cape], Grahamstown, Commonage on left of Cradock road, cult. Cape Town, Oct.–Nov. 1929, *Dyer 1682* (BOL, holo.; GRA, K, PRE, iso.).

Plants (200–)300–600 mm high. *Corm* globose, 12–22 mm diam., often with small cormlets at base; tunics of fine to fairly coarse fibres. *Stem* erect, simple or with 1(2) branches, usually flexed above sheath of uppermost leaf. *Leaves* 6 to 8, lower 3 to 5 basal, reaching ± to base or slightly exceeding spike, linear, 1–3 mm wide, elliptic in section when alive, midrib area thickened, margins rarely lightly thickened, cauline leaves progressively smaller, uppermost entirely sheathing or with vestigial blade. *Spike* inclined, lightly flexuose, 4- to 12-flowered; bracts green or flushed purple above, outer 12–16(–20) mm long, inner shorter to ± as long, notched apically. *Flowers* white to cream-coloured or yellowish, reverse of upper tepals usually flushed pink to dull purple toward tips, sometimes also on midline, sometimes lower 3 tepals each with short, pale mauve streak, often sweetly scented; perianth tube obliquely funnel-shaped, 6–13 mm long, slender cylindric part



Distribution of ***Gladiolus wilsonii***.

3–6 mm long; tepals oblanceolate, unequal, dorsal largest, 20–26(–30) × 10–13(–18) mm, hooded over stamens, upper laterals 16–20(–23) × 8–9 mm long, curving outward distally, lower 3 tepals joined to upper laterals for 1–2 mm and together for ± 2 mm, lower laterals 16–20 × 6.5–13.0 mm, lower median ± as long or slightly shorter and wider or narrower than laterals. *Filaments* 10–13 mm long, exserted 6–8 mm from tube; anthers 6–9 mm long, purple; pollen cream-coloured. *Style* arching over stamens, dividing shortly below anther apices, branches 3.5–5.0 mm long. *Capsules* ellipsoid, 10–15 mm long. *Seeds* oblong, 5–6 × ± 3 mm, broadly but somewhat unevenly winged. *Flowering time*: mainly October to mid-November, occasionally in September.

Distribution and ecology: restricted to the coastal and near inland Eastern Cape, South Africa, from Jeffrey's Bay and Cape St Francis to Engcobo; in open grassland.

Diagnosis: recognised by the basal fan of linear leaves, 1–3 mm wide, with the midrib area thickened but not the margins, and the rather closed, white to greenish flowers with short perianth tube 6–13 mm long. *Gladiolus inandensis* from higher elevations and further north has very similar flowers produced in winter and spring at which time the current season's leaves are mostly dry and withered – the fresh leaves are subsucculent and distinctly oval in section.

99. **Gladiolus inandensis** *Baker*, Handbook of the Irideae: 207 (1892). Type: South Africa, [KwaZulu-Natal], Inanda, Aug., *Wood 237* (K, lecto., designated by Lewis et al.: 133 (1972); BM, K, GRA, isolecto.).

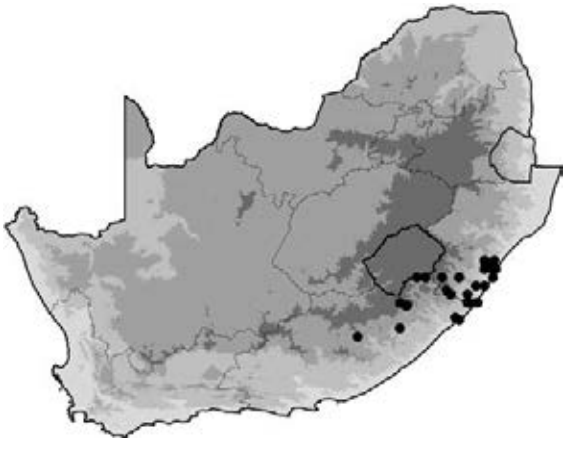
Tritonia teretifolia Baker: 194 (1892). Type: South Africa, [KwaZulu-Natal], foot of Table Mtn near Pietermaritzburg, Aug. 1840, *Krauss 430* (BM, holo.; G, K, OXF, iso.).

Gladiolus microphyllus Baker: 206 (1892). Type: South Africa, [KwaZulu-Natal], Suurberg Mtns near Kokstad, 5 500 ft [1 700 m], Oct. 1883, *Tyson 1852* (K, holo.; GRA, MO, SAM, iso.).

Gladiolus stenophyllus Baker: 282 (1897b), illegitimate homonym, not *G. stenophyllus* Schrank (1822). Type: South Africa, [Eastern Cape], Hangklip Mtn, Queenstown, Jan. 1894, *Galpin 1769* (K, holo.; BOL, GRA, PRE, iso.).

Gladiolus microsiphon Baker: 1006 (1904a). Type: South Africa, [KwaZulu-Natal], hills near Pinetown, 150 m, 12 Sept. 1893, *Schlechter 3167* (Z, probable holo.; BM, BOL, G, K, SAM, Z, iso.).

Plants 200–450 mm high, often growing in small clumps. *Corm* globose, 18–25 mm diam., usually with 1 or 2 large cormlets at base; tunics of fine, densely matted fibres. *Stem* erect or inclined, simple or with 1 branch, usually flexed above sheath of uppermost leaf. *Leaves* 4 to 6, lower 2 to 4 basal, usually ± dry at flowering (or burned and absent), reaching or exceeding spike, somewhat fleshy, oval in section when fresh but with midrib area thickened and prominent when dry, 1.5–2.0 mm diam., cauline leaves entirely sheathing or with vestigial blades; new leaves emergent at flowering, produced from separate shoots, ultimately 3 or 4 basal leaves produced in summer. *Spike* inclined, lightly flexuose, 4- to 12-flowered; bracts green, sometimes flushed purple, outer 11–16 mm long, inner shorter, notched apically. *Flowers* white to cream-coloured usually flushed pink to dull purple on reverse toward tips and sometimes also on midline, evidently without markings, unscented; perianth tube narrowly funnel-shaped, 9–12 mm long, slender cylindric part 5–8 mm long; tepals oblanceolate, unequal, dorsal largest, 22–23 × 11–15 mm, hooded over stamens, upper laterals 15–20 × 7–8 mm, curving outward distally, lower 3 tepals joined to upper laterals for 2–4 mm and together for 2–3 mm, lower laterals 14–16 × 6–7 mm, lower median 10–12 × 7 mm. *Filaments* 10–12 mm long, exserted 6–9 mm from tube; anthers 5–6 mm long, purple; pollen cream-coloured. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches ± 3.5 mm long. *Capsules* narrowly ovoid-ellipsoid, (10–)12–15 mm long. *Seeds* ovate, 6–7 × 3.5–4.5 mm, broadly and evenly winged. *Flowering time*: August to September.



Distribution of ***Gladiolus inandensis***.

Distribution and ecology: extending from Queenstown in Eastern Cape, South Africa to southern Lesotho and to just inland of Durban in KwaZulu-Natal; largely restricted to sandstone outcrops in open grassland, with flowering delayed until winter and early spring when the leaves are usually dry and withered. Emergent leaves from the coming season's growth may be visible.

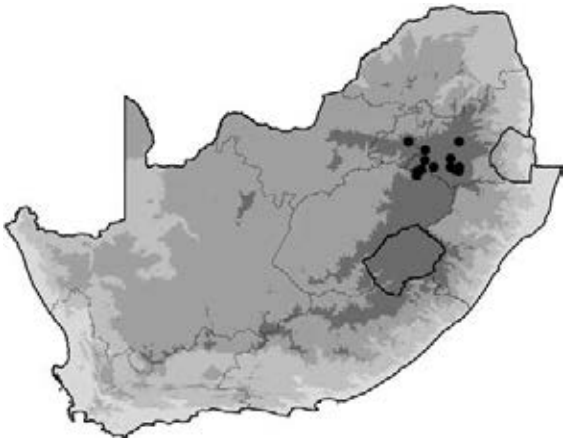
Diagnosis: an early-flowering species resembling *Gladiolus wilsonii* in the white to mauve flowers with short perianth tube 9–12 mm long but with subsucculent leaves, oval in section when fresh but largely withered at flowering.

100. **Gladiolus robertsoniae** *F.Bolus* in Journal of Botany, British and foreign 66: 13 (1928). Type: South Africa, [Free State], Frankfort, near Villiers, cult. Cape Town, *Robertson s.n.* as *BOL 15053* (BOL, lecto., designated by Lewis et al.: 181 (1972); GRA, K, isolecto.).

Plants 200–400 mm high. *Corm* globose, 14–18 mm diam.; tunics of somewhat wiry fibres. *Stem* erect, simple or with 1 branch, usually lightly flexed above sheaths of upper 2 leaves, 1.2–1.7 mm diam. below base of spike. *Leaves* 3(4), lower 2 linear to falcate, 80–160 mm long, 2–4 mm wide, main vein moderately thickened, margins lightly or not raised, cauline leaves shorter. *Spike* weakly inclined, ± straight, 4- to 8-flowered; bracts dark green sometimes flushed purple, outer 16–18 mm long, inner shorter to almost as long, notched apically. *Flowers* white or sometimes faintly flushed with violet toward tepal apices, reverse of tepal apices mauve in bud, reverse of tepals and tube becoming pale mauve on fading, lower side of throat with or without fine red lines decurrent on lower tepal bases, remaining open and carnation-scented day and night; perianth tube 28–44 mm long, straight and cylindric below, curving outward ± 6 mm below mouth and then flaring, 2.5 times as long as bracts; tepals broadly lanceolate to ovate, unequal, dorsal smallest, 18–24 × 12–16 mm, lightly inclined, broadly cordate above narrow base, upper laterals spreading gradually, 20–25 × 13–18 mm, lower 3 tepals joined to upper laterals for 4–6 mm, lower laterals 16–25 × 7.5–9.0 mm, lower median 14–22 × ± 11 mm. *Filaments* 8–9 mm long, included in upper part of tube or exserted up to 2 mm; anthers 5–9 mm long, white or light mauve; pollen yellow. *Style* arching over stamens, dividing between upper ⅓ and apex of anthers, branches 3.5–4.5 mm long. *Capsules* ± globose, 10–14 mm long. *Seeds* ovate, broadly winged, 5–6 × 3–4 mm. *Flowering time*: mostly October, occasionally to late November and rarely early December.

Distribution and ecology: scattered through the southern highveld of South Africa, from Ermelo in Mpumalanga to Frankfort and Villiers in eastern Free State; on dolerite outcrops and along drainage lines or seeps in moist grassland.

Diagnosis: recognised by the white or pale lilac flowers with long, narrow tube 28–44 mm long, with the filaments included or very shortly exserted, and ovate tepals with the dorsal smaller than the upper laterals.



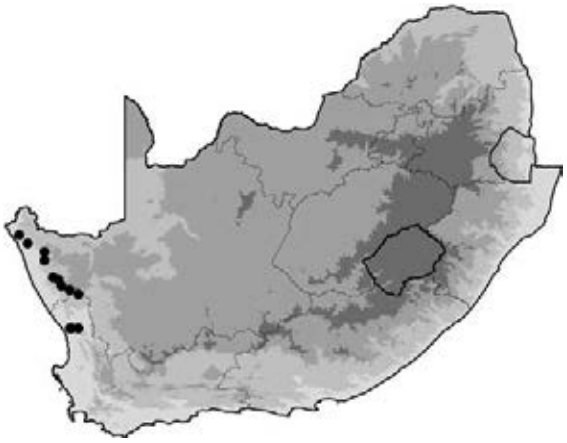
Distribution of ***Gladiolus robertsoniae***.

Ser. **Deserticola** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus deserticola* Goldblatt

Plants from winter-rainfall region, often short. *Corm* tunics usually leathery to woody and clawed, rarely papery. *Leaves* green at flowering, often falcate, plane, firm-textured. *Spike* usually strongly inclined and scalloped. *Flowers* small to medium, zygomorphic or actinomorphic; perianth tube long or short, usually scented. *Capsules* ellipsoid and obtuse or obovoid and, lobed-retuse above.

101. **Gladiolus arcuatus** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 338 (1882). Type: South Africa, [Western Cape], Mierenkasteel, 1830, *Drège 2629* (B, holo.; BM, G, P, S, iso.).

Plants (80–)120–200(–300) mm high. *Corm* depressed-globose, 12–20 mm diam.; tunics papery to dry-membranous. *Stem* erect or inclined, flexed outward above sheath of penultimate leaf, flexuose, usually simple or with a short branch. *Leaves* 5 or 6, lower 4 or 5 basal, reaching ± base of spike, narrowly lanceolate to falcate, 5–10(–12) mm wide, sheaths pubescent to velvety, main vein lightly thickened but not raised, margins and main vein pubescent, uppermost cauline leaf fairly short, diverging sharply from stem. *Spike* inclined, 4–7(9)-flowered; bracts pale green, outer (20–)25–35 mm long, inner slightly shorter but much narrower, minutely forked. *Flowers* dull greyish purple, brownish or dark purple, lower 3 tepals yellow in lower ⅔, papillose below and in throat, distal third dark purple fading to light grey-purple toward apices, tepals often partly yellowish on reverse but at least lower ½ of dorsal purple, with sweet fruity-herbal scent; perianth tube obliquely funnel-shaped, 10–15(–19) mm long; tepals with dorsal largest, arching forward, horizontal in upper ½, narrowed and ± claw-like in lower part, 26–32 mm long, claw ± 4.5 mm wide, limb ± 18 × 12–15 mm,



Distribution of ***Gladiolus arcuatus***.

upper laterals lanceolate, 25–26 × 10–12 mm, narrow and almost claw-like below, spreading in upper ⅓, windowed between bases of dorsal and upper laterals, lower tepals joined to upper laterals for 3–5 mm and together for 2–3 mm, free parts narrowed below into channelled claws 8–10 mm long, limbs lightly channelled, gently curving downward, ± 12–15 × 8–12 mm. *Filaments* 14–15 mm long, exserted ± 10 mm from tube; anthers 7–10 mm long, pale grey; pollen cream-coloured. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches 3.5–5.0 mm long. *Capsules* broadly ellipsoid, 18–25 mm long. *Seeds* 8–9 × 7 mm, obliquely saucer-shaped, usually asymmetric with seed body closer to one side. *Flowering time*: late June to early August at low elevations, late August and September at higher elevations.

Distribution and ecology: scattered through high-lying parts of Namaqualand, South Africa, from near Steinkopf in Northern Cape to the central Olifants River Valley near Trawal in Western Cape; on gravelly or silty flats in open succulent shrubland, flowering in winter or early spring.

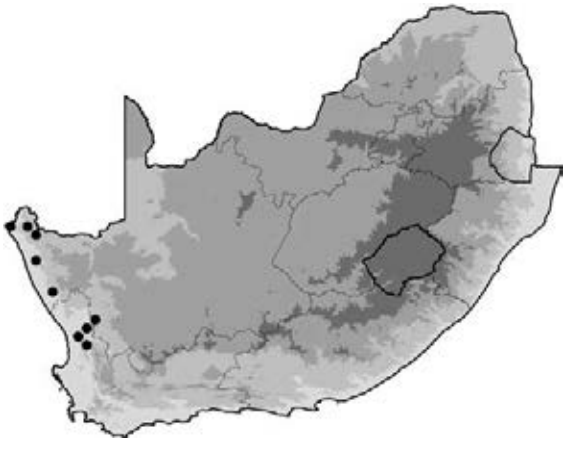
Diagnosis: distinguished from superficially similar species such as *Gladiolus scullyi* by its early flowering, softly papery or membranous corm tunics, and finely pubescent leaf sheaths and blade midrib and margins. The distinctive puberulous leaf sheaths are sometimes also encountered in *G. viridiflorus*, another winter-flowering species distinguished by its woody corm tunics, strikingly mottled cataphylls and often twisted leaves.

102. **Gladiolus viridiflorus** *G.J.Lewis* in Lewis *et* al. in Journal of South African Botany, Suppl. 10: 217 (1972). Type: South Africa, [Northern Cape], Calvinia District, between Nieuwoudtville and Kareebooms Farm, flowered at Kirstenbosch Gardens, 10 May 1963, *Lewis 6132* (NBG, holo.).

Plants 80–150(–300) mm high, with cataphylls mottled purple and white, rarely entirely purple, often puberulous. *Corm* globose to conic, 12–25 mm diam.; tunics of hard, woody layers divided into segments below or coarsely netted with claw-like ridges. *Stem* erect or slightly inclined below, flexed outward above sheath of second leaf and inclined, flexed at upper nodes, simple or with 1(2) branches, 1.3–2.0 mm diam. *Leaves* (3)4, lower 2 or 3 basal, erect to falcate, sheaths often puberulous, blades usually loosely twisted to lightly coiled, 2.7–6.0 mm wide, shorter than spike, up to 100 mm long, main vein evident but not thickened, margins not thickened, cauline leaves diverging sharply from stem. *Spike* lightly to strongly flexuose-scalloped, inclined to almost horizontal, (2)3- to 8-flowered; bracts green and slightly glaucous, outer (20–)25–40(–75) mm long, inner shorter, margins broadly transparent. *Flowers* greenish to yellowish brown with purple highlights, lower tepals with broad transverse yellow band in distal ⅓ outlined in purple and often dark near apices, strongly scented of freesia; perianth tube obliquely funnel-shaped, 12–17 mm long; tepals lanceolate, dorsal longest, 23–31 × 10–15 mm, inclined over stamens, upper lateral tepals 20–26 × 10–14 mm, narrowly windowed between dorsal and upper lateral tepals, lower tepals joined to upper laterals for 3–5 mm, and together for ± 2 mm, narrowly lanceolate, free parts 15–20 × 5–7 mm, arching downward. *Filaments* 12–15 mm long, exserted 6–8 mm from tube; anthers 6–9 mm long, greenish; pollen pale yellow. *Style* arching over stamens, dividing opposite middle of anthers, branches 3–4 mm long. *Capsules* broadly ellipsoid, acute, (12–)15–21 × ± 10 mm. *Seeds* broadly ovate, 10–12 × 8–10 mm, broadly and evenly winged. *Flowering time*: May to July.

Distribution and ecology: widespread through Namaqualand, South Africa, from near Clanwilliam in Western Cape to the Orange River near Alexander Bay in Northern Cape, and possibly extending into southern Namibia; on sandy or loamy flats in succulent karroid shrubland, flowering in winter.

Diagnosis: recognised by the purple and white mottled, often puberulous cataphylls and the relatively short, usually twisted leaves, sometimes with finely puberulous sheaths, and the hard corm tunics separating into

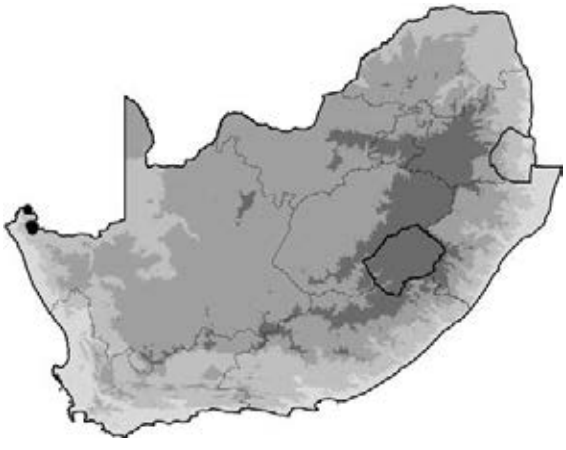


Distribution of ***Gladiolus viridiflorus***.

claws at the base. The flowers are dull green to yellowish brown with purple highlights and intensely fragrant.

103. **Gladiolus deserticola** *Goldblatt* in Journal of South African Botany 50: 457 (1984). Type: South Africa, [Northern Cape], Richtersveld, Stinkfontein Mtns, upper slopes of Cornellsberg, ridge south of beacon, ± 1 300 m, 6 Sept. 1977, *Oliver, Tölken & Venter 706* (PRE, holo.).

Plants 100–200(–270) mm high, with cataphylls purple mottled with white. *Corm* ± conic, base oblique, 6–12 mm diam.; tunics leathery becoming broken, somewhat fibrous and toothed below. *Stem* erect or inclined, erect below, sharply flexed above sheaths of leaves or above nodes when sheaths lacking, simple or with 1 or 2 branches. *Leaves* 4 (or 5 if stem with more than 1 branch), lower 2 basal and reaching to base of spike or exceeding it, linear, 1.5–2.5(–3.0) mm wide, usually twisted, erect or becoming trailing, main vein raised, second leaf sheathing lower ½ of stem, cauline leaves progressively shorter above, upper 1 or 2 not sheathing, diverging from stem. *Spike* flexed at base, usually inclined to horizontal, strongly flexuose-scalloped, 4- to 6-flowered; bracts green or brownish green, outer 12–20 mm long, inner slightly shorter, minutely forked. *Flowers* nearly actinomorphic but nectar guides only on lower tepals and stamens often unilateral, dark blue with lower lateral tepals or sometimes all 3 lower tepals cream-coloured in basal ⅓ edged with purple distally, weakly rose-scented; perianth tube narrowly funnel-shaped, ± 11 mm long, wider upper part only ± 1.5 mm long; tepals subequal, lanceolate, dorsal slightly longer and narrowed below, 14–21 × 4–5 mm, straight and usually upright, remaining tepals spreading from shortly above bases, 12–18 × 3.5–4.5 mm. *Filaments* symmetrical or unilateral, 6–9 mm long, exserted ± 4 mm from tube; anthers 4–5 mm long, pale yellow; pollen pale yellow. *Style* ± central, only slightly arcuate, dividing between middle and apex of anthers, branches ± 4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-August to mid-September, later at higher elevations.



Distribution of ***Gladiolus deserticola***.

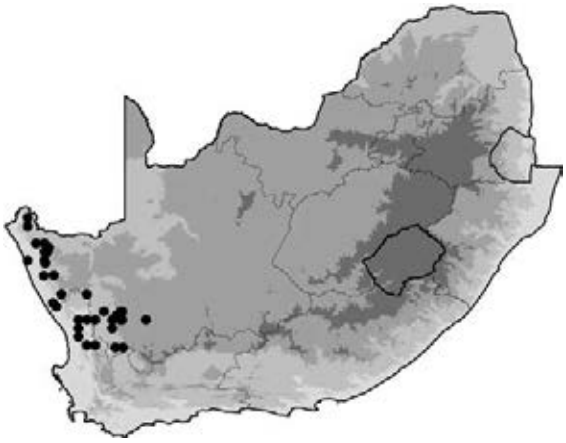
Distribution and ecology: a narrow endemic of the Richtersveld in Northern Cape, South Africa, on the Stinkfontein Mtns and the Vandersterrberg; on cooler south-facing slopes in the lee of rocks or under shrubs, often along drainage lines.

Diagnosis: unmistakable in the almost regular, dark blue flowers on a scalloped, nearly horizontal spike, purple and white spotted upper cataphyll, and coarsely fibrous corm tunics. The lower lateral or all lower tepals are creamy white in the lower third.

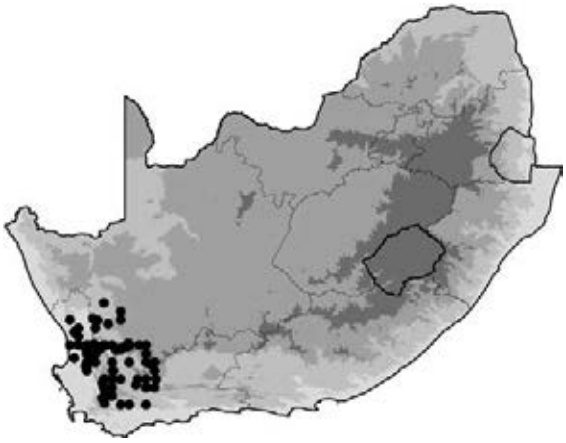
104. **Gladiolus scullyi** *Baker*, Handbook of the Irideae: 244 (1892). Type: South Africa, [Northern Cape], Namaqualand, without precise locality, without date [probably 1890], *Scully s.n.* (K, holo.).

Plants (120–)200–350 mm high. *Corm* globose-conic, 12–15 mm diam., with small cormlets at base; tunics ± woody, fragmenting irregularly and often claw-like below, orange when young. *Stem* erect or inclined, flexed outward above sheaths of upper leaves, simple or often 1- or 2-branched. *Leaves* (5)6 to 8, lower 4 to 6 basal and usually in a 2-ranked fan, grey-green, often glaucous, reaching to base or sometimes middle of spike, narrowly lanceolate to linear, (2–)3–5 mm wide, fairly thick and succulent, main vein lightly raised, margins not raised, uppermost cauline leaf diverging from stem or sheathing only near base. *Spike* inclined, lightly flexuose, 5- to 8-flowered; bracts pale green, translucent on veins, occasionally dry near tips, outer 20–30(–35) mm long, inner shorter, acute or minutely forked. *Flowers* greenish cream-coloured to yellow-brown or beige, upper tepals sometimes flushed purple above, lower tepal limbs yellow basally and brown to purplish above, throat irregularly streaked with purple, strongly sweet-scented; perianth tube obliquely and narrowly funnel-shaped, 12–14 mm long, slender lower part 8–9 mm long; tepals lanceolate, dorsal largest, inclined over stamens, 25–35(–42) × 10–14(–16) mm, upper laterals arching outward, 22–28(–35) × 9–15 mm, windowed between dorsal and upper lateral tepals, lower 3 tepals united with upper laterals for 3–4 mm and together for 4–7 mm, narrowed into claws below, claws narrowly channelled, 4–6 mm long, limbs abruptly expanded and deflexed, sometimes with weakly developed auricles, 10–15(–20) × 8–12 mm. *Filaments* 12–16 mm long, exserted 9–12 mm from tube; anthers 6–9 mm long, light purple to cream-coloured; pollen cream-coloured. *Style* arching over stamens, dividing opposite or just below anther apices, branches 3.0–4.5 mm long. *Capsules* obovoid, trilobed-retuse above, 9–14 mm long. *Seeds* 5–6 × ± 5 mm, broadly and usually asymmetrically winged with seed body closer to one side. *Flowering time*: August and September.

Distribution and ecology: widespread though the high-lying parts of Namaqualand, South Africa, from Steinkopf in Northern Cape to Vanrhynsdorp in Western Cape and inland onto the Bokkeveld Escarpment to Calvinia; on stony granite and shale flats in succulent karroid and renosterveld shrubland.



Distribution of ***Gladiolus scullyi***.



Distribution of ***Gladiolus venustus***.

Diagnosis: recognised by the sweetly scented, dull yellowish to brownish flowers with the upper tepals windowed in profile, ± erect leaves, unspotted upper cataphylls and woody corm tunics clawed at the base and orange when young. The parapatric *Gladiolus venustus* has abruptly deflexed lower tepals with the lower laterals strongly auriculate at the base of the limbs and suberect upper lateral tepals not forming windows with the dorsal in profile. The two species intergrade along the Vanrhynsdorp–Calvinia axis and discrimination between them may be difficult there.

105. **Gladiolus venustus** *G.J.Lewis* in Journal of South African Botany 7: 56 (1941), replacement name for *G. formosus* Klatt in Linnaea 32: 692 (1864), illegitimate homonym, not *G. formosus* Pers. (1805). Type: South Africa, [Western Cape], Clanwilliam District, Olifants River at Brakfontein, Aug. [probably 1829], *Ecklon & Zeyher Irid. 140* (S, lecto., designated by Lewis et al.: 122 (1972); G, SAM, isolecto.).

Plants 120–350 mm high. *Corm* conic, 8–14 mm diam.; tunics hard, ± woody, fragmenting irregularly and often claw-like below, orange when young. *Stem* erect below, flexed outward above sheaths of upper leaves, then weakly inclined, frequently branched. *Leaves* 5 or 6, lower 3 to 5 basal, reaching to base or shortly exceeding spike, linear, 1.5–4.0(–9.0) mm wide, main veins but not margins lightly raised, cauline leaves shorter, uppermost diverging from stem or sheathing only near base. *Spike* inclined, flexuose-scalloped, 5- to 8-flowered; bracts pale green, apices sometimes becoming dry, veins transparent, attenuate, outer 20–30(–35) mm long, inner shorter to ± as long, minutely forked. *Flowers* blue-purple or bright pink, occasionally entirely dull yellow, lower 3 tepals bright yellow in lower ½, usually lightly rose-scented; perianth tube obliquely funnel-shaped, 12–17 mm long, lower cylindric part 8–11 mm long; tepals lanceolate, dorsal largest, lightly inclined, 30–37 × 10–16 mm, upper laterals slightly shorter than dorsal, suberect and extending at least partly behind dorsal, curving outward distally, lower 3 tepals united for 3–5 mm, free parts narrowed below into claws 2–4 mm long, deeply channelled, limbs sharply deflexed and pinched together at point of flexure with margins raised into ascending auriculate lobes, 15–22 × 9–11 mm, ± straight. *Filaments* 11–15 mm long, exserted 5–7 mm from tube; anthers 6–8 mm long, greyish or yellow; pollen yellow. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches 2–3 mm long. *Capsules* globose, 3-lobed-retuse above, ± 10 mm long. *Seeds* 5–7 × ± 5 mm, broadly and usually asymmetrically winged with seed body closer to one side. *Flowering time*: August to mid-September, sometimes later at higher elevations.

Distribution and ecology: extending through the interior valleys of the southwestern Western Cape, South Africa, from Vanrhynsdorp through the Olifants River Valley and the eastern Cederberg to Worcester and Robertson thence inland to Laingsburg and in the Northern Cape along the foothills of the Roggeveld to Calvinia; on stony shale and clay or sometimes sandstone flats and slopes, often along drainage lines.

Diagnosis: recognised by the fragrant, yellowish flowers tipped mauve to bright pink, the upper lateral tepals suberect and partially overlapping the dorsal tepal, the lower tepals abruptly deflexed and pinched together at the base and the lower laterals strongly auriculate at the base of the limbs. Most populations have the tepals tipped dull purple to mauve but populations in the Olifants River Valley and around Worcester have bright pink tips. The parapatric *Gladiolus scullyi* has the upper lateral tepals forming a more-or-less pronounced window with the dorsal tepal in profile, and the recurved lower tepals not strongly auriculate at the limb bases. The two species intergrade along the Vanrhynsdorp–Calvinia axis and discrimination between them is problematic there.

106. **Gladiolus salteri** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 127 (1972). Type: South Africa, [Northern Cape], Namaqualand, 28 km east of Springbok, 19 Sept. 1933, *Salter 3798* (BOL, holo.; BM, K, iso.).

Plants 100–200 mm high. *Corm* globose-conic, 18–25 mm diam. or more, bearing a few cormlets around base; tunics coarsely fibrous, sometimes accumulating. *Stem* inclined, flexed above sheath of uppermost leaf, simple or with one or two branches. *Leaves* usually 4, lower 3 basal, falcate, all arching to one side, generally as long as spike, 4–7 mm wide, grey-green, uppermost leaf inserted in middle of stem. *Spike* inclined to nearly horizontal, flexuose, 5- to 8-flowered; bracts pale grey-green, dry and brown above, outer 15–20 mm long, inner slightly shorter. *Flowers* pale pink, lower tepals cream-coloured with deep pink markings in midline and toward apices, papillose on claws and lower throat, lightly rose-scented during day; perianth tube 18–22 mm long, narrowly and obliquely funnel-shaped, normally exserted from bracts, wider portion 3–4 mm long; tepals narrowed into claws below, dorsal longest, initially arcuate, erect distally with age, claw 28–32 mm long, slender, ± 8 mm at widest, upper laterals 20–22 mm long, claws ± 7 mm long, directed forward, limbs abruptly expanded, curving outward, lower tepals strongly clawed, united basally for 4–5 mm, channelled, free for ± 15 mm, limbs curving downward. *Filaments* ± 25 mm long, papillose toward bases, exserted 18–20 mm from upper part of tube; anthers ± 6 mm long, cream-coloured; pollen pale yellow. *Style* arching over stamens, dividing opposite lower ½ of anthers, branches ± 4 mm long. *Capsules* broadly ovoid, trilobed-retuse above, 9–11 × 10 mm. *Seeds* 4–5 × 3.5–4.0 mm, broadly winged with seed body asymmetrically placed. *Flowering time*: mid-August to mid-September.

Distribution and ecology: a local endemic from eastern Namaqualand in Northern Cape, South Africa, known only from east of Springbok at the western edge of Bushmanland; in gritty decomposed granite, often along drainage lines.

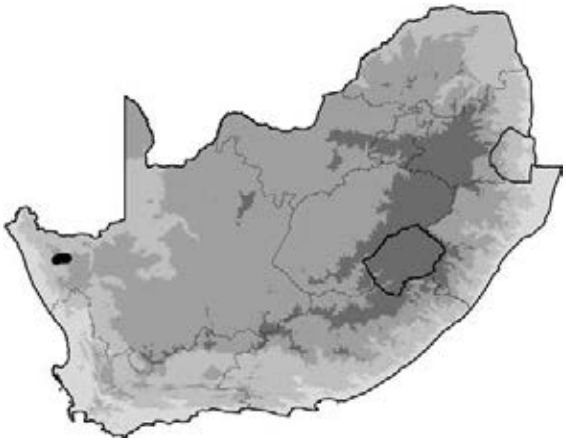
Diagnosis: recognised by the pale pink flowers with relatively narrow, spreading tepals, the upper ± 8 mm wide, lower tepals with cream-coloured and reddish markings, and relatively long filaments ± 25 mm long, well exserted from the perianth tube and papillose toward the base.

107. **Gladiolus lapeirousioides** *Goldblatt* in Journal of South African Botany 37: 229 (1971). Type: South Africa, [Northern Cape], Loeriesfontein District, along road to Kliprand, 23 Sept. 1970, *Goldblatt 540* (BOL, holo.; NBG, PRE, iso.).

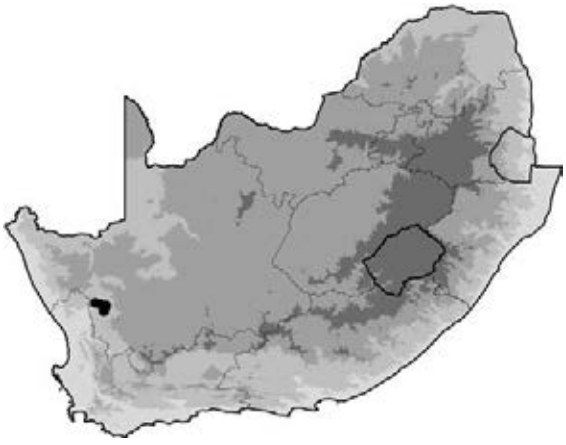
Plants 80–140 mm high. *Corm* ± conic, 9–12(–15) mm diam., usually with a few cormlets at base on short stolons 5–8 mm long; tunics cartilaginous, breaking up into coarse fibres, yellow when young, sometimes accumulating in a dense mass. *Stem* erect below, strongly flexed outward above sheath of uppermost leaf, sometimes almost horizontal above, simple or 1- or 2-branched. *Leaves* 4 to 6, forming a basal fan, falcate and often all arching to one side, 3–5 mm wide, main vein and margins lightly thickened, only uppermost inserted on stem above ground, sheathing below. *Spike* nearly horizontal, lightly flexuose, (5)7- to 12-flowered; bracts green to green-grey, 15–20 mm long, inner shorter. *Flowers* creamy white, lower 3 tepals with yellow spot near base bordered with red, unscented; perianth tube cylindric, 35–40 mm long; tepals when fully open spreading at right angles to tube and all held in same plane, upper 3 narrowly elliptic, 20–22 mm long, lower tepals nearly linear, laterals 8–10 × 1.5–2.0 mm, lower median ± 15 × 4 mm. *Filaments* ± 8 mm long, exserted ± 4 mm from tube; anthers ± 3 mm long, purplish; pollen yellow. *Style* ± erect, dividing opposite anther apices, branches ± 2 mm long. *Capsules* obovoid, 3-lobed-retuse above, 8–12 mm long, lightly warty. *Seeds* ± 4 × 3 mm, broadly but unevenly winged with seed body eccentric. *Flowering time*: late August to early October.

Distribution and ecology: a narrow endemic known only from west of Loeriesfontein and the Agter Hantam in Northern Cape, South Africa; on low hills in stony shale, often along drainage lines.

Diagnosis: recognised by the horizontal spikes of long-tubed, cream-coloured flowers with narrow, spreading tepals, the lower three with small yellow and red



Distribution of ***Gladiolus salteri***.



Distribution of ***Gladiolus lapeirousioides***.

markings near the base, the perianth tube long, straight and subcylindric, 35–40 mm long, and the filaments short, ± 8 mm long and exserted from the tube for about half their length.

Ser. **Hebea** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus alatus* L.

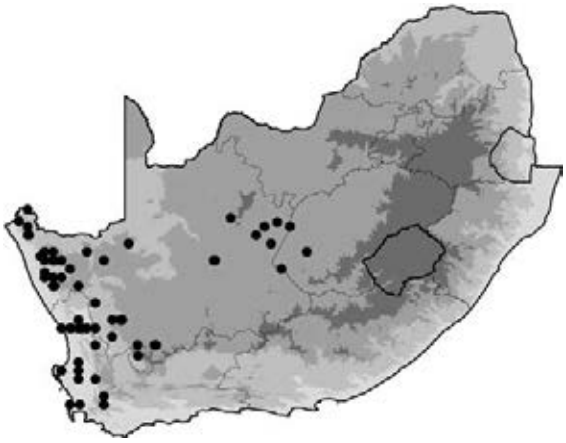
Plants mainly from winter-rainfall region, often short. *Corm* tunics papery to leathery. *Stem* sometimes flattened and winged. *Leaves* green at flowering, often falcate, plane or corrugate, firm-textured. *Spike* usually suberect, few-flowered. *Flowers* often large, strongly zygomorphic, perianth tube short, dorsal tepal arching or vertical, outer whorl widest, cordate and shortly clawed, sutures with glistening papillate ridges; filaments long and sometimes puberulous. *Capsules* ellipsoid and obtuse.

108. **Gladiolus orchidiflorus** *Andrews*, The Botanist's Repository 4: t. 241 (1802). *Hebea orchidiflora* (Andrews) Eckl. [as (Pers.) Eckl.]: 43 (1827). *Antholyza orchidiflora* (Andrews) Klatt: 733 (1864) [misapplied to *Tritoniopsis* species]. Type: South Africa, without precise locality, cultivated in England in 1802, *Niven s.n.*, illustration in Andrews: t. 241 (1802).

Gladiolus viperatus Ker Gawl.: t. 688 (1803d). Type: South Africa, without precise locality or collector, cultivated in Great Britain, illustration in Ker Gawl.: t. 688 (1803d).

Gladiolus dregei Klatt: 693 (1864). Type: South Africa, [Northern Cape], Namaqualand, between Pedroskloof and Leliefontein, 1830, *Drège 2631* (B, presumed holo.; G, K, P, S, iso.).

Plants (80–)180–450(–800) mm high. *Corm* globose to conic, 12–20 mm diam., producing numerous small cormlets at base; tunics moderately to very coarsely fibrous or thinly leathery to firmly papery. *Stem* erect below, flexed outward above sheaths of upper, simple or 1- or 2-branched. *Leaves* (4)5 to 8(10), lower 3 to 7 basal and often in a fan, reaching to ± middle of stem, narrowly lanceolate to linear, sometimes falcate, 2–7(–15) mm wide, soft-textured, sometimes somewhat fleshy, central and sometimes one or more secondary veins lightly thickened, margins occasionally lightly thickened, rarely lightly crisped. *Spike* inclined, lightly flexuose, flowers in 2 ranks, 5- to 12-flowered; bracts greenish or flushed purple-grey, outer (13–)18–23(–30) mm long, inner slightly shorter to ± as long, notched apically. *Flowers* greyish green to dull purple, lower 3 tepals with bright yellow to greenish transverse band in upper ⅓ edged distally darker purple, strongly scented of violets; perianth tube narrowly and obliquely funnel-shaped, 9–14 mm long; tepals with papillate ridges along sutures, dorsal longest, narrowly oblong-spathulate, strongly arched, 20–35 × 3–6 mm, upper laterals narrowly spade-shaped, with claws 2–4 mm wide, limbs triangular to lanceolate, 12–16 × 6–17 mm, curving outward distally, somewhat attenuate, lower 3 tepals joined to upper laterals for 2–4 mm and together for 1–2 mm, 11–20 mm long, arching downward, lower median slightly longer or shorter than laterals but ± twice as wide. *Filaments* strongly arched, 20–25 mm long, exserted 6–20 mm from tube; anthers 5–11 mm long, lilac to purple; pollen cream-coloured. *Style* arching over stamens, dividing opposite middle to upper ½ of anthers, branches 3.5–5.0 mm long. *Capsules* ellipsoid or occasionally globose, then ± 3-lobed and retuse, 10–23 mm long. *Seeds* ovate to rotund, 6–8 × 5–6 mm, broadly and evenly winged. *Flowering time*: August and September, occasionally in October or November in Kamiesberg.



Distribution of ***Gladiolus orchidiflorus***.

Distribution and ecology: widespread through the western near-interior of the winter-rainfall belt of southern Africa, from southern Namibia through the higher-lying parts of Namaqualand and Bushmanland in Northern Cape, South Africa southward along the Atlantic Coast and the Bokkeveld Escarpment to Cape Town and Worcester in Western Cape with outlying populations from Calvinia and Ladysmith, and then inland on the interior plateau from Fauresmith in Free State to Kimberley and Kuruman in North West; often on deep sandy soils in open shrubland, also on rocky slopes, sometimes in dolerite outcrops.

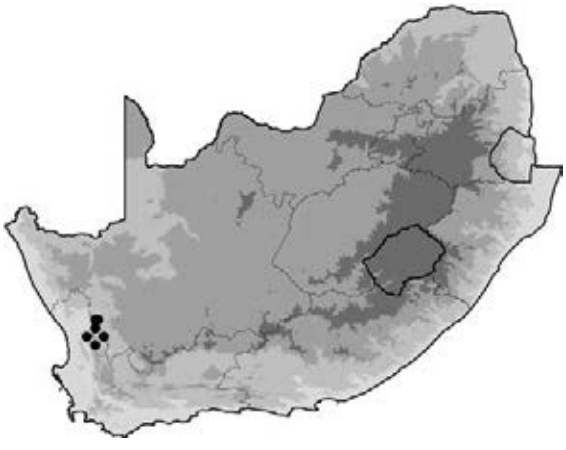
Diagnosis: recognised by the several plane leaves and characteristic greenish to purplish flowers with narrow, strongly arched dorsal tepal 3–6 mm wide, and broad, spade-shaped upper lateral and lower median tepals. Populations from the Atlantic Coast have almost turquoise green flowers but elsewhere the flowers are greyish to dull purple.

109. **Gladiolus watermeyeri** *L.Bolus* in South African Gardening and Country Life 17: 294 (1927b). Type: South Africa, [Northern Cape], Calvinia District, near Nieuwoudtville, Aug. 1913, *Marloth 5569* (BOL, holo.; PRE, iso.).

Plants (100–)160–350 mm high. *Corm* globose to depressed-globose, 15–22 mm diam.; tunics soft-papery to

membranous, not persisting, decaying irregularly. *Stem* erect below, flexed outward above sheathing part of third leaf and inclined above, occasionally robust plants with 1 branch. *Leaves* 4 or 5, lower 3 basal, lowermost longest and usually exceeding spike, others seldom reaching beyond middle of spike, narrowly lanceolate to linear, 3–11 mm wide, strongly 2- to 5-ribbed, margins thickened and raised, scabrid on veins, cauline leaves smaller, diverging from stem. *Spike* inclined, lightly flexuose, (1)2- to 6-flowered; bracts bright green, transparent along veins, outer 40–45 mm long, inner slightly shorter, not keeled, forked. *Flowers* greenish to creamy white, dorsal tepal grey-translucent but purplish along midline, upper lateral tepals conspicuously veined with maroon to purple or pink, lower 3 tepals dark olive-green, paler at tips and lightly veined, sutures between tepals thickened into iridescent papillose ridges, with strong freesia-like scent; perianth tube narrowly and obliquely funnel-shaped, 14–16 mm long, lower cylindric part ± 10 mm long, with sharp bend at base of flared part; tepals with upper laterals largest, dorsal hooded over filaments, boat-shaped, 27–35 × 10–15 mm, upper laterals spade-shaped, narrowed near base into short claws 1–2 mm long, curving outward from near base, 20–30 × 15–25 mm, lower 3 tepals united below for 2–4 mm, free parts 20–25 mm long, lower laterals channelled and narrowed below into claws, limbs narrowly boat-shaped, ± 9 mm long, lowermost triangular, narrowed below into a short claw, ± 22 mm wide. *Filaments* strongly arched, 20–22 mm long, exserted 15–16 mm from tube; anthers 9–13 mm long, dark green; pollen yellowish. *Style* arching over stamens, dividing between middle and apex of anthers, branches 4–8 mm long. *Capsules* broadly ellipsoid and 3-sided, (20–)27–35 mm long. *Seeds* broadly oval, (7–)9–11 × (5–)7–9 mm, light to dark pinkish brown, broadly and evenly winged. *Flowering time*: August to mid-September.

Distribution and ecology: a relatively local South African endemic, extending from the Bokkeveld Escarpment in Northern Cape to the Gifberg and the northern Cederberg near Wuppertal in Western Cape; on stony sandstone in seasonally moist sand in arid fynbos.



Distribution of ***Gladiolus watermeyeri***.

Diagnosis: recognised by the ribbed and scabridulous leaves, and the characteristic greenish to creamy white flowers with a translucent, boat-shaped dorsal tepal hooded over the stamens, and darkly veined, heart-shaped upper lateral tepals. The lower tepals are predominantly yellowish green except at the tips. The flowers are exceptionally cryptic and often most easily located by their strong and penetrating fragrance.

110. **Gladiolus virescens** *Thunb.*, Flora capensis: 196 (1811). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* (UPS-THUNB 1090, holo.).

Gladiolus luridus Hornem.: 113 (1819). Type: South Africa, without precise locality or collector [possibly *C.P. Thunberg*] (C, holo.).

Gladiolus luteus Klatt: 694 (1864), illegitimate homonym, not *G. luteus* Lam. (1788). Type: South Africa, [Western Cape], Caledon District, without date [possibly 1831], *Ecklon & Zeyher Irid. 135* (C, holo.; BR, LD, P, PRE, S, Z, iso.).

Gladiolus pulchellus Eckl. ex Klatt: 693 (1864), illegitimate homonym, not *G. pulchellus* Salisb. (1796). *Hebea pulchella* Eckl. ex Baker: 178 (1877), as a synonym. *Gladiolus virescens* var. *lepidus* G. J.Lewis in Lewis et al.: 153 (1972), replacement name at varietal rank for *G. pulchellus* Eckl. ex Klatt. (1864). Type: South Africa, [Western Cape], Swellendam, without precise locality, Oct. 1831, *Ecklon & Zeyher Irid 137* (B, holo.; G, iso.).

Gladiolus bicolor Eckl. ex Baker: 178 (1877), illegitimate homonym, not *G. bicolor* Thunb. (1784). Type: South Africa, [Western Cape], near Caledon, *Ecklon s.n.* (S, holo.).

Gladiolus templemannii Klatt: 196 (1885). Type: South Africa, [Western Cape], Caledon District, Zwartberg near Hot Springs, Sept. 1884, *Templemann sub MacOwan 2608* (S, possible holo.; BM, BOL, K, SAM, iso.).

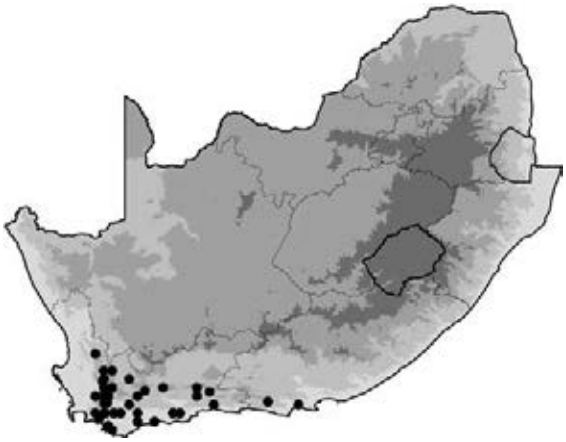
Gladiolus virescens var. *roseovenosus* G.J.Lewis in Lewis et al.: 153 (1972). Type: South Africa, [Western Cape], Worcester District, Kweekkraal near Brandvlei, 4 Sept. 1962, *Bayliss 642* (NBG, holo.).

Plants 120–200 mm high [excluding basal leaf]. *Corm* globose to depressed-globose, 12–15 mm diam.; tunics soft-papery becoming fibrous, seldom persisting. *Stem* ± erect below, flexed outward and inclined in middle but sometimes ± erect below spike, seldom branched. *Leaves* 3(5), lowest much longer and ± as long to twice as long as stem, linear to terete, 1–3 mm wide, oval to round in section with margins raised and edges arching toward main vein, main and often one other vein also raised, thus 2- or 3-grooved on each surface, remaining leaves short, lowermost sheathing lower half of stem, uppermost inserted in upper half of stem and distant from lower, usually bract-like without blade, sheaths

and sometimes blades sparsely to densely scabrid to pubescent on veins. *Spike* flexed at base, inclined, fairly straight or lightly flexuose, 3- to 7(12)-flowered; bracts green, veins ± transparent, outer 20–30 mm long, inner shorter and ± enclosed by outer. *Flowers* yellow to yellow-green or pink, upper 3 tepals flushed or feathered green, brownish purple or dark pink, lower 3 tepals with deep yellow to white band across base of limb, pale distally and sometimes mauve or pink apically, sutures between tepals thickened into densely papillose iridescent ridges, strongly violet-scented or unscented (some pink-flowered plants); perianth tube narrowly and obliquely funnel-shaped, 9–12(–15) mm long; tepals with dorsal longest, ± spathulate, straight and inclined or erect, margins sometimes recurved, 20–40(–48) × 10–16(–20) mm long, narrowed below and claw-like for ± 18 mm, upper ⅓ abruptly expanded and triangular, upper laterals spade-shaped, base narrow and claw-like for, 1–3 mm, limbs abruptly expanded, triangular, curving outward distally, 14–25(–30) mm long, lower 3 tepals joined to upper laterals for ± 5 mm and together for 1–3 mm, free parts 16–20(–30) mm long, clawed, narrow and grooved below, abruptly expanded into limbs 10–12(–20) mm long. *Filaments* strongly arched, 18–27 mm long, exserted for 15–22 mm; anthers 6–8 mm long, pale or dark; pollen yellow. *Style* arched over stamens, dividing opposite upper ⅓ of anthers, branches 4–6 mm long. *Capsules* oblong-ellipsoid, 18–25(–30) mm long. *Seeds* ovate to round, 5–7 × 5–6 mm, broadly and evenly winged. *Flowering time*: mid-August through September.

Distribution and ecology: widespread through southwestern and southern Western Cape, South Africa, from the Warm Bokkeveld and the Witteberg into the Breede River Valley and east of the Hottentots Holland Mtns to Bot River thence eastward into Eastern Cape near Humansdorp; on stony shale or sometimes alluvial fans in loamy, mostly in renosterveld shrublands.

Hybrids with *Gladiolus alatus* L. have been recorded near Rawsonville and Bot River.



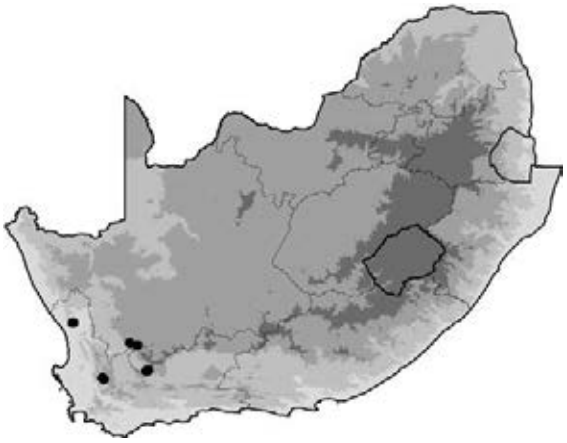
Distribution of ***Gladiolus virescens***.

Diagnosis: recognised by the soft corm tunics, the ribbed or grooved and often scabrid leaves, the uppermost separated from and not overlapped by the leaf below it, thus exposing a portion of the stem, and the strongly veined flowers with suberect dorsal tepal. The flowers are variable in colour, usually yellowish to greenish with purple veins but sometimes pinkish with darker pink veins. Plants from the Swartruggens are unusually robust, with branched stems and relatively small, pinkish flowers. *Gladiolus ceresianus* has similar flowers but invariably three leaves, the lowermost terete and 4-grooved, the sheaths of all three leaves overlapping and completely concealing the lower part of the stem, and characteristically dark, fibrous corm tunics forming a neck around the base of the stem.

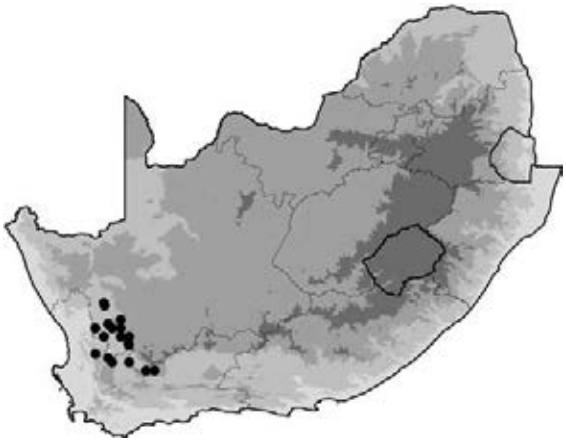
111. **Gladiolus ceresianus** *L.Bolus* in South African Gardening and Country Life 21: 368, t. B (1931c). Type: South Africa, [Western Cape], Ceres District, from the Ceres Wild Flower Show, 5 Oct. 1931, *Compton s.n.* (BOL [BOL 19883], holo.; K, iso.).

Plants 100–180(–300) mm high. *Corm* conical, 9–12 mm diam., with cormlets at base; tunics of dark, medium to coarsely textured fibres forming collar around base. *Stem* inclined throughout or erect below, flexed outward above sheath of uppermost leaf, unbranched. *Leaves* 3, always overlapping, lowermost longest and usually longer than stem, terete, 4-grooved, straight or falcate, 1–2 mm diam., second leaf sheathing lower ½ of stem and overlapping upper leaf sheath, reaching to ± middle of spike, third leaf shortest, sheathing only near base. *Spike* inclined, (1)2- to 4-flowered, lightly flexuose; bracts green or flushed reddish, outer 25–35(–40) mm long, inner slightly shorter, minutely notched. *Flowers* purplish brown or greenish grey, upper 3 tepals with dark purple veins radiating from midline, lower tepals greenish yellow in lower ⅔, sutures between tepals forming glistening papillose ridges, intensely sweetly scented; perianth tube narrowly and obliquely funnel-shaped, 12–16 mm long, slender basal part 8–10 mm long; tepals with dorsal longest, oblanceolate, 28–36(–45) × ± 11 mm, erect or inclined below and erect above, margins recurved, upper lateral tepals spade-shaped, bases abruptly narrowed into claws ± 4 mm long, limbs triangular, acuminate, curving outward above, 20–25 × 14–16 mm, lower 3 tepals united with upper laterals for 3–4 mm, free parts ± 16–25 mm long, clawed, narrow and channelled below, lower laterals with limbs 4–6 mm wide, lower median 9–10 mm wide. *Filaments* strongly arched, 20–22 mm long, exserted for ± 18 mm; anthers 8–9 mm long, light purple; pollen yellow. *Style* arching over stamens, dividing between middle and upper ⅓ of anthers, branches ± 6 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-August to late September.

Distribution and ecology: centred in southwestern interior Western Cape, South Africa, in the Cold Bokkeveld and eastward to Matjiesfontein and the Klein Roggeveld and the Roggeveld in Northern Cape, with an outlying northern population at Hol River near Vredendal; on



Distribution of ***Gladiolus ceresianus***.



Distribution of ***Gladiolus uysiae***.

stony clay slopes, often along drainage lines, in succulent karoo and renosterveld shrubland.

Diagnosis: recognised by the dark, fibrous corm tunics, the three overlapping leaves concealing the stem between the second and third leaves, the lowermost leaf terete and 4-grooved, and the strongly purple-veined flowers with more-or-less erect dorsal tepal. *Gladiolus virescens* has similar flowers but the uppermost leaf is always slightly distant from the second leaf, thus exposing a section of stem, and the corm tunics are softly papery becoming finely fibrous.

112. **Gladiolus uysiae** *L.Bolus ex G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 156 (1972). Type: South Africa, [Northern Cape], Calvinia District, without precise locality, cultivated at Nieuwoudtville, Sept. 1930, *Buhr s.n.* (BOL, holo.).

[*Gladiolus uysiae* L.Bolus: 367 (1931c), invalid provisional name.]

Plants 70–180 mm high. *Corm* depressed-globose, 10–14 mm diam., producing slender white stolons from base; tunics membranous to papery, not accumulating. *Stem* ± erect below, flexed outward and inclined in middle, rarely with short branch. *Leaves* 3, overlapping, lowermost longest, ± as long or slightly longer than stem, plane, somewhat fleshy, falcate, 3–6(–9) mm wide, main and 1 or 2 secondary veins evident but not thickened, remaining leaves reaching to between middle of stem and base of spike, uppermost usually mostly channelled. *Spike* flexed at base, inclined, 1- to 3-flowered, lightly flexuose; bracts green, outer 20–25 mm long, margins transparent, inner shorter and ± enclosed by outer. *Flowers* purple-pink but paler distally with strong purple to green veining, lower tepals with dark yellow-green band shortly below apex, sometimes purple-veined at tips, strongly and sweetly scented; perianth tube narrowly and obliquely funnel-shaped, 10–12 mm long; tepals with dorsal longest, straight and erect, oblanceolate, 28–35 mm long, widest in upper ⅓ with margins recurved, upper laterals spade-shaped, bases abruptly narrowed and claw-like for 2–3 mm, limbs triangular, acute, curving outward in upper ½, 15–18 mm long, lower 3 tepals joined to upper laterals for ± 1 mm and together for ± 1 mm, free for ± 15 mm long, clawed and narrow and channelled below, abruptly expanded into limbs 8–9 mm long, sutures between lower and upper lateral tepals thickened into iridescent papillose ridges. *Filaments* strongly arched, 20–25 mm long, exserted 18–20 mm from tube; anthers 6–8 mm long, purple; pollen yellow. *Style* arched over the filaments, dividing opposite upper third of anthers, branches 5–6 mm long. *Capsules* obovoid with rounded apices, obscurely 3-lobed, 12–18 mm long. *Seeds* round to broadly oval, ± 6 × 4–5 mm, broadly and evenly winged. *Flowering time*: mid-August to the end of September.

Distribution and ecology: restricted to the southwestern interior of South Africa, from the Bokkeveld Escarpment and Hantam to the Klein Roggeveld in Northern Cape and though the northern Cederberg and Tanqua Karoo basin to Touws River in Western Cape; on clay soils in renosterveld and succulent shrubland, forming extensive colonies through vegetative reproduction via stolons.

Diagnosis: recognised by the plane, subsucculent and usually ± falcate leaves, and the strongly purple-veined flowers with a large, suberect dorsal tepal. The production of slender, naked stolons is characteristic for the species. *Gladiolus ceresianus* and *G. virescens* have similar flowers but corrugate or grooved to terete leaves with thickened and raised veins and margins, and sessile or subsessile cormlets.

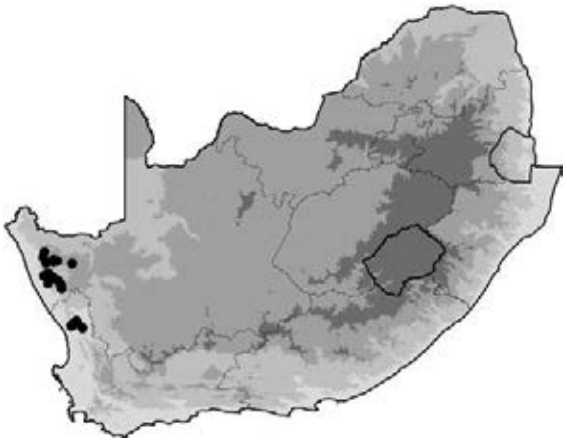
113. **Gladiolus equitans** *Thunb.*, Prodromus plantarum capensium: 186 (1800). Type: South Africa, Cape, without precise locality or collector, (UPS-THUNB 1021, holo.).

Gladiolus namaquensis Ker Gawl.: t. 592 (1802e). *G. alatus* var. *namaquensis* (Ker Gawl.) Baker: 177 (1877). Type: South Africa, without precise

locality, cult. in England from plants collected by J. Niven, illustration in Ker Gawl.: t. 592 (1802e), syn.; BM ['*Gladiolus namaquensis* Ker Gawler'], syn.).

Plants 150–300 mm high. *Corm* globose, 20–40 mm diam.; tunics firm-membranous to leathery, decaying irregularly, occasionally ± coarsely fibrous, often accumulating in a dense mass. *Stem* erect, compressed and ridged, usually 3-winged, with two wide and one narrow face, unbranched. *Leaves* 4(5), lower 2 or 3 ± basal and forming a 2-ranked fan, lowermost largest, reaching to just below base of spike, falcate, remaining leaves progressively shorter, 20–40 mm wide, obtuse-apiculate, margins heavily thickened, hyaline or reddish. *Spike* flexed at base and inclined, flexuose, nearly 2-ranked, 3- to 7-flowered; bracts prominently keeled with keels decurrent on stem angles, green with reddish keels and margins, outer 25–40(–50) mm long, 1-keeled, inner shorter, 2-keeled, minutely forked apically. *Flowers* orange to scarlet, lower lateral tepals yellow in lower ⅔, lower median tepal yellow in lower half, throat with glistening papillose ridges on sutures between tepals, lightly scented; perianth tube obliquely funnel-shaped, 10–15 mm long, entirely included in bracts; tepals dorsal largest, obovate-concave, hooded over stamens, 27–38 × 18–20 mm, upper laterals broadly heart-shaped, narrowed near base, curving gradually outward distally and spreading, 23–26 × 23–30 mm, lower 3 tepals united below for 3–5 mm, free parts ± 25 × 9–10 mm, clawed below, laterals channelled for most of length, lower median ± 18 × 12–15 mm. *Filaments* strongly arched, 17–25 mm long, exserted 13–20 mm from tube; anthers 8–14 mm long, cream-coloured with red on lines of dehiscence; pollen cream-coloured. *Style* arching over stamens, dividing opposite middle to upper ⅓ of anthers, branches 5–7 mm long. *Capsules* oblong-ellipsoid, 25–30 mm long. *Seeds* broadly ovate, 8–9 × ± 7 mm, broadly and evenly winged. *Flowering time*: mainly late August to mid-September, occasionally later, especially at high elevations.

Distribution and ecology: scattered through the highlands of Namaqualand, South Africa, in the mountains around Springbok and Okiep, and on the escarpment west of Kamieskroon and the Kamiesberg, all in Northern Cape, and in southern Namaqualand east of Bitterfontein as far south as Hol River near Vredendal in Western Cape; on rocky ridges, mainly in granite but also quartzite outcrops.

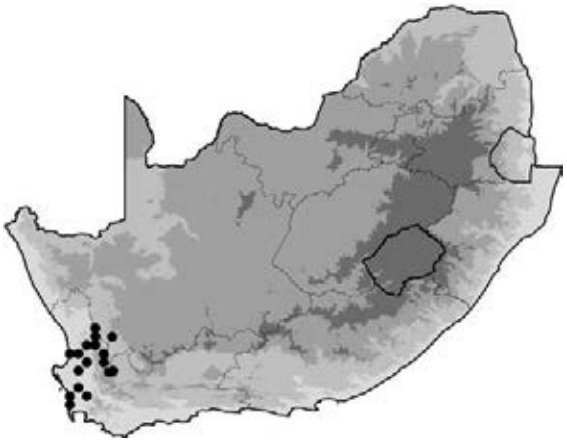


Distribution of ***Gladiolus equitans***.

Diagnosis: recognised by the broad, falcate lower leaves widest near the tips and with reddish, heavily thickened margins and large, bright orange to scarlet flowers with hooded dorsal tepal. The filaments are smooth.

114. **Gladiolus speciosus** *Thunb.*, Flora capensis: 196 (1811). *Hebea speciosa* (Thunb.) Steud.: 724 (1840). *G. alatus* var. *speciosus* (Thunb.) G.J.Lewis in Lewis et al.: 167 (1972). Type: South Africa, without precise locality, probably Sept. 1773, *Thunberg s.n.* (UPS-THUNB 1071, holo.).

Plants (80–)120–200 mm high; *Corm* depressed-globose, 7–12 mm diam., with several long, slender, often branched stolons from base; tunics membranous to dry and softly papery, decaying irregularly. *Stem* erect below or inclined above ground, flexed outward above uppermost basal leaf and then inclined, compressed and 2-angled below, 3-sided and winged above, occasionally with a short branch. *Leaves* 4 to 6(8), lower 3 to 6 basal, lowermost about twice as long as stems, remaining leaves progressively shorter, linear to falcate, (2–)3–7 mm wide, midribs and sometimes 1 other pair of veins evident but not raised, margins sometimes slightly thickened, upper 2 or 3 leaves cauline, sheathing only at base. *Spike* inclined, lightly flexuose, 2- to 5(8)-flowered; bracts keeled, pale glaucous green usually red on keel and margins, outer 35–40(–50) mm long, inner shorter. *Flowers* predominantly orange, dorsal tepal whitish inside, upper laterals usually with large yellow blotch on reverse and orange or dull red to purple or yellowish inside, lower tepals yellow with orange apices, with iridescent papillose ridges at sutures between tepals, strongly herbaceous-scented; perianth tube obliquely funnel-shaped, 11–13 mm long; tepals dorsal largest, obovate to oblanceolate, concave, nearly horizontal, hooded over stamens, 25–40 × 18–26 mm, upper laterals broadly spade-shaped, strongly narrowed near bases into short claws 1–3 mm long, limbs triangular, 20–25 × 20–28 mm, gently curving outward distally, lower 3 tepals united with upper laterals for 3–5 mm, free parts 20–25 mm long, laterals spathulate, narrowed below into channelled claws 6–8 mm long, gradually expanding distally and 8–10 mm wide, lowermost with a claw ± 5 mm long, limb broadly triangular, 17–24 mm wide. *Filaments* ascending to arched, ± 22 mm long, exserted for ± 15 mm from tube, minutely pubescent toward base; anthers 8.5–10.0 mm long, dull greenish yellow, sometimes reddish to purple on lines of dehiscence; pollen yellowish. *Style* arching over stamens, dividing opposite middle third of anthers, branches ± 7 mm long. *Capsules* ellipsoid, 3-sided, often shortly beaked, (20–)30–35 × ± 11 mm, septa sometimes inflated and pithy. *Seeds* ovoid, sometimes



Distribution of ***Gladiolus speciosus***.

only 1 or 2 per locule with remaining ovules aborted, 9–12 × 8–11 mm, broadly and evenly winged. *Flowering time*: mid-September to mid-October.

Distribution and ecology: extending from the Bokkeveld Escarpment in Northern Cape, South Africa and Leipoldtville in Western Cape southward to Mamre; in deep sandy soils among Restionaceae.

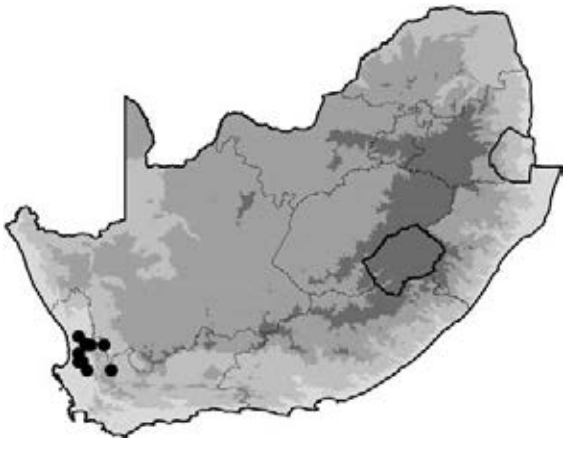
Diagnosis: a relatively late-flowering species recognised by narrow, linear to falcate leaves with plane blades, and bright orange flowers, the upper laterals often predominantly yellow on the reverse, with hooded dorsal tepal arched over the stamens. The conspicuous, slender stolons are diagnostic among the small group of species with angled to winged stems and orange flowers. *Gladiolus pulcherrimus* with similar leaves, has flowers with a suberect dorsal tepal and conspicuously hairy filaments and the corm lacks stolons.

115. **Gladiolus pulcherrimus** *(G.J.Lewis) Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 229 (1998). *G. alatus* var. *pulcherrimus* G.J.Lewis in Lewis et al.: 168 (1972). Type: South Africa, [Western Cape], Olifants River Valley 12 miles south of Klawer, 28 Aug. 1957, *Lewis 5220* (NBG, holo.).

Plants 200–400(–650) mm high. *Corm* depressed-globose, 10–15 mm diam.; tunics membranous, decaying irregularly. *Stem* erect below, flexed outward above sheaths of cauline leaves and inclined, compressed and 3-angled to 3-winged, usually with 1 or 2 branches. *Leaves* 5 to 7(8), lower 4 or 5 ± basal, lowermost sometimes slightly longer than others, reaching to ± base of spike, lanceolate to sword-shaped, (3–)6–12 mm wide, plane, main vein scarcely evident in fresh plants, margins lightly thickened, sometimes lightly crisped, grey-green with waxy bloom, uppermost leaf often ± bract-like. *Spike* inclined, flexuose, usually 5- to 8-flowered; bracts pale grey-green, glaucous, prominently keeled, outer 35–50 mm long, inner shorter, usually 2-keeled, minutely notched apically. *Flowers* salmon-pink to orange, upper 3 tepals feathered reddish below, dorsal often whitish on inside surface, lower 3 tepals pale greenish with salmon apices, sutures between tepals thickened into iridescent papillose ridges, lightly rose-scented; perianth tube obliquely funnel-shaped, ± 11 mm long, lower cylindric part ± 5 mm long; tepals with dorsal largest, initially arching over stamens but later ascending and curving upward distally, oblanceolate, ± 40 × 19 mm, narrowed below into a claw-like base ± 8 mm long, upper laterals ± spade-shaped, ± 27 × 23 mm, with narrow base 3–4 mm long, limb broadly triangular, spreading distally, lower 3 tepals united for ± 2–3 mm, free parts ± 24 mm long, lower laterals narrowly spathulate, narrowed below and channelled, gradually expanding above and ± 5 mm wide, lower median with a claw ± 8 mm long, limb narrowly triangular, ± 12 mm wide. *Filaments* strongly arched, ± 22 mm long, exserted ± 18 mm from tube, shortly pilose; anthers ± 8.5 mm long, dull greenish yellow, reddish on lines of dehiscence; pollen yellowish. *Style* arching over stamens, dividing opposite middle of anthers, branches ± 6 mm long. *Capsules* ellipsoid, 3-sided, (20–)25–40 mm long. *Seeds* ovate to fiddle-shaped, ± 8 × 6.5 mm, broadly and evenly winged. *Flowering time*: late August to mid-October.

Distribution and ecology: a relatively local endemic of the western part of Western Cape, South Africa, from the Olifants River Valley near Clanwilliam to Leipoldtville and the Gifberg; on deep sandy flats among Restionaceae.

Diagnosis: recognised by the plane leaves without thickened or raised veins, and salmon-pink to orange flowers with a suberect dorsal tepal and conspicuously hairy filaments. *Gladiolus speciosus*, with similar leaves, has a concave dorsal tepal that is strongly arched over the stamens, and almost glabrous filaments; it also produces characteristic long, slender stolons from the base of the corm. *Gladiolus alatus* has similar flowers but strongly ribbed or corrugate leaves.



Distribution of ***Gladiolus pulcherrimus***.

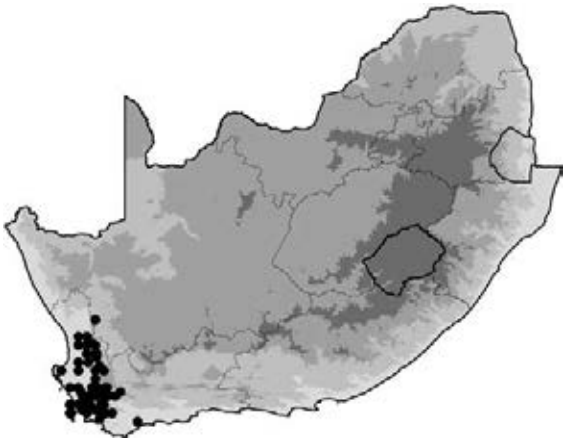
116. **Gladiolus alatus** *L.*, Plantae rariores africanae: 8 (1760). *Hebea alata* (L.) Eckl.: 42 (1827). Type: South Africa, Cape, without precise locality or collector [G: Herb. Burman, lecto., designated by Lewis et al.: 163 (1972)].

Gladiolus galeatus Burm.f.: 2 (1768). *Hebea galeata* (Burm.f.) Eckl.: 41 (1827). Type: South Africa, Cape, without precise locality or collector (G: Herb. Burman, holo.).

Gladiolus papilionaceus Licht. ex Roem. & Schult.: 408 (1817), illegitimate homonym, not *G. papilionaceus* Salisb. (1796). *G. alatus* var. *uniflorus* Klatt: 337 (1882), as a replacement name at varietal rank for *G. papilionaceus* [*G. uniflorus* Klatt mss cited in synonymy]. Type: South Africa, without precise locality, possibly collected by *M.H. Lichtenstein* (B: Herb. Willdenow 916, holo.).

Gladiolus alatus var. *algoensis* Herb.: t. 2608 (1825). *Gladiolus algoensis* (Herb.) Sweet: 397 (1826). Type: South Africa, said to be from the vicinity of Algoa Bay [Port Elizabeth], without collector, grown in England, illustration in Herb.: t. 2608 (1825).

Plants (80–)150–200 mm high. *Corm* depressed-globose, 12–16 mm diam.; tunics membranous, decaying irregularly or occasionally ± fibrous. *Stem* ± erect below, flexed outward above sheathing part of third leaf, slightly compressed, ridged to winged at least on 1 side, simple or rarely with 1 short branch, often with a small cormlet in subterranean leaf axils. *Leaves* 3 or 4(5), lower 2 or 3 ± basal, lowermost longest and reaching to ± top of spike, others progressively smaller, narrowly lanceolate to linear or falcate, 2–6(–9) mm wide, lightly (1)2–several-ribbed to markedly corrugate, often lightly scabrid-papillose on veins or surface, uppermost leaf often ± bract-like. *Spike* flexed at base and inclined, lightly flexuose, 2- to 5(8)-flowered; bracts strongly keeled, green with purple keel and margins, 25–35 mm long, inner slightly shorter, 2-keeled, acute. *Flowers* orange to scarlet, lower tepals light yellow-green with orange apices, upper lateral tepals feathered dark red in lower half, sutures between tepals thickened into iridescent papillose ridges, sweetly herbaceous-scented; perianth tube obliquely funnel-shaped, 10–14 mm long; tepals with dorsal largest, ascending to ± erect or weakly arching toward stamens, occasionally almost horizontal, broadly fiddle-shaped, 35–40(–50) × 16–25 mm, margins undulate below, upper laterals spade-shaped, 22–30 mm long, narrowed below into short claws 1–3 mm long, abruptly expanded into triangular limbs 18–28 mm wide, curving outward distally, lower 3 tepals united below for 3–5 mm, free for 20–26 mm, lower laterals narrowly oblanceolate, channelled below or throughout, 8–12 mm wide near apex, lowermost narrowed below into a claw-like base ± 8 mm long, limb broadly triangular, 12–18 × 16–19 mm, as wide or wider than both lower laterals. *Filaments* strongly arched, 20–26 mm long, exserted for ± 16–18 mm from tube, lightly to densely pubescent in upper half and minutely so below; anthers 6–10 mm long, dull green to yellowish with purple lines; pollen yellowish. *Style* arching over stamens, sparsely pilose, dividing near anther apices, branches ± 5 mm long. *Capsules* oblong-ellipsoid, 18–25 mm long. *Seeds* ovate to round, ± 8 × 6–8 mm, broadly and evenly winged. *Flowering time*: August and September, at higher elevations as late as early October.



Distribution of ***Gladiolus alatus***.

Distribution and ecology: widespread through the southwestern part of South Africa, from the Bokkeveld Escarpment in Northern Cape southward through the Cederberg, along the Atlantic Coast and east to Swellendam and the Potberg, and from Breede River Valley inland to Cabidu; mainly on stony sandstone or granite, often on thin or loamy soils.

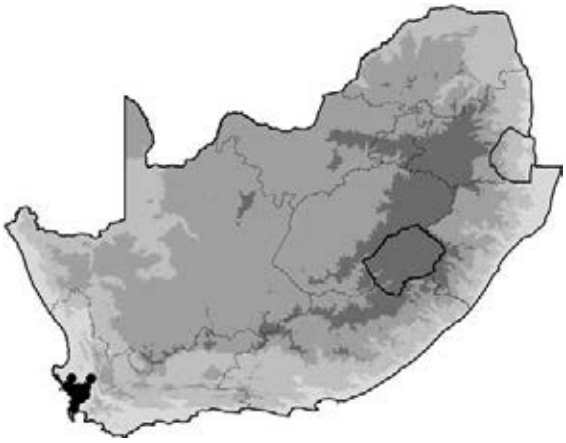
Hybrids with *Gladiolus virescens* Thunb. have been recorded near Rawsonville and Bot River.

Diagnosis: distinguished among the species with ridged or winged stems and large, predominantly orange flowers with yellowish green markings on the lower tepals by the narrow, ribbed or corrugate leaves, suberect dorsal tepal, and pubescent filaments and style. *Gladiolus meliusculus* is vegetatively similar but typically has pink (rarely orange) flowers with broader, oblanceolate lower tepals with reduced yellow markings heavily edged with dark red, and shorter filaments ± 15 mm long.

117. **Gladiolus meliusculus** *(G.J.Lewis) Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 232 (1998). *G. alatus* var. *meliusculus* G.J.Lewis in Lewis et al.: 166 (1972). Type: South Africa, [Western Cape], Malmesbury District, Ganzekraal road, 15 Sept. 1940, *Barker 2000* (NBG, holo.).

Plants 120–200(–270) mm high. *Corm* depressed-globose, 6–10 mm diam., usually producing 1 or 2 corm-

lets on short stolons up to 10 mm long; tunics membranous. *Stem* usually inclined from base or erect below, flexed outward above sheath of third leaf, unbranched, slightly compressed and 2-ridged to -winged below uppermost leaf, usually 3-ridged or -winged below first flower, usually with a small cormlet in subterranean axil. *Leaves* 4, lower 2 or 3 basal, lowermost longest, as long or longer than spike, linear, (1.8–)3.0–5.0 mm wide, strongly ridged, uppermost leaf usually bract-like and diverging from stem. *Spike* inclined, occasionally 2-, usually 3- to 6-flowered; bracts keeled, pale green with keel and margins red, 17–30 mm long, inner bracts shorter to ± as long, usually 2-keeled, minutely forked. *Flowers* pink to brick-red or orange, lower tepals yellow to greenish below narrowly to broadly edged with dark purple, throat with glistening papillose ridges on tepal sutures, sweetly honey-scented; perianth tube obliquely funnel-shaped, ± 11 mm long, mostly included in bracts; tepals with dorsal largest, oblanceolate, arching forward or ± erect when fully open, 30–38 × 15–18 mm, upper lateral tepals spade-shaped, shortly clawed for ± 2 mm, limbs abruptly expanded, 20–30 × ± 20 mm, spreading distally, lower tepals united for 3–4 mm, clawed below, laterals ± 23 mm long, claws channelled, limbs 12–16 × ± 12 mm, lower median with shorter claws, limbs 15–18 × 14–16 mm. *Filaments* strongly arched, ± 15 mm long, exserted ± 10 mm from tube, minutely pilose; anthers 5–7 mm long, purple or buff-coloured; pollen cream-coloured to yellow. *Style* arching over stamens, minutely pubescent, dividing between base and middle of anthers, branches ± 6 mm long. *Capsules* ovoid-ellipsoid, 20–26 mm long. *Seeds* oval, 6–8 × 5–6 mm, broadly and evenly winged. *Flowering time*: mid-August to early October.



Distribution of ***Gladiolus meliusculus***.

Distribution and ecology: a local endemic of the Atlantic coast of Western Cape, South Africa, historically recorded from the northern Cape Peninsula but now known only from near Philadelphia to Hopefield and Malmesbury and inland to Porterville; on loamy, seasonally waterlogged flats on granite or sandstone soils.

Diagnosis: recognised by the narrow, ribbed or corrugate leaves and pink to orange flowers with suberect dorsal tepal, oblanceolate lower tepals yellowish only toward the base edged with dark red, and relatively short, pubescent filaments ± 15 mm long and pubescent style. *Gladiolus alatus* has consistently orange flowers with narrower lower tepals yellowish for most of their length except at the extreme apices, and longer filaments 20–26 mm long.

Sect. 7. **Homoglossum** *(Salisb.) Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 234 (1998). *Homoglossum* Salisb.: 143 (1866). Type species: *Gladiolus watsonius* Thunb.

Plants small to medium-sized. *Stem* unbranched. *Corm* tunics usually leathery to woody and clawed below, sometimes fibrous or membranous. *Leaves* 2 to 4, superposed with only lowermost basal, usually firm-textured, linear to terete, midrib and margins usually thickened and variously raised, sometimes X- or H-shaped, rarely plane with unthickened midrib and margins, usually less than 5 mm wide, sometimes reduced on flowering stem. *Spike* few-flowered; bracts glabrous, margins of inner bracts free. *Flowers* small to medium, weakly to strongly bilabiate, nectar guides various, usually streaks or spots on a pale background or a yellow transverse chevron edged in darker colour, usually strongly scented; perianth tube usually obliquely funnel-shaped, shorter than or much longer than dorsal tepal. *Anthers* never tailed. *Capsules* oblong-ellipsoid. *Seeds* broadly and evenly winged.

The section includes 52 species from southern Africa plus others from tropical Africa.

Ser. **Carinati** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus carinatus* Ait.

Plants from winter-rainfall region. *Corms* ovoid to subglobose; tunics papery to fibrous. *Cataphylls* sometimes purple mottled white above ground. *Leaves* green at flowering, linear, plane, firm-textured, midrib and margins lightly thickened. *Flowers* small to medium, bilabiate or rarely actinomorphic, perianth tube shorter than to ± as long as dorsal tepal, tepals acute to attenuate, lower tepals sometimes channelled below.

118. **Gladiolus atropictus** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 235 (1998). Type: South Africa, Western Cape, MacGregor, pass to Die Galg, 25 July 1993, *Manning 2010* (NBG, holo.; PRE, iso.).

Plants 340–600 mm high. *Corm* conic, ± 15 mm diam.; tunics firm-papery, fragmenting into firm strips or

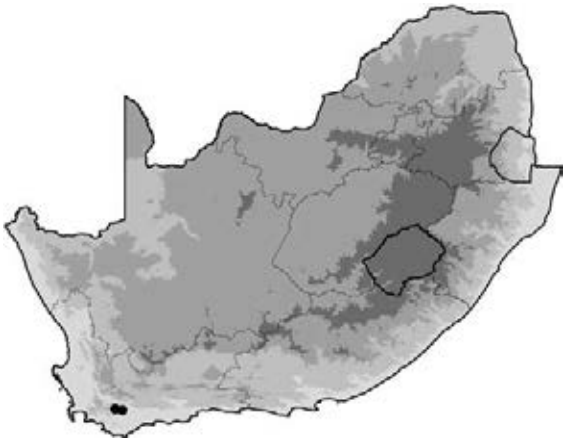
fairly coarse fibres. *Stem* erect, flexed outward above sheaths of upper 3 leaves, inclined in upper ⅓, unbranched. *Leaves* 4, lower 2 basal, lowermost sheathing lower ½ of stem, reaching to between middle and upper ⅓ of stem, linear, 1.5–2.0 mm wide, margins and main vein moderately thickened, second leaf sheathing stem to about upper third, blade shorter than basal, upper 2 leaves much shorter, lower margins united around stem. *Spike* flexuose, 1- or 2-flowered, inclined; bracts dull greenish grey with broad membranous margins, outer 26–35 mm long, inner slightly shorter, acute or minutely notched apically. *Flowers* deep mauve to violet, lower 3 tepals pale yellow in lower ½ feathered with dark violet, strongly scented of freesias and violets; perianth tube obliquely funnel-shaped, ± 13 mm long, lower cylindric part enclosed in bracts; tepals lanceolate-attenuate, upper 3 larger than lower, subequal or dorsal largest, dorsal 30–33 × ± 16 mm, horizontal and concave, upper laterals 28–30 × 12–14 mm, curving outward distally, lower 3 tepals joined to upper laterals for ± 10 mm, slightly narrowed and channelled in lower ½, lower laterals 18 × 8 mm, lower median longer than lower laterals, ± 21 × 9 mm, all curving outward distally. *Filaments* ± 12 mm long, exserted 5–8 mm from tube but concealed in flower; anthers 10–11 mm long, pale cream-coloured; pollen whitish. *Style* arching over stamens, branching just below anther apices, branches ± 3.5 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-July to mid-August.

Distribution and ecology: a narrow endemic of the lower northern slopes and foothills of the Riviersonderend Mtns in Western Cape, South Africa; in loamy soil in sandstone outcrops.

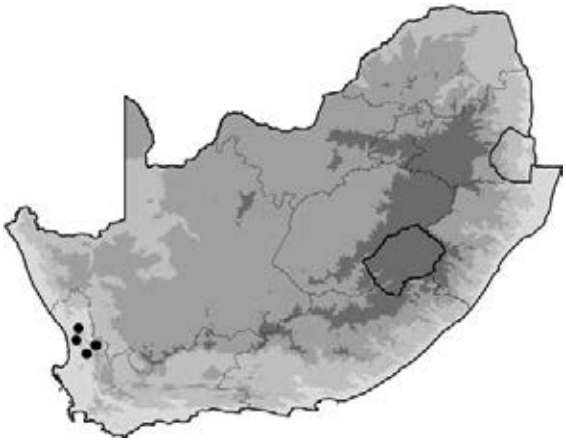
Diagnosis: recognised by the ± conical corms with papery to somewhat fibrous corm tunics, four linear leaves with the margins and midrib moderately thickened, and deep mauve to violet, funnel-shaped flowers with darker streaks on the lower tepals. The thickened midrib and margins distinguish the species from *Gladiolus mutabilis*, which has characteristic subsucculent leaves without evidently thickened midrib and margins, and *G. inflexus* has just three leaves and subglobose corms with woody tunics.

119. **Gladiolus violaceolineatus** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 233 (1972). Type: South Africa, [Western Cape], Clanwilliam District, Farm Alpha, west slope, 28 July, 1963, *Lewis 6142* (NBG, holo.; K, iso.).

Plants 300–500 mm high, with cataphylls sometimes minutely puberulous. *Corm* conic, 8–10 mm diam.; tunics cartilaginous to papery, fragmenting into firm strips or fairly coarse fibres. *Stem* erect, flexed outward above sheaths of upper 3 leaves, inclined in upper ⅓, unbranched. *Leaves* 4, lower 1 or 2 basal, lowermost sheathing lower ½ of stem, reaching to between upper ⅓ of stem and base of spike, linear, 1–2(–4) mm wide, straight, 3-angled, abaxial margin with raised edges extending outward at right angles to surface, main vein and adaxial margin not thickened or raised, remaining leaves progressively shorter, ± plane, lower margins united around stem. *Spike* inclined, flexuose, (1)2- to 4-flowered; bracts green to dark grey-green with broad membranous margins, outer (20–)28–33(–50) mm long, inner shorter, notched apically. *Flowers* pale blue streaked, speckled, and feathered with purple, lower 3 tepals white to yellow below and more strongly marked than upper, base of tepals and upper part of tube speckled with red spots, lightly sweet-scented; perianth tube obliquely funnel-shaped, 12–15 mm long, lower cylindric part enclosed in bracts; tepals narrowly lanceolate-attenuate, upper 3 larger than lower, dorsal usually largest, 26–39 × 9–18 mm, upper laterals ± 26–37 × 8–11 mm, curving outward distally, lower 3 tepals joined to upper laterals for ± 5 mm and together for ± 3 mm, slightly narrowed and deeply channelled in lower ½, lower laterals 18–30 mm long, lower median longer than laterals, 24–32 mm long, all curving outward above. *Filaments* 13–15 mm long, exserted 5–10 mm from tube but included in flower; anthers 9–11 mm long, pale grey; pollen whitish. *Style* arching over stamens, dividing between upper ⅓ and



Distribution of ***Gladiolus atropictus***.



Distribution of ***Gladiolus violaceolineatus***.

tips of anthers, branches ± 3.5 mm long. *Seeds* ovate, 7–8 × 5–6 mm, broadly and evenly winged. *Flowering time*: July to mid-August, occasionally later at higher elevations.

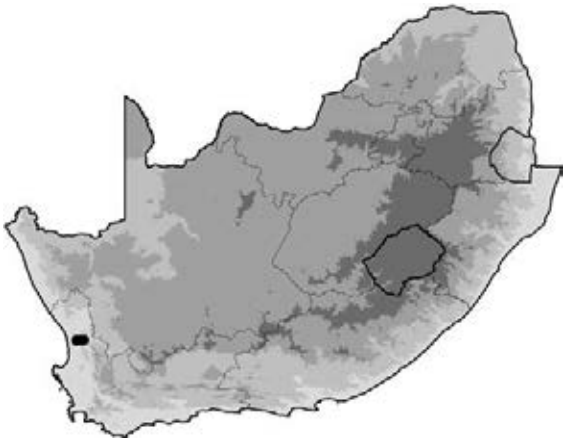
Distribution and ecology: a narrow endemic of the western mountains of Western Cape, South Africa, from Gifberg along the Pakhuis Mtns and Cederberg to Elandskloof near Citrusdal and on the Olifantsrivier Mtns near Clanwilliam; on cooler, south-facing rocky sandstone slopes.

Diagnosis: recognised by the conic corms, four leaves with unusual 3-angled blades with the adaxial margin winged at right angles to the blade proper, and distinctive purple-streaked flowers with attenuate tepals. The attenuate tepals and puberulous upper cataphyll suggest a relationship with yellow-flowered *Gladiolus comptonii* from the Heerenlogement Mtn near the coast.

120. **Gladiolus comptonii** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 235 (1972). Type: South Africa, [Western Cape], Heerenlogement Mtn, 26 July 1963, *Lewis 6144* (NBG, holo.; K, MO, iso.).

Plants 300–450 mm high, with cataphylls minutely puberulous. *Corm* globose-ovoid, 15–20 mm diam.; tunics leathery, fragmenting into coarse fibres. *Stem* erect, flexed outward above sheaths of 2 or 3 upper leaves and inclined in upper ⅓, unbranched. *Leaves* 4, lower 1 or 2 basal, lowermost sheathing lower ½ of stem, sheath minutely puberulous, reaching to base of spike, linear, 1.5–3.0 mm wide, straight, main vein and margins lightly raised, remaining leaves progressively shorter, lower margins united around stem. *Spike* inclined, flexuose, (1)2- or 3-flowered; bracts green to dark grey-green with broad membranous margins, attenuate, outer 35–60 mm long, inner shorter, lightly notched. *Flowers* bright yellow, upper tepals streaked and spotted reddish in lower ⅓, lower lateral tepals streaked and spotted with brown below, lightly sweet-scented; perianth tube obliquely funnel-shaped, 11–14 mm long, lower cylindric part enclosed in bracts; tepals narrowly lanceolate-attenuate, upper 3 subequal or dorsal slightly larger, dorsal 40–50 × 13–15 mm, upper laterals 36–44 mm long, curving outward distally, lower 3 tepals joined to upper laterals for ± 4 mm and together for ± 4 mm, slightly narrowed and deeply channelled below, lower laterals 33–40 × 8–9 mm, lower median slightly longer, 34–42 × 11–13 mm, all curving outward and downward distally. *Filaments* ± 13 mm long, exserted 8–10 mm from tube but hidden in flower; anthers 9–11 mm long, yellow; pollen yellow. *Style* arching over stamens, dividing between upper ⅓ and anther apices, branches 4–5 mm long. *Capsules* ellipsoid, subacute, 12–15 mm long. *Seeds* ovoid, 7–8 × 4–5 mm, broadly and evenly winged. *Flowering time*: mid- to late July, possibly also in late June.

Distribution and ecology: a winter-flowering species known only from the Heerenlogement Mtn near Graafwater in Western Cape, South Africa; on the cooler, upper southern slopes in rocky situations in fynbos at 600–700 m elevation.



Distribution of ***Gladiolus comptonii***.

Diagnosis: recognised by the four narrow leaves and the canary-yellow flowers with attenuate tepals, the upper laterals characteristically strongly recurved. The attenuate tepals and puberulous upper cataphyll suggest a relationship with mauve-flowered *Gladiolus violaceolineatus* from the Cederberg and adjacent mountains.

121. **Gladiolus roseovenosus** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 238 (1998). Type: South Africa, [Western Cape], near Ruitersbos Forest Station, 1 Mar. 1982, *Vlok 347* (MO, holo.).

Plants 350–500 mm high, with cataphylls green or purple sometimes lightly mottled with white. *Corm* ± globose, ± 15 mm diam.; tunics firm-papery becoming fibrous. *Stem* erect, flexed outward above sheath of uppermost or upper 2 leaves, erect above, unbranched. *Leaves* 4, lowermost basal and reaching to between lower ⅓ and middle of stem, blade short to vestigial, up to 75 mm long, linear, 1.5–2.0 mm wide, margins and main vein lightly thickened, upper leaves progressively smaller, largely sheathing, uppermost with lower margins united around stem. *Spike* erect, lightly flexuose, 2- to 4-flowered; bracts pale green, outer 25–45 mm long, inner slightly shorter, forked apically. *Flowers* creamy pink mottled and streaked with dark pink on reverse, lower 3 tepals feathered with red on veins, sometimes becoming ± solid red below, unscented; perianth tube narrowly funnel-shaped, 36–44 mm long, curving forward and widened above, cylindric lower part 26–34 mm long, enclosed in bracts; tepals lanceolate, margins undulate, dorsal largest, arching over stamens, 34–37 × 18–26 mm, curving upward distally, upper laterals curving outward distally, 33–38 × 12–14 mm, lower 3 tepals joined to upper laterals for 9 mm and together for ± 2 mm, ± 27 × 11 mm, lower median slightly larger than laterals. *Filaments* 15–17 mm long, exserted 6–8 mm from tube; anthers 8–11 mm long, purple, reaching only



Distribution of ***Gladiolus roseovenosus***.

to middle of dorsal tepal; pollen cream-coloured. *Style* arching over stamens, dividing at or up to 5 mm beyond anther tips, branches 6–8 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-February to April.

Distribution and ecology: a poorly known and local endemic of the southern foothills of the Outeniqua Mtns in Western Cape, South Africa, from the foot of Robinson's Pass near Mossel Bay to George; in peaty sandstone soil in grassy fynbos.

Diagnosis: an autumn-flowering species with short, linear leaves and large, pinkish flowers with relatively long perianth tube, 36–44 mm long and slightly longer than the dorsal tepal.

122. **Gladiolus carinatus** *Ait.*, Hortus Kewensis 1: 64 (1789). *G. odorus* Salisbury: 40 (1796), illegitimate superfluous name for *G. carinatus* Ait. Type: South Africa, without precise locality, ex Hort. Kew, 1781, *Masson s.n.* (BM, holo.).

Gladiolus tenellus Jacq.: 255 (1791). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 248 (1792 [1788–1795]).

Gladiolus punctatus Jacq.: 160 (1791). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 247 (1794 [1788–1795]).

Gladiolus tristis var. *inodorus* Thunb.: 11 (1784). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1082, 1083, syn.).

Gladiolus laevis Thunb.: 184 (1800). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1038, holo.).

Gladiolus tristis var. *humilis* Thunb.: 8 (1784). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1075, holo.).

Gladiolus tristis var. *luteus* Thunb.: 8 (1784). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1076, holo.).

Gladiolus ringens Andrews: t. 27 (1798b) [as *G. ringens* var. *cinereo-odorata*]. *G. violaceus* Pers., illegitimate superfluous name for *G. ringens* Andrews. Type: South Africa, without precise locality or collector, illustration in Andrews: t. 27 (1798b).

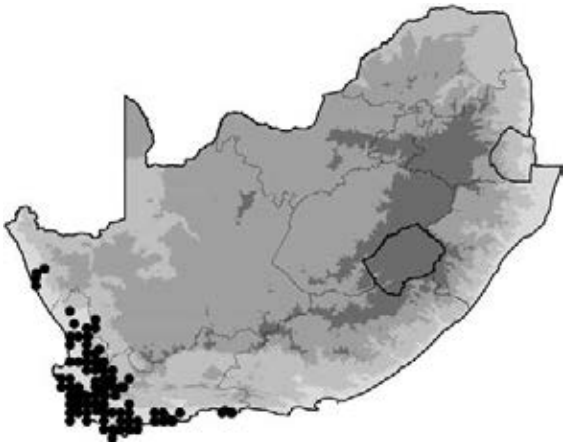
Gladiolus suaveolens Zeyh. ex Klatt: 711 (1864), illegitimate homonym, not *G. suaveolens* Ker Gawl. (1827), illegitimate superfluous name. Type: South Africa, Western Cape, near Constantia, *Ecklon & Zeyher Irid. 150* (G, MO, S, syn.).

Gladiolus nivenii Baker: 210 (1892), as a replacement name at species rank for *G. ringens* var. *undulatus* Andrews: t. 275 (1803). Type: South Africa, without precise locality, *J. Niven s.n.* cult. Great Britain, illustration in Andrews: t. 275 (1803).

Gladiolus superans N.E.Br.: 467 (1932b). Type: South Africa, [Western Cape], Riversdale District, 1932, *Muir 4850* (K, holo.).

Plants 200–500(–1 000) mm high, with cataphylls purple mottled with white. *Corm* globose, 12–18 mm diam.; tunics leathery to ± woody, fragmenting into narrow strips or coarse fibres. *Stem* erect below, flexed outward above sheaths of 2 upper leaves, unbranched. *Leaves* 3, lowermost usually shortly exceeding spike, linear, (1–)3–9 mm wide, main vein lightly to moderately thickened, margins not or very little thickened, second leaf sheathing lower ½ of stem, channelled or with short blade, uppermost leaf inserted on upper ⅓ of stem, margins united below. *Spike* inclined, lightly flexuose, (1)4- to 6(10)-flowered; bracts pale green or greyish or flushed with purple, veins and margins translucent, outer 25–35(–65) mm long, inner shorter, lightly notched apically. *Flowers* pale to mid-blue to grey or pale yellow, rarely purple or pink, lower tepals with yellow band across upper third or yellow in lower ⅔, sometimes also streaked below and above with dark purple to blue, usually intensely scented of freesias or violets; perianth tube obliquely funnel-shaped, 13–16 mm long, lower cylindric part 5–7 mm long; tepals ovate to lanceolate, dorsal largest, arching forward, recurved apically, 24–30(–38) × (11–)17–20(–26) mm, upper laterals ± equal or slightly smaller, 22–34 × 14–18 mm, curving outward distally, lower 3 tepals joined to upper laterals for up to 5 mm and together for 4–6 mm, 18–25 × 7–13 mm, widest in upper ⅓, laterals deeply channelled below with margins ± vertical. *Filaments* 11–15 mm long, exserted 5–6 mm from tube; anthers 8–10 mm long, cream-coloured; pollen cream-coloured. *Style* arching over stamens, dividing near anther apices, branches 3–4 mm long. *Capsules* oblong to ellipsoid, acute, 20–25 mm long. *Seeds* oblong, 6–8 × 5–7 mm, broadly and evenly winged. *Flowering time*: June to mid-September.

Distribution and ecology: widely distributed through the southwestern part of Western Cape, South Africa, from the Bokkeveld Escarpment to near Knysna, and also recorded along the Namaqualand Coast at Hondeklipbaai and Kleinsee in Northern Cape; in deep sandy soils or alluvial washes among Restionaceae.



Distribution of ***Gladiolus carinatus***.



Distribution of ***Gladiolus griseus***.

Diagnosis: recognised by the conspicuously mottled cataphylls, three linear leaves with lightly thickened midrib, and relatively large, funnel-shaped flowers, usually pale to mid-blue but rarely pink or yellowish, the dorsal tepal 24–38 mm long. Blue-flowered plants are most common and are widespread through the coastal areas; yellow-flowered plants are largely restricted to montane and interior areas. Winter-flowering *Gladiolus griseus* from neutral and calcareous sands along the southwest coast has smaller, greyish flowers with perianth tube 6–10 mm long and dorsal tepal 16–26 mm long.

123. **Gladiolus griseus** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 242 (1998). Type: South Africa, [Western Cape], Melkbos, 21 June 1959, *Horrocks 9* (NBG, holo., iso.).

Gladiolus tristis var. *permeabilis* Thunb.: 13 (1784). *G. carinatus* subsp. *parviflorus* G.J.Lewis in Lewis et al.: 216 (1972), replacement name at subspecific rank [not *G. parviflorus* Jacq. (1771)]. Type: South Africa, [Western Cape], Paarden Island, Cape Peninsula, *Thunberg s.n.* (UPS-THUNB 1058, holo. [photo at BOL]).

Plants 200–800 mm high, with cataphylls purple mottled with white above ground. *Corm* globose, 8–15 mm diam.; tunics papery, decaying into soft-textured fibres. *Stem* erect below, flexed outward above sheaths of upper 2 leaves, unbranched. *Leaves* 3, lowermost usually shortly exceeding spike, linear, 2.0–7.5 mm wide, main vein lightly to moderately thickened, margins not or very little thickened, second leaf sheathing lower ½ of stem, blade fairly short, uppermost leaf shortest and inserted on upper ⅓ of stem, margins united below. *Spike* inclined, lightly flexuose, (3)6- to 15-flowered; bracts pale green or greyish green or flushed purple, veins and margins translucent, outer 25–35(–40) mm long, inner slightly shorter, minutely notched apically. *Flowers* greyish mauve to greenish grey, lower tepals with yellow band across upper ⅓ edged green and maroon, usually with light sweet scent; perianth tube obliquely funnel-shaped, 6–10 mm long, lower cylindric part 3–5 mm long; tepals with dorsal largest, arching forward, recurved apically, 16–26 × 11–17 mm, upper laterals ± equal or slightly smaller, 15–21 × 10–14 mm, scarcely curving outward distally, lower tepals joined to ± laterals for 2–3 mm and to one another for up to 3.5 mm, 13–16 × ± 6 mm, widest in upper ⅓, lower laterals deeply channelled below with margins ± vertical. *Filaments* 5–9 mm long, exserted 3–6 mm from tube; anthers 7.0–9.5 mm long, cream-coloured; pollen cream-coloured. *Style* arching over stamens, dividing between middle and upper ⅓ of anthers, branches ± 2 mm long. *Capsules* oblong to ellipsoid, acute, 15–20(–25) mm long. *Seeds* ovate, ± 7 × 4–5 mm, broadly and evenly winged. *Flowering time*: late May to July.

Distribution and ecology: a rare species of the Atlantic coast of Western Cape, South Africa, from St Helena Bay to False Bay; in neutral or calcareous sands in coastal scrub or sometimes among Restionaceae.

Diagnosis: a winter-flowering species with conspicuously mottled cataphylls, three linear leaves with lightly thickened main veins, and small, greyish flowers with short perianth tube 6–10 mm long and dorsal tepal 16–26 mm long. *Gladiolus carinatus* from acid sands along the coast and inland has larger, blue to pink or yellow flowers with a perianth tube 13–16 mm long, dorsal tepal 24–38 mm long and filaments 11–15 mm long.

124. **Gladiolus quadrangulus** *(D.Delaroche) Barnard* in Goldblatt in Journal of South African Botany 36: 300 (1970). *Ixia quadrangula* D.Delaroche: 16 (1766) [*I. quadrangularis* Burm.f.: 1 (1768), orthographic variant]. *Trichonema quadrangulum* (D.Delaroche) Sweet: 399 (1826). *Geissorhiza quadrangula* (D.Delaroche) Ker Gawl.: 88 (1827). Type: South Africa, [Western Cape], Cape Flats, Isoetes Vlei, waterlogged sandy soil, 22 Sept. 1970, *Goldblatt 525* (BOL, neo.; BOL, K, iso.).

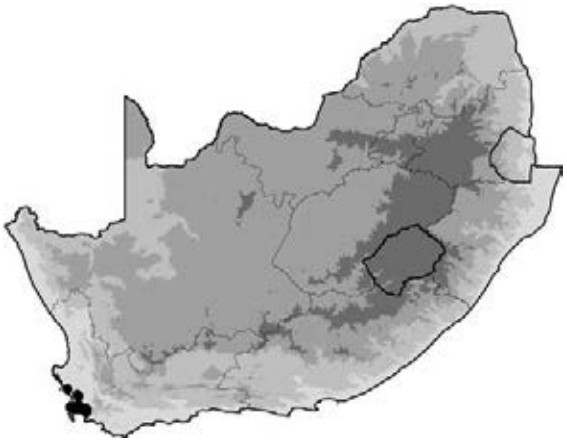
Ixia linearis L.f.: 92 (1782). *Morphixia linearis* (L.f.) Ker Gawl.: 106 (1827). *Gladiolus linearis* (L.f.)

N.E.Br.: 48 (1928). Type: South Africa, Western Cape, flats between Cape Town and Stellenbosch, *Thunberg s.n.* (UPS-THUNB 964, holo.).

Gladiolus biflorus Klatt: 197 (1885), illegitimate homonym, not *G. biflorus* Thunb. (1784). Type: South Africa, [Western Cape], Cape Flats near Wynberg, seasonally flooded sandy ground, Sept. 1884, *MacOwan 2279* (S, ? holo.; B, BOL, G, K, P, SAM, UPS, iso.).

Plants 140–350(–450) mm high, with cataphylls purplish to dry and brown with white spots. *Corm* globose, 10–15 mm diam.; tunics firm-papery to softly leathery, fragmenting into narrow strips. *Stem* erect, unbranched, straight or lightly flexed above. *Leaves* 3, lower 2 basal, lowermost as long as or slightly longer than spike, linear, thickest in midline, margins not thickened or raised, 1–2 mm wide, second leaf sheathing lower half of stem, uppermost leaf inserted on upper ⅓ of stem, margins of sheathing part united around stem. *Spike* straight and erect, 2- to 5(8)-flowered; bracts pale green, veins and margins translucent, outer 27–33(–45) mm long, inner shorter. *Flowers* actinomorphic, star-like, pale pink, mauve, or white, tepals with darker veins and often with dark median streak toward base, lightly scented of narcissus, closing tightly in midafternoon; perianth tube narrowly funnel-shaped, 6–10 mm long, lower cylindric part filiform, 4–6 mm long, tightly enclosing style; tepals subequal or outer slightly larger than inner, ovate to broadly lanceolate, 18–25 × 7–12 mm. *Filaments* erect and symmetrically disposed, ± 5 mm long; anthers 7–8 mm long, yellow; pollen yellow. *Style* erect and central, dividing just below anther apices, branches 3–4 mm long. *Capsules* ellipsoid, 13–16 mm long. *Seeds* ovate, 4–6 × ± 4 mm, broadly and evenly winged. *Flowering time*: mid-August to mid-September, occasionally in early October.

Distribution and ecology: a rare and local endemic of the coastal forelands around Cape Town in Western Cape, South Africa, from near Yzerfontein to Strand but locally extinct in parts of its range; in seasonal wetlands and vleis. The flowers close tightly in mid-afternoon.



Distribution of ***Gladiolus quadrangulus***.

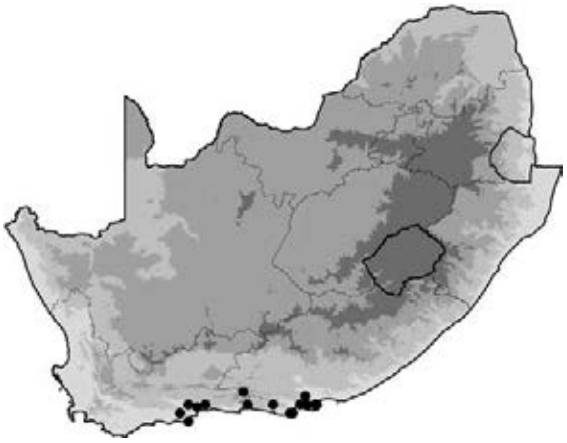
Diagnosis: recognised by the conspicuously mottled cataphylls, three linear leaves with lightly thickened midrib, and radially symmetric, mauve to pink (rarely white) flowers with darker veins.

Ser. **Mutabili** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus mutabilis* G.J.Lewis

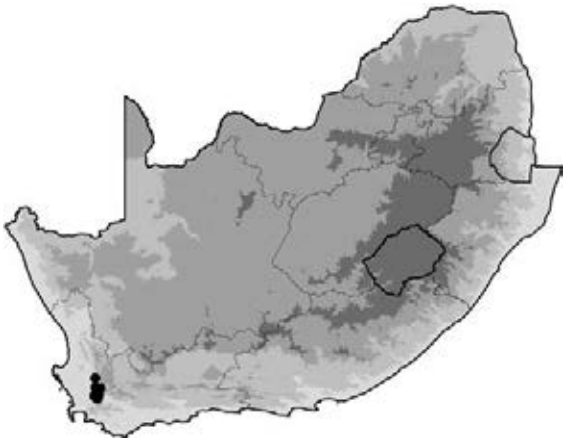
Plants from winter-rainfall region. *Corms* ovoid to subglobose; tunics papery to fibrous. *Leaves* green at flowering, often short, linear, plane, subsucculent or leathery, midrib and margins not at all thickened. *Flowers* medium, bilabiate, perianth tube shorter than to longer than dorsal tepal, tepals acute to attenuate, lower tepals sometimes channelled below.

125. **Gladiolus mutabilis** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 230 (1972), as a replacement name for *G. muirii* L.Bolus in Annals of the Bolus Herbarium 3: 181 (1924), illegitimate homonym, not *G. muirii* L.Bolus (1915). Type: South Africa, [Western Cape], Riversdale District, without precise locality, *Muir 1412* [BOL, lecto., designated by Lewis et al.: 230 (1972)].

Plants 250–500 mm high. *Corm* elongate-obconic, 8–10 mm diam.; tunics cartilaginous, decaying into firm strips and ultimately coarsely fibrous. *Stem* erect, flexed outward above sheaths of upper 2 or 3 leaves, unbranched. *Leaves* 4, lowermost basal, sheathing lower ⅓ of stem, ± linear, at least 50 mm long or reaching to top of spike, leathery or subsucculent, margins and main vein not thickened or raised, remaining leaves cauline, inserted between middle and upper ⅓ of stem, progressively shorter, all with short blades, imbricate and enclosing stem nearly to base of spike. *Spike* inclined, lightly flexuose, 2- to 5-flowered; bracts pale green, glaucous, outer elongate and attenuate, 25–40(–50) mm long, inner shorter. *Flowers* pale or dark blue, mauve, or brownish to cream-coloured shaded with brown, lower 3 tepals yellow across midline or in lower ⅔ and lightly and irregularly lined and spotted with purple to brown, sweetly scented of violets; perianth tube obliquely funnel-shaped, 13–17 mm long, usually completely enclosed in bracts; tepals with upper 3 larger than lower, obovate, lower laterals oblanceolate, margins undulate to crisped, dorsal arched to hooded over stamens, upper edges recurved, 25–32 × 14–16 mm, upper laterals curving outward distally, lower tepals united with upper laterals for 6–10 mm and together for 2–3 mm, lower laterals 16–28 × 7–9 mm, tapering and channelled below, lower median 16–25 × 12–14 mm. *Filaments* 10–15 mm long, exserted 4–5 mm from tube; anthers 9–11 mm long, lilac to cream-coloured; pollen pale yellow. *Style* arching over stamens, dividing just below to shortly above anther apices, branches ± 3 mm long. *Capsules* ellipsoid, ± 15 mm long. *Seeds* ovate, ± 5 × 3 mm, broadly evenly winged. *Flowering time*: May to July, rarely in August.



Distribution of ***Gladiolus mutabilis***.



Distribution of ***Gladiolus exilis***.

Distribution and ecology: scattered along the south coast, from Albertinia to Mossel Bay in Western Cape, South Africa and further east from west of Humansdorp to Grahamstown in Eastern Cape; in loamy and stony sandstone soils.

Diagnosis: recognised by the elongate-obconic corm with four, linear, sometimes short-bladed, leathery or subsucculent leaves with the midrib and margins not thickened or raised, and the funnel-shaped flowers with perianth tube shorter than the dorsal tepal. *Gladiolus exilis* from the mountains on the West Coast has three leaves.

126. **Gladiolus exilis** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 229 (1972). Type: South Africa, [Western Cape], Wellington, near top of Bain's Kloof Pass, west-facing slopes, 20 May 1962, *Barnard s.n. NBG 62038* (NBG, holo.).

Plants 300–600 mm high. *Corm* ovoid, 12–15 mm diam.; tunics leathery, becoming finely fibrous. *Stem* slender, usually lightly flexed above sheaths of leaves and inclined above, unbranched. *Leaves* 3, lowermost basal, sheathing lower ½ of stem, reaching ± upper ⅓ of stem, blade linear, (50–)80–120 mm long, 1.0–1.5 mm wide, plane and slightly succulent, margins and main vein not thickened or raised, remaining leaves inserted on upper ⅓ of stem, much shorter than basal and slightly narrower. *Spike* inclined, weakly flexuose, 1- to 4-flowered; bracts greyish green, relatively soft-textured, outer 20–30 mm long, often attenuate and twisted, inner slightly shorter to ± as long, usually minutely forked apically. *Flowers* pale blue-mauve to whitish barely flushed with mauve, lower lateral tepals with narrow, pale yellow median streak in lower half, all 3 lower tepals irregularly streaked and speckled with dark mauve, usually lightly violet-scented; perianth tube obliquely funnel-shaped, 11–15 mm long, lower cylindric part 7–10 mm long; tepals lanceolate, dorsal 22–35 × 11–18 mm, extending ± horizontally over stamens, curved upward distally, upper laterals 22–33 × 10–15 mm, slightly spreading above, lower 3 tepals joined to upper laterals for 5–8 mm and together for 3–4 mm, laterals 16–28 × ± 6 mm, narrow below and becoming channelled toward base, lower median 18–28 × ± 9 mm. *Filaments* 11–12 mm long, exserted 5–7 mm from tube; anthers 8–10 mm long, pale mauve; pollen whitish. *Style* arching over stamens, dividing at or just beyond anther apices, branches ± 3 mm long. *Capsules* ellipsoid, 12–15 mm long. *Seeds* ovate, ± 6 × 4 mm, broadly and evenly winged. *Flowering time*: April and May.

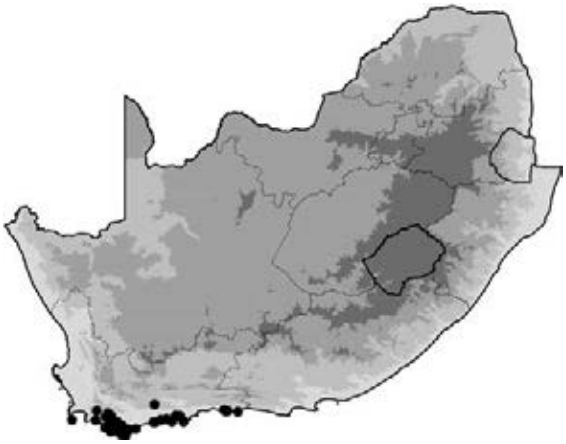
Distribution and ecology: an early-flowering species restricted to the mountains northeast of Cape Town in Western Cape, South Africa, from the Groot Winterhoek Mtns and the Witzenberg to Bain's Kloof and the Slanghoek Mtns near Rawsonville; in loamy soils on rocky sandstone slopes.

Diagnosis: distinguished by the three, linear to almost filiform, short-bladed leathery leaves without thickened midrib and margin, and funnel-shaped pale blue to whitish flowers with the perianth tube shorter than the dorsal tepal. Related *Gladiolus mutabilis* from the south coast has four leaves.

127. **Gladiolus vaginatus** *F.Bolus* in Annals of the Bolus Herbarium 2: 103 (1917). Type: South Africa, [Western Cape], Albertinia, Apr. 1914, *Muir 1287* (BOL, holo.; K, iso.).

Gladiolus vaginatus var. *subtilis* Oberm. in Lewis et al.: 273 (1972). Type: South Africa, [Western Cape], 16 km west of Elim on road to Gansbaai, '*Gladiolus delicatus*,' Lewis ms., 15 Apr. 1962, *Lewis 5956* (NBG, holo.; MO, iso.).

Plants (220–)300–550(–1 050) mm high. *Corm* globose to slightly depressed-globose, 18–30 mm diam.; tunics thin and papery, decaying into fine fibres. *Stem* straight and erect, unbranched, continuing to elongate after flowering, remaining green for several months. *Leaves* 2, lowermost basal and entirely sheathing lower ⅔ of stem, blade completely suppressed, upper leaf reduced to sheathing scale 16–20 mm long, inserted above basal



Distribution of ***Gladiolus vaginatus***.

leaf, margins overlapping; leaves of non-flowering plants and seedlings solitary, linear, slightly succulent, 1.0–1.5 mm wide. *Spike* flexed at base and inclined, lightly flexuose, 2- to 6(12)-flowered; bracts grey to purplish green, outer 15–20 mm long, inner slightly shorter or ± as long, acute or minutely forked apically. *Flowers* pale blue, lower tepals streaked and dotted with purple on a cream-coloured to yellow background, throat yellow and minutely speckled with red-purple, usually with a light sweet scent; perianth tube obliquely funnel-shaped, 6.5–20.0 mm long, wider upper part 3–8 mm long; tepals with dorsal largest, ovate to lanceolate, arching over stamens to nearly horizontal, 18–27 × 8–13 mm, upper laterals spreading in upper ½, 17–23 × 6.5–10.0 mm, lower 3 tepals united with upper laterals for 2.5–4.0 mm and together for 3–6 mm, free parts lanceolate, 12–20 × 5–8 mm, narrowed and channelled below. *Filaments* 8–14 mm long, exserted 5–8 mm from tube; anthers 5.5–11.0 mm long, mauve; pollen pale mauve. *Style* arching over stamens, dividing opposite middle of anthers, branches 2–4 mm long. *Capsules* broadly ovoid, obtuse, 10–13 mm long. *Seeds* oblong, 7 × 4 mm, broadly and evenly winged. *Flowering time*: March and April.

Distribution and ecology: largely restricted to the coastal forelands of Western Cape, South Africa, from the southern Cape Peninsula to Knysna, extending inland to Villiersdorp; mostly on calcareous sands and limestone outcrops but also gravelly clay inland. The stem and sheathing leaves remain green and photosynthetic throughout the winter months.

Diagnosis: recognised by the two bladeless leaves, the lowermost sheathing the lower two thirds of the stem and the upper reduced to a sheathing bract or scale. The funnel-shaped flowers are pale blue to white, with a perianth tube shorter than to ± as long as the dorsal tepal.

128. **Gladiolus maculatus** *Sweet*, Hortus britannicus: 397 (1826), replacement name at species rank for *G. versicolor* var. *tenuior* Ker Gawl.: t. 556 (1802a). *G. suaveolens* Ker Gawl.: 136 (1827), illegitimate superfluous name for *G. maculatus* Sweet [based on same type]. Type: South Africa, without precise locality, cult. Great Britain, illustration in Ker Gawl.: t. 556 (1802a).

Gladiolus versicolor var. *inaequalis* Ker Gawl.: t. 556 (1802a). *G. breynianus* Ker Gawl.: 135 (1827), replacement name at species rank and superfluous name for *G. pterophyllus* Pers. (1805). Type: South Africa, without precise locality, *Masson s.n.* [BM, lecto., designated by Lewis et al.: 260 (1972)].

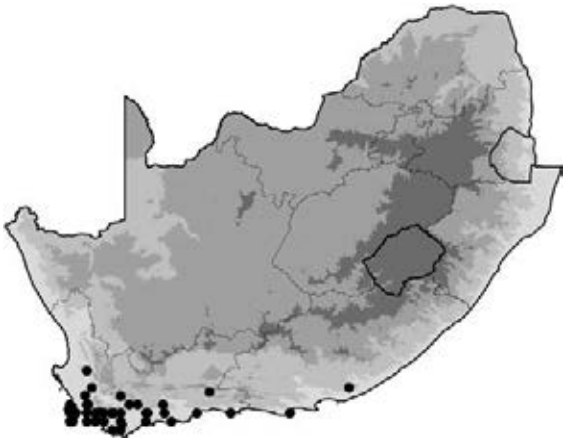
Gladiolus versicolor var. *binervis* Ker. Gawl.: t. 1042 (1807). *G. binervis* (Ker Gawl.) Sweet: 397 (1826). Type: South Africa, without precise locality or collector, illustration in Ker. Gawl.: t. 1042 (1807).

Gladiolus vaginatus var. *fergusoniae* L.Bolus: 215 (1929b). Type: South Africa, [Western Cape], Riversdale District, Still Bay, May 1929, *Ferguson s.n. BOL 18922* (BOL, holo.).

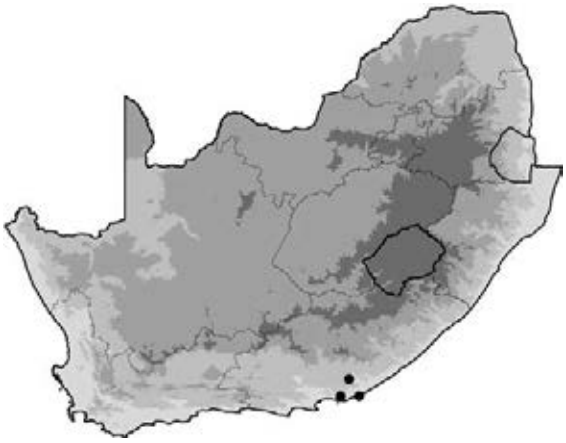
Gladiolus hibernus Ingram: 9 (1931c). *G. maculatus* subsp. *hibernus* (Ingram) Oberm. in Lewis et al.: 263 (1972). Type: South Africa, without precise locality, *Ingram s.n.,* (BM, ?holo. [illustration]).

Plants 300–800 mm high. *Corm* globose, 10–20 mm diam.; tunics papery, becoming fibrous. *Stem* erect, lightly flexed above sheaths of upper 2 leaves, unbranched. *Leaves* 3 or 4, lower 2 basal, lowermost sheathing lower ½ of stem, short, rarely reaching above base of spike, linear, leathery or subsucculent, margins and main vein not raised or thickened, remaining leaves inserted between middle and upper ⅓ of stem, progressively shorter. *Spike* usually flexed at base and inclined, flexuose, 1–3(5)- flowered; bracts green or greyish to dull purple, soft-textured, outer 30–50(–65) mm long, inner shorter than to ± as long. *Flowers* dull yellow to lilac, densely to lightly speckled throughout with small to large, pale to dark brown or purplish spots, often darkest toward tepal apices, dorsal tepal ± transparent below apices on either side of midline, strongly and sweetly scented both day and night; perianth tube obliquely funnel-shaped, 23–35(–48) mm long, lower cylindric part 15–25 mm long, with papillose zones in lower throat opposite lower tepals; tepals lanceolate-attenuate, margins undulate, dorsal slightly larger, 25–33 × 13–19 mm, extending ± horizontally over stamens, upper laterals curving outward in upper ½, 25–33 mm long, lower 3 tepals joined to upper laterals for 5–7 mm and together for 1–2 mm, free parts 23–33 mm long, curving downward in upper ½. *Filaments* 13–16 mm long, exserted 4–6 mm from tube; anthers 8–11 mm long, brown to cream-coloured; pollen yellow. *Style* arching over stamens, dividing slightly below to slightly beyond anther apices, branches 2–3 mm long. *Capsules* ovoid-ellipsoid, ± 12 mm long. *Seeds* ovate, 5–6 × 3–4 mm, broadly and evenly winged. *Flowering time*: April to June, occasionally later.

Distribution and ecology: widespread through the southern coast and near interior of Western Cape, South Africa,



Distribution of ***Gladiolus maculatus***.



Distribution of ***Gladiolus albens***.

extending from the Cape Peninsula north to the Cederberg and east in Eastern Cape to Grahamstown and Alexandria; in clay or loamy soils in renosterveld shrubland or in transitional fynbos, flowering mainly in winter.

The species hybridises with *Gladiolus priorii* on the Cape Peninsula.

Diagnosis: recognised by the three or four linear leaves with short, subsucculent blades without thickened midrib and margins, and the fragrant, mottled flowers with narrowly funnel-shaped perianth tube 23–35(–48) mm long and longer than the dorsal tepal. The flowers are highly variable in colour and intensity of mottling *Gladiolus albens* from Port Elizabeth to Alexandria has unmarked white flowers with a mostly longer perianth tube (35–)45–65 mm long.

129. **Gladiolus albens** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 250 (1998), as a new name at species rank for *G. maculatus* subsp. *eburneus* Oberm. in Lewis et al.: 263 (1972). Type: South Africa, [Eastern Cape], Alexandria, 8 May 1931, *Galpin s.n.* (BOL [*BOL 19568*], holo.; K, iso.).

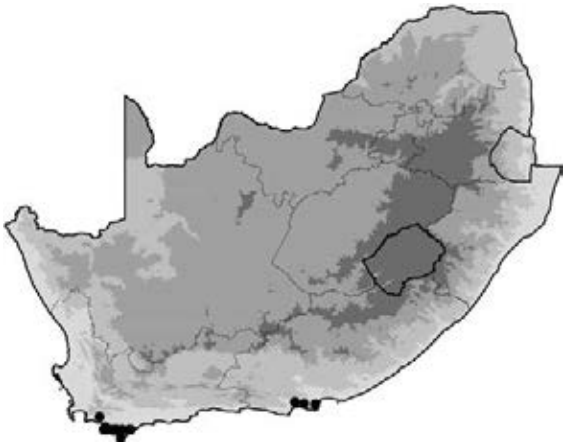
Plants 250–500(–700) mm high. *Corm* globose, 10–20 mm diam.; tunics papery, becoming fibrous. *Stem* erect, lightly flexed above sheaths of upper 1 or 2 leaves, unbranched. *Leaves* 3(4), lower 2 basal, lowermost sheathing lower ⅓–½ of stem, short, rarely longer, linear, up to 100 mm long, 1–2 mm wide, leathery or subsucculent, with 3 equal veins, margins not raised or thickened, remaining leaves inserted between middle and upper ⅓ of stem, progressively shorter. *Spike* flexed at base and inclined, flexuose, 1–3(5)-flowered; bracts green or greyish, soft-textured, outer 27–40(–45) mm long, inner shorter to ± as long. *Flowers* cream-coloured to white, sometimes with small speckles or faint red-brown streaks in throat or on tepals, with light, somewhat metallic, dusty sweet scent; perianth tube narrowly and obliquely funnel-shaped, (35–)45–65 mm long, lower cylindric part 25–42 mm long, gradually expanding in upper part; tepals ovate, margins lightly undulate, subequal, dorsal slightly larger, 23–35 × 12–21 mm, extending ± horizontally over stamens, upper laterals curving outward distally, 23–39 × 9–14 mm, lower 3 tepals joined to upper laterals for 5–6 mm and together for 1–2 mm, free parts 21–31 × 1–13 mm, curving downward distally. *Filaments* 12–15 mm long, exserted 3–6 mm from tube; anthers 9–12 mm long, cream-coloured; pollen yellow. *Style* arching over stamens, dividing close to or shortly beyond anther apices, branches 3–5 mm long. *Capsules* and *seeds* unknown. *Flowering time*: March to May, occasionally in February.

Distribution and ecology: a narrow endemic of Eastern Cape, South Africa, from Port Elizabeth to Alexandria and inland to Somerset East; on grassy slopes.

Diagnosis: distinguished from *Gladiolus maculatus*, in which it was once included a subspecies, by the unmarked, white to cream-coloured flowers with mostly longer perianth tube, (35–)45–65 mm long and well exserted from the bracts.

130. **Gladiolus meridionalis** *G.J.Lewis* in Annals of the South African Museum 40: 127 (1954). *G. maculatus* subsp. *meridionalis* (G.J.Lewis) Oberm. in Lewis et al.: 262 (1972). Type: South Africa, [Western Cape], Caledon District, south slopes of mountains near Danger Point, 28 Apr. 1948, *Linley s.n.* (SAM [*SAM 60214*], holo.; BOL, K, iso.).

Plants 300–800 mm high. *Corm* globose, 10–20 mm diam.; tunics papery to leathery, becoming fibrous. *Stem* erect, lightly flexed above sheaths of upper 2 leaves, unbranched. *Leaves* 3, lower 2 basal, lowermost sheathing lower ½ of stem, short, rarely reaching base of spike, linear, leathery, margins and main vein not raised or thickened, cauline leaves inserted between middle and upper ⅓ of stem, progressively shorter. *Spike* flexed at base and inclined, flexuose, 1- or 2(3)-flowered; bracts green or greyish to dull purple, soft-textured, outer 36–50 mm long, inner shorter to ± as long. *Flowers* pale



Distribution of ***Gladiolus meridionalis***.

to deep salmon-pink or cream-coloured, often with dark spots at base of lower tepals and in lower throat, faintly sweet-scented; perianth tube 40–48 mm long, slender and subcylindric below for ± 20 mm, upper part wide and cylindric; tepals ovate, subequal, dorsal 22–28 × 18–23 mm, extending ± horizontally over stamens, upper laterals 24–32 × 15–17 mm long, lower 3 tepals joined to upper laterals for 6–7 mm and to one another for ± 1 mm, free parts 20–28 mm long, curving downward in upper half. *Filaments* 28–40 mm long, exserted 3–4 mm from tube; anthers 9–10 mm long, light brown; pollen yellow. *Style* extending horizontally over stamens, dividing at or up to 5 mm beyond anther tips, branches ± 4 mm long. *Capsules* ovoid-ellipsoid, ± 12 mm long. *Seeds* ovate, ± 5 × 3 mm, broadly and evenly winged. *Flowering time*: April to June, occasionally in March or rarely later in year.

Distribution and ecology: with a highly discontinuous range in the southern part of South Africa, occurring between Gansbaai and Elim in Western Cape, and between Greenbushes and Bethelsdorp near Port Elizabeth in Eastern Cape; on sandstone slopes in fynbos near the coast.

Diagnosis: recognised by the three linear leaves with short, subsucculent blades without thickened midrib and margins, and the long-tubed, cream-coloured to pink flowers, the tube 40–48 mm long and slender and subcylindric in the lower half and widely cylindric in the upper half. Orange-flowered *Gladiolus priorii* from the west and southwest coast has narrower, oblong upper lateral and lower tepals 9–12 mm wide.

131. **Gladiolus priorii** *(N.E.Br.) Goldblatt & M.P.de Vos* in Adansonia 11: 421 (1990). *Antholyza priorii* N.E.Br.: 244 (1929b). *Homoglossum priorii* (N.E.Br.) N.E.Br.: 279 (1932a). Type: South Africa, [Western Cape], near Cape Town, open sites in scrub, July 1846, *Prior s.n.* (K, holo.).

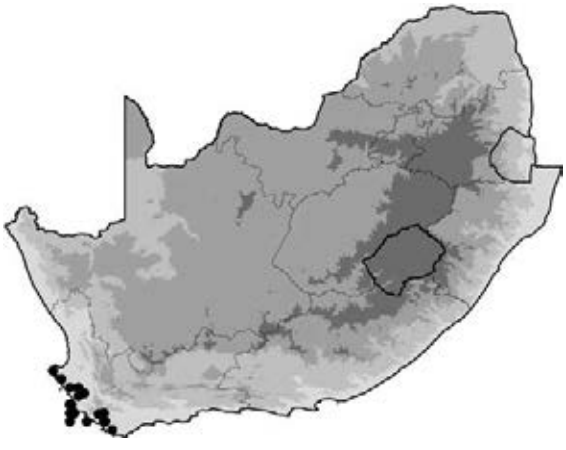
Gladiolus hirsutus var. *tenuiflorus* Klatt: 713 (1864). Type: South Africa, [Western Cape], near Cape Town, without date, *Ecklon & Zeyher Irid. 152* (MO, syn.).

Plants 300–500(–700) mm high. *Corm* ovoid, 12–20 mm diam.; tunics papery, becoming softly fibrous. *Stem* erect, flexed outward above sheaths of upper 3 leaves, unbranched. *Leaves* (3)4, lowermost basal and sheathing lower ⅓–½ of stem, relatively short, rarely reaching base of spike, linear, up to 100 mm long, usually fairly fleshy, margins and main vein not raised or thickened, remaining leaves progressively shorter. *Spike* inclined, flexuose, 1- to 4(5)-flowered; bracts firm-textured, outer 25–40(–50) mm long, inner shorter to ± as long. *Flowers* scarlet, base of lower tepals and upper part of tube pale yellow or cream-coloured, unscented; perianth tube 30–46 mm long, slender and cylindric in lower 10–20 mm, abruptly expanded into a wider cylindric upper part 20–30 mm long; tepals lanceolate, dorsal largest, extending horizontally over stamens, 25–32 × 15–19 mm, upper laterals spreading ± from base, 22–32 × 10–12 mm, lower 3 tepals arching downward from base, 20–27 × 9–12 mm. *Filaments* 25–37 mm long, exserted 6–10 mm from tube; anthers 7.5–8.5 mm long, pale yellow; pollen yellow. *Style* extending horizontally over stamens, dividing between middle and upper ⅓ of anthers, 2.5–3.5 mm long. *Capsules* ellipsoid, acute, 12–15 mm long. *Seeds* ovate, 6–7 × ± 5 mm, broadly and evenly winged. *Flowering time*: May and June, occasionally in April or July.

Diagnosis and ecology: a species of rocky outcrops along the southwestern coast of Western Cape, South Africa, from Saldanha Bay to the Cape Peninsula, and east to Betty's Bay to Hermanus; often on granite but also sandstone ourcrops.

The species hybridises with *Gladiolus maculatus* on the Cape Peninsula.

Diagnosis: recognised by the three or four linear leaves with short, subsucculent blades without thickened midrib and margins, and the long-tubed, red to nearly orange flowers, the tube 30–46 mm long and slender and subcylindric in the lower half and widely cylindric



Distribution of ***Gladiolus priorii***.

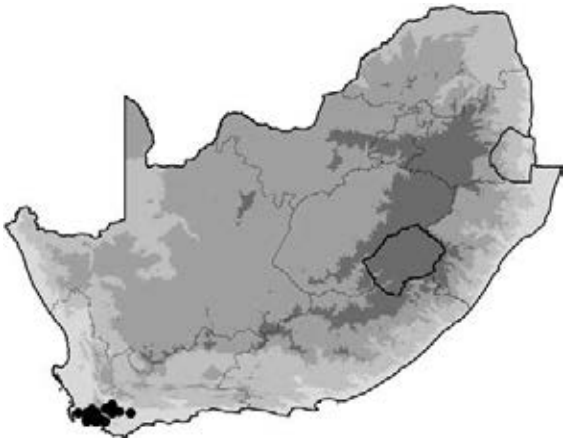
in the upper half. With cream-coloured to salmon-pink flowers, *Gladiolus meridionalis* from the south coast has broader, ovate tepals 15–23 mm wide.

Ser. **Brevitubi** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus brevitubus* G.J.Lewis

Plants from winter-rainfall region. *Corms* subglobose; tunics fibrous. *Leaves* green at flowering, linear, midrib and margins lightly thickened, lower sheath scabridulous; bracts broadly ovate, obtuse. *Flowers* small, subactinomorphic, subrotate, perianth tube very short, tepals acute, lower tepals yellow at base.

132. **Gladiolus brevitubus** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 171 (1972), replacement name for *Tritonia ventricosa* Baker: 192 (1892) [not *G. ventricosus* Lam.]. Type: South Africa, [Western Cape], Appelskraal near Riviersonderend, Sept., *Zeyher 3793* (K, lecto., designated by Lewis et al.: 171 (1972), SAM, isolecto.).

Plants 120–400 mm high. *Corm* globose, 8–12 mm diam.; tunics of fine to medium-textured fibres, forming a short collar around base of stem. *Stem* erect or inclined, ± straight, unbranched. *Leaves* 3 or 4, lower 1 or 2 basal, lowermost usually somewhat longer than spike, sheath scabridulous, linear, 1.5–3.5 mm wide, main vein and margins lightly thickened, remaining leaves progressively shorter, upper 2 leaves largely to entirely sheathing. *Spike* inclined, flowers borne on upper side, lightly flexuose, 2- to 8-flowered; bracts green, broadly ovate and obtuse, margins often reddish, outer 10–13 mm long, inner slightly shorter to slightly longer. *Flowers* nearly actinomorphic, subrotate, orange to salmon or brick-red, lower lateral tepals yellow near base, with a light, sweet scent; perianth tube funnel-shaped, 2.5–4.0 mm long, papillate at throat; tepals subequal, outer whorl slightly larger than inner, ovate, 11–18 × 5.5–10.0 mm. *Filaments* unilateral, 2–3 mm long, reaching to ± mouth of tube, bases papillate; anthers 4–5 mm long, yellow; pollen yellow. *Style* straight, 4–5 mm long, dividing opposite base of anthers, branches 3–4 mm long. *Capsules* obovoid, 3-lobed apically and retuse, 8–11 mm long. *Seeds* oblong, 4.5–6.0 × 3.5–4.0 mm, broadly and evenly winged. *Flowering time*: late October and November, occasionally in early December.



Distribution of ***Gladiolus brevitubus***.

Distribution and ecology: endemic to the southwestern mountains of Western Cape, South Africa, from the Hottentots Holland Mtns to the Riviersonderend and Kleinrivier Mtns in the east; on moist, south-facing sandstone slopes from 200 to 1 500 m elevation, flowering in late spring and early summer.

Diagnosis: a slender species with soft-textured, linear leaves, unusual ovate bracts, subequal tepals and subrotate, orange flowers with very short perianth tube, 2.5–4.0 mm long, enclosing the short, unilateral filaments.

Ser. **Graciles** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus gracilis* Jacq.

Plants from winter-rainfall region. *Corms* subglobose; tunics ± leathery and fragmenting into claws, or coarsely fibrous. *Leaves* green at flowering, linear, midrib and margins lightly thickened or margins winged and blade thus H-shaped. *Flowers* medium, zygomorphic, perianth tube usually shorter than dorsal tepal, tepals acute to attenuate or rarely obtuse, lower tepals usually streaked or spotted, sometimes blotched.

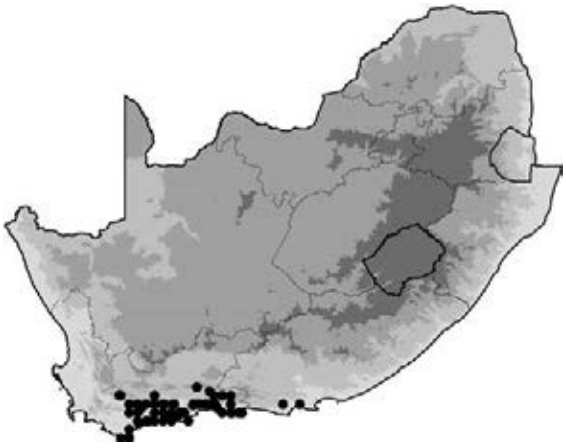
133. **Gladiolus rogersii** *Baker*, Handbook of the Ixideae: 208 (1892). Type: South Africa, [Western Cape], without precise locality (as Cape Flats), 1859, *Moyle Rogers s.n.* (K, holo.).

Gladiolus bolusii var. *burchellii* L.Bolus: 101 (1917). *G. burchellii* (L.Bolus) Ingram: 482 (1932). Type: South Africa, [Western Cape], Knysna District, west end of Groenvlei, 9 Aug. 1814, *Burchell 5631* (K, holo.).

Gladiolus rogersii var. *graminifolius* G.J.Lewis in Lewis et al.: 246 (1972). Type: South Africa, [Western Cape], Montagu District, Scheepersrus, 5 Aug. 1949, *Barker 5427* (NBG, holo.; BOL, iso.).

Gladiolus rogersii var. *vlokii* Goldblatt: 453 (1984). Type: South Africa, [Western Cape], Ruitersbos Forest Reserve in deep sand, 1 Mar. 1948, *Vlok 348* (NBG, holo.; MO, PRE, iso.).

Plants (200–)300–500(–650) mm high, with cataphylls purple or mottled with white or dry and dark brown, sometimes minutely velvety. *Corm* globose, 8–14 mm diam.; tunics usually papery or finely fibrous, occasionally fibres of medium texture, rarely coarse and claw-like below. *Stem* erect below, flexed outward above sheaths of 2 upper leaves and inclined above, unbranched. *Leaves* 3 or 4(5), lowermost or lower 2 reaching base or exceeding spike, linear (rarely ± ellipsoid in section), 1.5–4.0(–6.5) mm wide, straight, soft-textured to somewhat wiry, margins and main vein lightly to heavily thickened, cauline leaves inserted well above ground, progressively shorter, uppermost sometimes entirely sheathing,



Distribution of ***Gladiolus rogersii***.

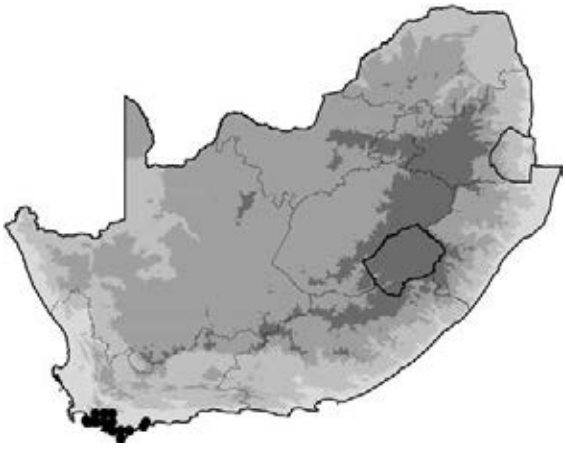
margins usually united below. *Spike* inclined, (1)3- to 6-flowered; bracts green or flushed grey to purple with broad, transparent margins, diverging, outer 15–22 mm long, inner slightly smaller, minutely forked. *Flowers* inflated and bell-like, pale to dark blue or purple, darker on reverse of upper tepals, lower tepals lightly spotted with purple in lower ½ and with transverse or median yellow to white mark in upper ⅓ outlined or surrounded with dark blue to purple, usually lightly sweet-scented; perianth tube obliquely funnel-shaped, geniculate, 12–19 mm long, lower half erect and cylindric, upper half bent at right-angles and flaring outward; tepals with upper ovate, lower spathulate, dorsal largest, extending horizontally over stamens, obovate, 20–30 × 16–26 mm, upper laterals slightly shorter, curving slightly outward apically, lower 3 cupped with apices directed forward or downward, united for 5–9 mm with upper laterals, free parts 16–22 × 8–16 mm, not clearly divided into limb and claw, broadly obtuse or emarginate margins curved upward distally. *Filaments* 10–12(–15) mm long, exserted 5–8 mm from tube; anthers 5.5–9.0 mm long, blue; pollen cream-coloured. *Style* arching over stamens, dividing close to anther apices, branches ± 4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mainly late August to mid-October, occasionally to mid-November, exceptionally March to July.

Distribution and ecology: widespread along the southern coast of Soutb Africa, from the Agulhas Peninsula along the coastal plain and the Langeberg and Outeniqua Mtns in Western Cape to near Humansdorp in Eastern Cape, extending inland on Touwsberg; in fynbos on costal limestone flats and south-facing sandstone slopes up to 1 000 m elevation.

Diagnosis: a variable species with three to five linear leaves with the margin and midrib lightly thickened, rarely solidly oval in section, and inflated, bell-shaped, mauve to blue flowers with a short, sharply bent perianth tube 12–19 mm long. The lower tepals are typically marked with a white to yellow transverse band outlined with dark blue or purple.

134. **Gladiolus bullatus** *Thunb. ex G.J.Lewis* in Botaniska Notiser 119: 286 (1966) [as *G. bullatus* Thunb. ex N.E.Br.], replacement name for *G. spathaceus* Pappe ex Baker: 208 (1892), illegitimate homonym, not *G. spathaceus* L.f. (1782). Type: South Africa, [Western Cape], Caledon Swartberg, Sept. 1884, *MacOwan 2167* (also as *Herb. Norm. Austr. Afr. 282*) (K, lecto., designated by Goldblatt & Manning: 257 (1998); G, BOL, isolecto.).

Plants 450–1 000 mm high, with minutely puberulous cataphylls. *Corm* ovoid, 10–20 mm diam.; tunics hard and woody, usually splitting below into thick claw-like ribs. *Stem* erect and ± straight, lightly flexed outward above sheaths of upper 3 leaves and at base of spike, unbranched. *Leaves* (3)4, lowermost reaching to ± middle of stem, usually largely sheathing, linear, ± 2 mm wide, main vein heavily thickened, margins lightly thickened, thus oval in section with two narrow grooves on each surface, upper leaves progressively shorter, mostly sheathing, sheaths of all leaves overlapping. *Spike* inclined, 1- or 2-flowered; bracts brownish purple to grey, attenuate, lightly ridged along veins, outer 30–37(–70) mm long, inner similar but shorter. *Flowers* inflated and bell-like, often slightly flattened, blue to violet, darker on reverse of upper tepals, whitish within, lower tepals lightly spotted with purple in lower half, lower laterals with yellow marginal marks or transverse band in upper third, lowermost with yellow median streak, unscented; perianth tube 10–16 mm long, obliquely funnel-shaped, geniculate, erect and cylindric below for 5–8 mm long, bent at right angles in middle and flaring abruptly; tepals with upper broadly obovate, lower oblanceolate, dorsal largest, extended horizontally over stamens, 25–35 × 20–28 mm, upper laterals slightly shorter and curved slightly outward apically, lower 3 united with upper laterals for 4–10 mm and together for ± 2 mm, laterals 20–32 × 10–18 mm, cupped with apices directed forward, lower median slightly shorter, 18–22 × 12–16 mm. *Filaments* 12–14 mm long, exserted from tube for 3–6 mm; anthers 7–10 mm long,



Distribution of ***Gladiolus bullatus***.

reaching to middle of dorsal tepal, white to grey-blue; pollen cream-coloured. *Style* arching over stamens, dividing near anther apices, branches ± 3 mm long. *Capsules* narrowly ovoid, obtuse, 18–20 mm long, concealed in bracts. *Seeds* ovate, pointed at one end, 4–5 × 3 mm, broadly and evenly winged. *Flowering time*: mid-August to mid-September.

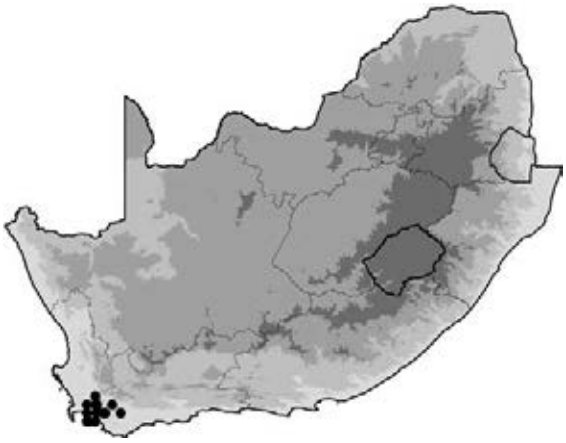
Distribution and ecology: restricted to the southern coastal mountains of Western Cape, South Africa, from Houw Hoek and Kogelberg to Bredasdorp and Potberg near Cape Infanta; on south-facing sandstone or rarely limestone slopes.

Diagnosis: distinctive in its four, rarely three, linear leaves with overlapping bases completely sheathing the stem to near the apex, the attenuate and ribbed bracts, and the one or two large, bell-shaped blue flowers with short, sharply bent tube 10–16 mm long. The lower tepals are marked with yellow lateral blotches or a transverse yellow band edged with purple.

135. **Gladiolus blommesteinii** *L.Bolus* in Annals of the Bolus Herbarium 3: 183 (1924). Type: South Africa, [Western Cape], without precise locality or collector, Caledon Wild Flower Show, 1915 [BOL (*BOL 14786*), lecto., designated by Lewis et al.: 218 (1972)].

Gladiolus blommesteinii var. *major* L.Bolus: 183 (1924). Type: South Africa, [Western Cape], without precise locality or collector, Caledon Wild Flower Show, 1915, *BOL 14791* (BOL, holo.).

Plants 300–600 mm high. *Corm* ovoid, 12–20 mm diam.; tunics hard and woody layers, splitting below into claw-like segments. *Stem* erect, flexed outward above sheaths of 3 upper leaves and weakly inclined above, unbranched. *Leaves* 4, lowermost basal, sheathing lower ½ of stem and reaching to between middle of stem and shortly above spike, linear, 1.0–1.5 mm wide, straight, margins and main vein lightly raised, upper leaves progressively shorter, usually sheathing for ½ their length, blades often slightly narrower, uppermost leaf usually reaching to middle of first flower. *Spike* inclined, (1)2- to 4-flowered; bracts green to dark grey-green, ridged along veins distally, outer 20–36 mm long, inner shorter, minutely forked apically. *Flowers* pale mauve-pink to pale blue-mauve, lower tepals yellowish below with streaks or lines of dark red, blue, or purple along veins, and with red spots and streaks in throat, lightly sweet-scented; perianth tube obliquely and narrowly funnel-shaped, 13–24 mm long, lower cylindric part 7–13 mm long, lower part enclosed in bracts and upper part reaching to ± apex of outer bract; tepals lanceolate, dorsal largest, 28–44 × 14–20 mm, ascending, upper laterals ± as long or somewhat shorter and slightly narrower, slightly ascending, lower 3 tepals joined to upper laterals for 4–6 mm and together for 2–3 mm, usually with a short tooth at point of union, narrowly lanceolate, not notably clawed below, free parts 20–35 × 8–10 mm, flexed outward in upper half. *Filaments* 12–14 mm long,



Distribution of ***Gladiolus blommesteinii***.

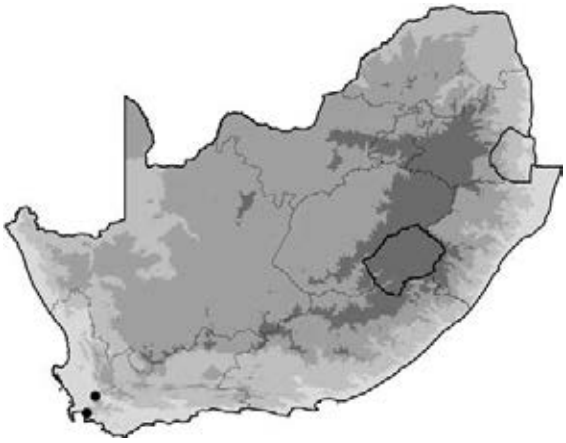
exserted 2–6 mm from tube but included in flower; anthers 8–11 mm long, whitish; pollen pale grey. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches 3–4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: August to mid-October.

Distribution and ecology: restricted to the southwestern mountains of Western Cape, South Africa, from Franschhoek Pass along the Hottentots Holland Mtns to Kogelberg and eastward to the Riviersonderend and Klein River Mtns; on south-facing sandstone slopes, flowering mainly after fire.

Diagnosis: recognised by the four linear leaves with slightly thickened main vein and margins, striate or ribbed bracts, and funnel-shaped, pink to mauve flowers with lanceolate-attenuate tepals, typically with darker veins and with purple-streaked nectar guides. *Gladiolus virgatus* has a slightly longer perianth tube, 22–27 mm long and ± abruptly flared above, and chevron-like red markings on the lower tepals.

136. **Gladiolus virgatus** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 260 (1998). Type: South Africa, [Western Cape], west end of Du Toit's Peak, 16 Oct. 1949, *Esterhuysen 16061* (BOL, holo.; K, NBG, SAM, iso.)

Plants 400–500 mm high. *Corm* globose, ± 12–14 mm diam.; tunics hard and cartilaginous to woody, splitting below into claw-like segments. *Stem* erect below or inclined from base, flexed laterally above sheaths of upper 2 leaves, unbranched. *Leaves* 4, lower 2 basal, lowermost reaching to between base and slightly beyond apex of spike, sometimes sheathing stem up to middle, linear, 1.5–2.5 mm wide, main vein and margins lightly raised, remaining leaves progressively shorter and sheathing for ½ their length. *Spike* inclined, 2- to 4(6)-flowered; bracts green or flushed purple, ridged along veins 30–45(–50) mm long, inner slightly shorter, notched apically. *Flowers* pale to dark pink or nearly white, lower tepals with spear-shaped whitish median streak in lower half edged distally with dark pink V-shaped mark,



Distribution of ***Gladiolus virgatus***.

speckled pink in throat, unscented; perianth tube 22–27 mm long, slender below, abruptly expanded in upper 4–7 mm, slightly exceeding bracts; tepals lanceolate, unequal, margins usually undulate, dorsal largest, inclined over stamens, ± 30–37 × 18–19 mm, upper laterals ± as long, 14–16 mm wide, arching outward in upper ⅓, lower 3 tepals joined to upper laterals for 2–3 mm and together for ± 3 mm, gently to sharply flexed downward in middle, lower laterals 20–28 × 10–12 mm, lower median 25–28 × 10–12 mm. *Filaments* 12–16 mm long, exserted ± 8 mm from tube; anthers 8–9 mm long, light mauve; pollen whitish. *Style* arching over stamens, dividing between upper ⅓ and slightly beyond anther apices, branches ± 6 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-September to early November, rarely as early as end of August.

Distribution and ecology: a narrow endemic of the southwestern mountains of Western Cape, South Africa, from the Helderberg above Somerset West to Du Toit's Kloof; on south-facing sandstone slopes, flowering mainly after fire.

Diagnosis: recognised by the four linear leaves with lightly thickened main veins and margins, striate or ribbed bracts, and relatively long-tubed, pink flowers with lanceolate-attenuate tepals and red, chevron-shaped nectar guides on the lower tepals. Allied *Gladiolus blommesteinii* has a lightly shorter, gently flared perianth tube, 17–24 mm long, and streaked or spotted nectar guides on the lower tepals.

137. **Gladiolus debilis** *Sims* in Curtis's Botanical Magazine 52: t. 2585 (1825). Type: South Africa, without precise locality or collector, cultivated in Great Britain, illustration in Sims: t. 2585 (1825).

Gladiolus cochleatus Sweet: t. 140 (1832). *G. debilis* var. *cochleatus* (Sweet) G.J.Lewis in Lewis et al.: 186 (1972). Type: South Africa, without precise locality or collector, cultivated in Great Britain, illustration in Sweet: t. 140 (1832).

Gladiolus lambda Klatt: 708 (1864). Type: South Africa, Cape, without precise locality, *Reynaud s.n.* [S, lecto., designated by Lewis et al.: 186 (1972)].

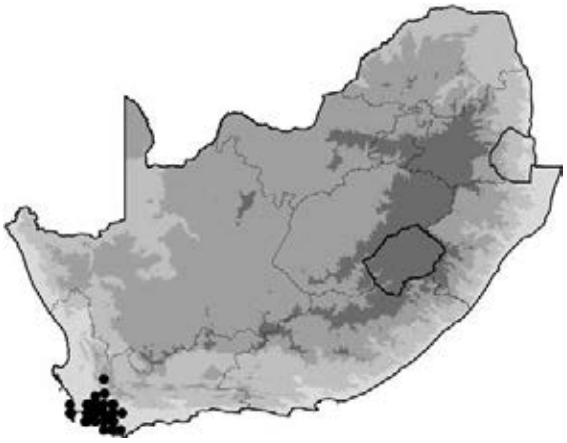
[*Geissorhiza albens* E.Mey.: 187 (1843), invalid name without description.]

Plants (120–)250–450 mm high. *Corm* 8–15 mm diam.; tunics splitting into coarse wiry to ± woody claw-like segments. *Stem* flexed outward above sheaths of upper leaves, inclined above, unbranched. *Leaves* (3)4, lowermost basal and reaching to between upper ⅓ of stem and apex of spike, linear, 1–2 mm wide, main vein moderately thickened and margins usually also thickened and raised, upper leaves progressively shorter, sheathing for about ½ their length. *Spike* inclined, flexuose, 1- to 3-flowered; bracts light green to greyish, sometimes flushed dull purple, lightly ridged along veins, margins hyaline, 15–28 mm long, inner slightly shorter, minutely forked apically. *Flowers* white to pale pink, lower 3 tepals variously marked with red, often with a pair of large spots near base and a V- or spade-shaped distal mark, sometimes extending back along midline, lower part of throat speckled and streaked with red and filaments red, unscented; perianth tube cylindric, very slightly curved and expanded in upper 2 mm, (10–)15–22 mm long, slightly shorter to as long as bracts; tepals ovate to nearly orbicular, dorsal largest, inclined or erect, 17–27 × 10–18(–22) mm, upper laterals arching outward from base, spreading at right angles to tube, 15–27 × (9–)13–18 mm, lower tepals sometimes united basally for up to 3 mm, weakly flexed downward in upper ½, narrowed below, 15–24 mm long, subequal or lower median larger. *Filaments* 4–10 mm long, exserted 2–7 mm from tube, often reddish, or red abaxially; anthers 5–9 mm long, white above, purple below; pollen cream-coloured. *Style* dividing opposite to slightly beyond anther apices, branches 2–5 mm long. *Capsules* ellipsoid, subacute, (12–)14–18 mm long. *Seeds* ovate, 5–6 × ± 4 mm, broadly and evenly winged. *Flowering time*: September to early October.

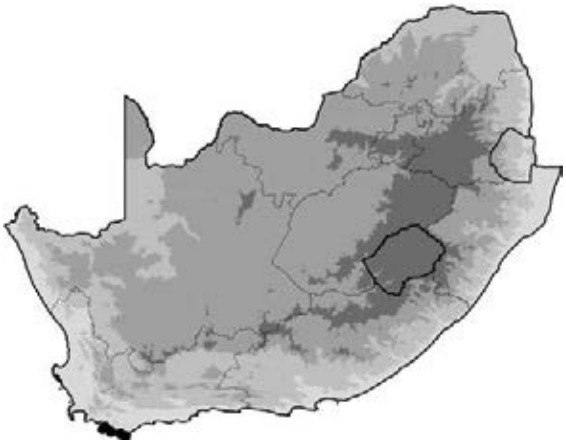
Distribution and ecology: endemic to the southwestern mountains of Western Cape, South Africa, on the Cape Peninsula and from Bain's Kloof along the Hottentots Holland Mtns to the Kogelberg and eastward to Bredasdorp; on sandstone slopes, flowering mainly after fire.

Diagnosis: recognised by the mostly four (rarely three) linear leaves with lightly thickened midrib and margins, striate or ribbed bracts, and white flowers marked with red on the lower tepals and often flushed pinkish on the reverse, with a cylindric perianth tube (10–)15–22 mm long expanded only near the top. The markings on the lower tepals include chevrons, diamonds or streaks and lines in regular patterns, and the base of the throat is also marked with a ring of red.

Populations from the Hottentots Holland Mtns have the smallest flowers, with the lower tepal marking reduced to a small red diamond; plants on the Cape Peninsula have flowers marked with V-shaped chevrons;



Distribution of ***Gladiolus debilis***.



Distribution of ***Gladiolus variegatus***.

and those from Hermanus to Bredasdorp are marked with paired spots and streaks. *Gladiolus variegatus* from limestone hills on the Agulhas Peninsula has mostly three leaves, smooth bracts, and unevenly spotted lower tepals.

138. **Gladiolus variegatus** *(G.J.Lewis) Goldblatt & J.C.Manning* in Novon 6: 178 (1996). *G. debilis* var. *variegatus* G.J.Lewis in Lewis et al.: 188 (1972). Type: South Africa, [Western Cape], Bredasdorp District, Brandfontein, 14 Oct. 1951, *Esterhuysen 19087* (BOL, holo.; BOL, NBG, PRE, iso.).

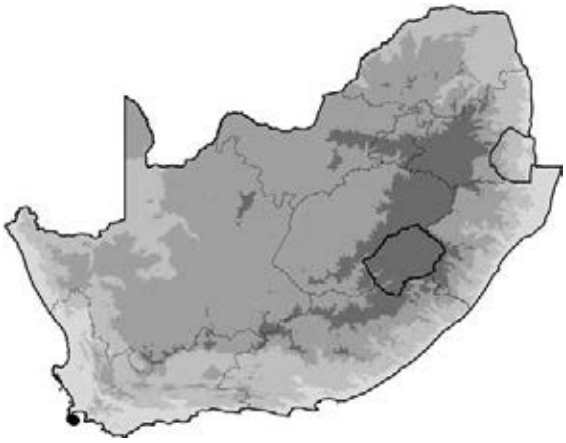
Plants 200–400(–600) mm high. *Corm* conical, 10–15 mm diam.; tunics hard and woody, splitting into claw-like segments. *Stem* flexed outward above sheaths of upper 2 leaves, inclined and flexuose in upper ½, unbranched. *Leaves* 3(4), lower 2 basal, reaching to base or shortly exceeding spike, lowermost sheathing stem for a short distance, linear or falcate, 1.5–2.5 mm wide, main vein lightly raised, margins not thickened, second leaf sheathing lower ⅔ of stem, uppermost leaf sheathing for ½ its length. *Spike* lightly inclined, flexuose, 1- or 2(4)-flowered; bracts dark green, sometimes flushed greyish purple, smooth with narrowly hyaline margins, outer 25–40(–50) mm long, inner slightly shorter, minutely forked. *Flowers* white to pale pink, lower part of throat and lower 3 tepals with red spots irregularly spread on lower ⅔, unscented; perianth tube cylindric, very slightly curved and expanded in upper 3–4 mm, 14–20 mm long, shorter than bracts; tepals with dorsal largest, inclined, 25–30 × 16–22 mm, upper laterals arching outward from base and ultimately spreading at right angles to tube, 23–28 × 11–15 mm, lower tepals united with upper laterals for ± 2 mm and together for ± 2 mm, weakly arching downward in upper half, 24–27 × 10–13 mm, lower median slightly smaller than laterals. *Filaments* 12–15 mm long, exserted 5–6 mm from tube, often reddish, or red abaxially; anthers (7–)8–10 mm long, white above, dark purple below; pollen cream-coloured. *Style* dividing shortly below to beyond anther apices, branches ± 4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-September to mid-October.

Distribution and ecology: a narrow endemic of the south coast of Western Cape, South Africa, from near Gansbaai and Stanford to Cape Agulhas; on limestone outcrops, from near sea level to 250 m elevation.

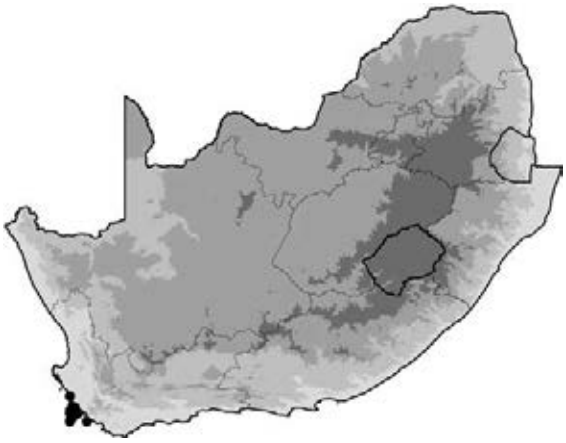
Diagnosis: recognised by the mostly three (rarely four) linear leaves with lightly thickened main vein and margins, striate or ribbed bracts, and white to pale pink flowers irregularly spotted with red on the lower tepals, with a cylindric perianth tube 14–20 mm long expanded only near the top. *Gladiolus debilis* from sandstone slopes has mostly four leaves, ribbed bracts, and symmetrically marked lower tepals, mostly with diamond-, spade-, or chevron-shaped markings.

139. **Gladiolus vigilans** *Barnard* in Lewis et al. in Journal of South African Botany, Suppl. 10: 82 (1972). Type: South Africa, [Western Cape], Cape Point Nature Reserve, Vasco da Gama Ridge, Nov. 1939, *Lewis s.n.* (SAM [*SAM 54296*], holo.; PRE, iso.).

Plants 300–450 mm high. *Corm* 12–15 mm diam.; tunics hard and woody, splitting into claw-like segments. *Stem* flexed outward above sheaths of upper 2 leaves, inclined above, unbranched. *Leaves* 4, lower 2 basal and usually shortly exceeding stem, linear, 1.2–1.5 mm wide, margin and main vein moderately thickened, cauline leaves inserted in middle and upper ⅓ of stem respectively, progressively shorter, sheathing for ± ½ their length, uppermost channelled throughout. *Spike* inclined, flexuose, 1- to 3-flowered; bracts pale green, smooth with hyaline margins, outer 20–25 mm long, inner slightly shorter, minutely forked apically. *Flowers* pale pink, lower 3 tepals with median spade-shaped white mark edged in dark red, extending onto tube, base of upper part of tube with fine red lines from tepal sutures, unscented; perianth tube narrowly funnel-shaped, 35–40 mm long, straight and cylindric below for 30–35 mm, curved outward and flared in upper 5 mm, ± twice as long as bracts;



Distribution of ***Gladiolus vigilans***.



Distribution of ***Gladiolus ornatus***.

tepals with dorsal largest, inclined over stamens, ± 28 × 18 mm, upper laterals arching outward from base, ultimately spreading at right angles to tube, ± 25 × 17 mm, lower tepals united with upper laterals for ± 3 mm and together for ± 3 mm, narrowed below, downcurving distally, laterals ± 18 × 8 mm, lower median ± 22 × 6 mm. *Filaments* 12 mm long, exserted 6 mm from tube, white below, pink toward apices; anthers ± 6.5 mm long, dark purple; pollen cream-coloured. *Style* dividing between upper ⅓ and apex of anthers, branches ± 4 mm long. *Capsules* ellipsoid, 12–14 mm long. *Seeds* oblong, ± 5.5 × 3 mm, broadly and evenly winged. *Flowering time*: late October to early November.

Distribution and ecology: a local endemic of Western Cape, South Africa, known from low hills near Cape Point; on well-drained sandstone slopes.

Diagnosis: recognised by the mostly four linear leaves with lightly thickened midrib and margins, striate or ribbed bracts, and long-tubed, pale pink flowers with a cylindric perianth tube 35–40 mm long expanded only near the top. The lower lateral tepals are strongly marked with red, spade-shaped nectar guides. Somewhat similar *Gladiolus debilis*, which also occurs on the Cape Peninsula, has ribbed bracts and a shorter perianth tube, (10–)15–22 mm long.

140. **Gladiolus ornatus** *Klatt* in Transactions of the South African Philosophical Society 3: 198 (1885). Type: South Africa, [Western Cape], flats near Rondebosch, Oct. 1884, *MacOwan 2553* (G, S, SAM, syn.).

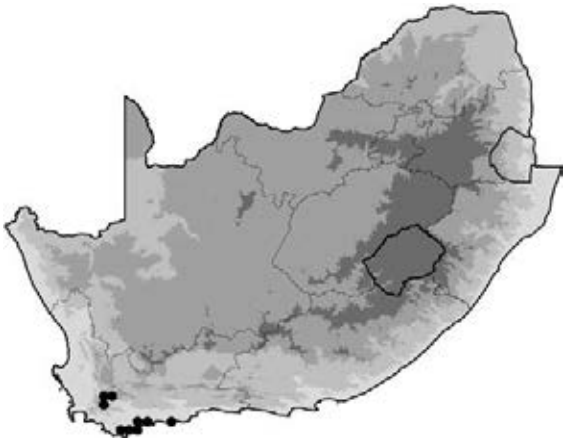
Plants 250–350 mm high. *Corm* globose, 9–12 mm diam.; tunics ± membranous, fragmenting irregularly. *Stem* flexed outward above sheathing parts of upper three leaves and inclined, unbranched. *Leaves* 3, lowermost basal and sheathing lower ⅓ of stem, linear, 1–2 mm wide, main vein lightly raised, margins lightly to heavily thickened, cauline leaves inserted on upper ½ of stem, progressively shorter, uppermost sheathing for ½ its length, channelled throughout. *Spike* inclined, flexuose, (1)2- or 3-flowered; bracts dull green or grey-purple, outer 27–32 mm long, inner ± as long or slightly shorter. *Flowers* pale to deep pink, lower tepals with spear–spade-shaped white median streak edged in dark pink, lower part of throat white, irregularly streaked dark pink, unscented; perianth tube obliquely funnel-shaped, 18–20 mm long, lower cylindric part ± 12 mm long, enclosed in bracts; tepals with dorsal largest, inclined, 30–33 × 18–21 mm, upper laterals outcurving in upper half, 28–31 × 15–17 mm, lower tepals united for ± 5 mm, curving downward in upper ⅓, 25–28 × 10–14 mm. *Filaments* 12–14 mm long, exserted 5–6 mm from tube; anthers ± 10 mm long, mauve to violet; pollen cream-coloured to mauve. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches 4.0–5.5 mm long. *Capsules* ellipsoid, 16–20 mm long. *Seeds* unknown. *Flowering time*: late September to November.

Distribution and ecology: a narrow endemic of the extreme southwestern part of Western Cape, South Africa, from the Mamre hills to the Cape Peninsula and Jonkershoek; on seasonally moist or marshy sandy flats and slopes.

Diagnosis: recognised by the soft, membranous corm tunics, three linear leaves, and pink, broadly funnel-shaped flowers with moderately short tube, 18–20 mm long, the lower tepals each with a white lozenge-shaped marking outlined with red.

141. **Gladiolus inflexus** *Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 266 (1998). Type: South Africa, [Western Cape], Worcester District, ± 8 km west of town in rocky alluvial ground with sandy loam, 27 July 1994, *Goldblatt & Manning 9888* (NBG, holo.; K, MO, PRE, iso.).

Plants (150–)200–350 mm high. *Corm* conic, 10–15 mm diam.; tunics hard and woody, splitting from below into claw-like segments. *Stem* sharply flexed outward above sheathing parts of each leaf, thus flexuose in upper ⅓.



Distribution of ***Gladiolus inflexus***.

Leaves 3, lowermost basal and sheathing lower ½–⅔ of stem, reaching or slightly exceeding apex of spike, linear, 1–2 mm wide, grey-green, main vein paler and slightly raised, margins not raised or hyaline, cauline leaves short, reaching to ± middle of spike, sheathing in lower ⅓–½. *Spike* flexuose, 1- to 3-flowered; bracts grey-green, margins transparent, apices often attenuate and twisted, outer 20–38 mm long, inner slightly longer or slightly shorter, lower margins broadly hyaline. *Flowers* pale to dull purple with base of tepals and throat cream-coloured, lower tepals speckled to blotched with purple in lower ⅔, sweetly scented; perianth tube obliquely funnel-shaped, 11–20 mm long; tepals broadly lanceolate, dorsal largest, 21–25 × 14–15 mm, spreading above, upper laterals as long but slightly narrower than dorsal, lower 3 tepals joined to upper laterals for 3–5 mm and together for 3–4 mm, 15–25 × 10 mm, narrowed below, curving outward and downward. *Filaments* 12–14 mm long, exserted 3–8 mm from tube but included in flower; anthers 6–7 mm long, light purple-grey; pollen cream-coloured. *Style* arched over stamens, dividing opposite or just below anther apices, branches 2–3 mm long. *Capsules* oblong-ellipsoid, 15–22 mm long. *Seeds* ovate, 6–7 × 4–5 mm, broadly and evenly winged. *Flowering time*: mid-to late July, rarely in early August.

Distribution and ecology: a local endemic with a scattered distribution in the southwestern corner of Western Cape, South Africa, between Worcester and Rawsonville and along the coast from Bredasdorp to Still Bay; in loamy soil on alluvial flats.

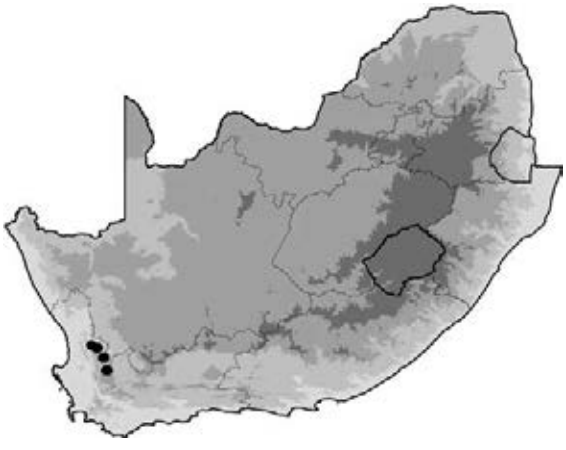
Diagnosis: recognised by the woody tunics, three linear leaves, and flexuose stem with purplish, narrowly funnel-shaped flowers, the lower tepals streaked and spotted. *Gladiolus gracilis* has similar flowers but mostly four leaves, these H-shaped in section with winged margins.

142. **Gladiolus taubertianus** *Schltr.* in Botanische Jahrbücher für Systematik 27: 103 (1899). Type: South Africa, [Western Cape], Cold Bokkeveld, 4 000 ft [1 200 m], 5 Sept. 1896, *Schlechter 8860* (BOL, lecto., designated by Goldblatt & Manning: 269 (1998); PRE, isolecto. [not *Schlechter 8860* in BM, G, K]).

Plants 180–500(–900) mm high, with cataphylls minutely puberulous above ground. *Corm* globose, ± 12 mm diam.; tunics hard and woody, splitting from below into claw-like segments. *Stem* flexed outward above sheathing parts of upper 2 or all 3 leaves, unbranched. *Leaves* 3, lowermost basal and sheathing lower ½ of stem, reaching to ± top of spike or exceeding it, linear, (1–)2–3 mm wide, main vein lightly raised and often a second vein pair also prominent and blade then flexed and L-shaped in section, margins barely thickened, second leaf sheathing lower ⅔ of stem, short, upper leaf inserted in upper ⅓ of stem, sheathing below, margins united around stem. *Spike* lightly inclined, and weakly flexuose, 1- to 3(5)-flowered; bracts grey-green, soft-textured, outer 20–35(–40) mm long, inner shorter, forked, twisted around to lie under outer. *Flowers* pale mauve to slate-blue, upper lateral and lower tepals lightly streaked with purple inside, lower laterals with pale yellow transverse band across middle, lightly sweet-scented; perianth tube obliquely funnel-shaped, 9–14 mm long, lower cylindric part 5–7 mm long; tepals ovate, dorsal largest, 20–26 × 11–16 mm, hooded over stamens, upper laterals curving outward above, 16–21 × 10–12 mm, lower 3 tepals joined to upper laterals for 2–5 mm, free parts 15–19 × 7–9 mm, ± straight and horizontal. *Filaments* ± 12 mm long, exserted ± 7 mm from tube, adpressed to dorsal tepal; anthers 6–9 mm long, pale lilac; pollen cream-coloured. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches 4–5 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-August to mid-September.

Distribution and ecology: endemic to the interior Cederberg and northern Cold Bokkeveld in Western Cape, South Africa; on relatively dry sandstone slopes.

Diagnosis: recognised by the woody tunics, three linear leaves, and small, purplish flowers with darker veins, the lower tepals streaked and spotted with purple on pale yellow nectar guides.



Distribution of ***Gladiolus taubertianus***.

143. **Gladiolus gracilis** *Jacq.*, Collectanea 4: 159 (1791). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 246 (1794 [1788–1795]).

Gladiolus tristis var. *punctatus* Thunb.: 12 (1784). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1028, holo.).

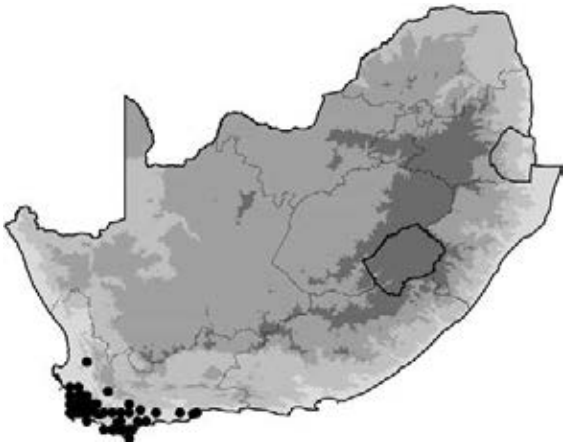
Gladiolus pterophyllus Pers.: 43 (1805). Type: South Africa, Western Cape, without precise locality or collector, cultivated in Austria, illustration in Jacq.: t. 244 (1794 [1788–1795]) '*Gladiolus tristis* var.'.

Gladiolus scaber Link: 70 (1820). Type: South Africa, without precise locality, *Lichtenstein s.n.* (B: Herb. Willdenow, holo.).

[*Gladiolus setifolius* Eckl.: 37 (1827), invalid name without description.]

Plants 250–500(–700) mm high. *Corm* 12–20 mm diam.; tunics hard and woody, splitting below into claw-like segments. *Stem* erect or inclined, upper portion inclined, flexed outward above sheaths of upper 3 leaves, unbranched. *Leaves* (3)4, lowermost basal and sheathing lower ½ of stem, often scabridulous below, reaching to between upper ⅓ of stem and middle of spike, linear and H-shaped in section, 1.5–2.5 mm wide, margins raised into broad wings arching over blade surface, margin usually scabrid to ciliate, cauline leaves progressively shorter and sheathing for at least ½ their length, sheaths closed. *Spike* inclined, flexuose, 2- to 5(7)-flowered; bracts grey-green or becoming dull purple, margins membranous, outer 17–35(–43) mm long, apices often attenuate and somewhat twisted, inner bract shorter. *Flowers* pale blue to grey, occasionally pink or dull yellow, lower 3 tepals and abaxial side of throat pale yellow to cream-coloured and marked irregularly with dark purple streaks and spots, usually delicately and sweetly scented, sometimes apparently unscented; perianth tube obliquely funnel-shaped, 12–18 mm long; tepals obovate, margins undulate, dorsal largest, 24–33 × 14–19 mm, curving outward in upper ½, upper laterals similar but slightly smaller, lower 3 tepals joined to upper laterals for 3–8 mm and together for a further 2–3 mm, narrowed below and shallowly channelled, sometimes ± claw-like, laterals 20–25 × 7–9 mm, arching downward distally, lower median 5–10 mm longer than lower laterals, up to 12 mm wide. *Filaments* 11–14 mm long, exserted 4–8 mm from tube; anthers 7–11 mm long, pale to dark blue; pollen cream-coloured or pale blue. *Style* arching over stamens, dividing shortly below to shortly beyond anther apices, branches 3–4 mm long. *Capsules* oblong-ellipsoid, acute, 12–18 mm long. *Seeds* ovate, 4.5–5.0 × ± 3 mm, broadly and evenly winged. *Flowering time*: mainly July and early August, sometimes in June.

Distribution and ecology: restricted to southwestern Western Cape, South Africa, from Aurora west of Piketberg along the coastal forelands to Albertinia; mainly on clay or granite flats and slopes in renosterveld shrubland.

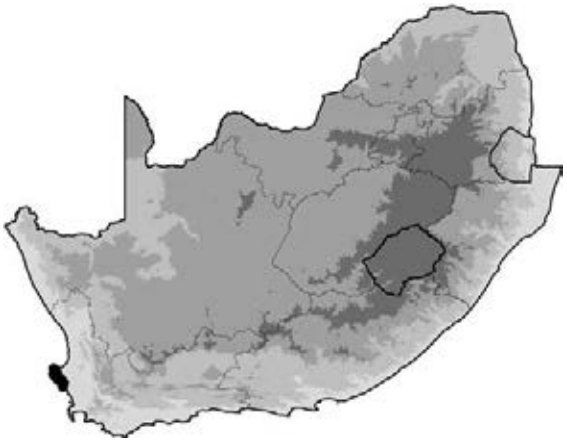


Distribution of ***Gladiolus gracilis***.

Diagnosis: recognised by the narrow, marginally winged lower leaf blade, 1.5–2.5 mm wide and ± H-shaped in section with the margins curved inward over the midline, and the relatively short-tubed, funnel-shaped flowers with acute tepals, the lower streaked and spotted. *Gladiolus caeruleus* from coastal limestones on the Atlantic Coast, has broader leaves, 3–7 mm wide with the marginal wings at right angles to the blade, and pale blue flowers with obtuse tepals, the lower spotted with dark blue.

144. **Gladiolus caeruleus** *Goldblatt & J.C.Manning* in Novon 6: 179 (1996), replacement name at species rank for *G. gracilis* var. *latifolius* G.J.Lewis in Lewis et al.: 228 (1972) [not *G. latifolius* Lam. (1791)]. Type: South Africa, Western Cape, road to Donkergat, north of Churchhaven, 15 Aug. 1966, *Barker 10395* (NBG, holo.; K, iso.).

Plants 400–600 mm high. *Corm* 10–14 mm diam.; tunics hard and woody, splitting from below into claw-like segments. *Stem* erect or inclined below, upper portion inclined at ± 20°, flexed outward above sheaths of upper 2 leaves, unbranched. *Leaves* 4, lowermost basal and sheathing lower part of stem, sheath often scabrid below, reaching to between base and apex of spike, linear, 3–7 mm wide, margins raised at right angles to surface, thus H-shaped in section, edges smooth, main vein lightly raised, cauline leaves progressively shorter above and sheathing for at least ½ their length, sheaths closed. *Spike* (4)8- to 10(14)-flowered, flexed at base, weakly flexuose; bracts greyish green to dull purple-grey, with narrowly membranous margins, 25–35(–40) mm long, inner shorter, margins broadly membranous, barely notched at apex. *Flowers* pale blue, abaxial side of throat and lower ⅔ of lower tepals irregularly speckled with dark purple on a cream-coloured background, lightly scented; perianth tube obliquely funnel-shaped, ± 15 mm long; tepals obovate and obtuse, dorsal largest, 30–32 × ± 20 mm, curving outward distally, upper laterals spreading distally, ± 25 × 17 mm, lower 3 tepals joined to upper laterals for ± 6 mm and together



Distribution of ***Gladiolus caeruleus***.

for a further 2–3 mm, tapering toward bases, subequal, ± 20 × 8–10 mm, obtuse, arching gently outward. *Filaments* ± 12 mm long, exserted ± 6 mm from tube; anthers 9–10 mm long, pale blue; pollen cream-coloured or pale blue. *Style* arching over stamens, dividing opposite or shortly beyond anther apices, branches ± 4 mm long. *Capsules* ellipsoid, ± 15 mm long. *Seeds* ovate, 5–7 × ± 4 mm, broadly and evenly winged. *Flowering time*: August to mid-September.

Distribution and ecology: a narrow endemic of the Atlantic coast of Western Cape, South Africa, from Cape Columbine to Yzerfontein; on limestone outcrops and neutral sands in coastal scrub.

Diagnosis: recognised by the lower leaf blade, 3–7 mm wide with broad marginal wings, thus ± H-shaped in section, and the relatively short-tubed, pale blue flowers with obtuse tepals, the lower spotted with dark blue. *Gladiolus gracilis* from clay soils further inland has narrower leaves 1.5–2.5 mm wide with the marginal wings curved over the blade, and variously coloured flowers with acute tepals, the lower streaked and spotted.

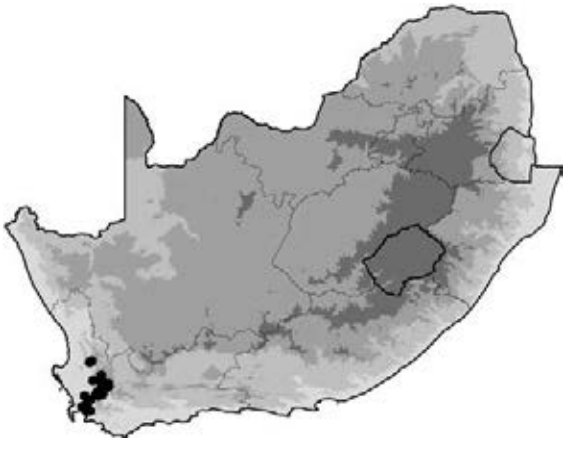
145. **Gladiolus recurvus** *L.*, Mantissa plantarum 1: 28 (1767). *Watsonia recurva* (L.) Pers.: 43 (1805). *G. ramosus* Burm.f.: 2 (1768), illegitimate homonym and superfluous name for *G. recurvus* L. [based on same type]. Type: South Africa, without precise locality, illustration in Miller, Figures of plants 2: 157, t. 235, fig. 2 (1758).

Gladiolus modestus Ingram: 9 (1931c). Type: South Africa, [Western Cape], Breede River Valley, without date, *Ingram s.n.* (BM, colour illustration).

Plants 250–350 mm high. *Corm* globose, 10–14 mm diam.; tunics hard and woody, splitting from below into claw-like segments. *Stem* inclined above and flexed outward above sheath of each leaf, unbranched. *Leaves* 4, lowermost basal and sheathing lower ⅓ of stem, blade short or reaching to just below base of spike, 30–100 mm long, linear, ± 2 mm wide, margins raised into wings extended at right angles and arching inward over blade surface, edges lightly scabrid, main vein lightly raised but not thickened. *Spike* inclined, flexuose, 1- or 2(4)-flowered; bracts dull green to greyish brown, outer 30–40 mm long, apices somewhat twisted and with margins inrolled, inner shorter. *Flowers* dull cream-coloured to pale yellow, lower lateral tepals irregularly lined and spotted with dull purple, upper tepals sometimes lightly lined or spotted toward midline, lower margins of upper tepals transparent, with a strong, sweet cloying scent; perianth tube ± cylindric, curving outward and widening in throat, 27–36 mm long; tepals lanceolate-attenuate, upper margins undulate, apices twisted outward, dorsal largest, ascending, 22–30 × 14–18 mm, upper laterals 22–26 × 8–11 mm, spreading distally, lower 3 tepals joined to upper laterals for 4–7 mm and together for 2–3 mm, free parts ± 20 × 8–9 mm, spreading in upper ½. *Filaments* 14–15 mm long, exserted 4–5 mm from tube; anthers 8–10 mm long, dull grey to blackish; pollen pale yellow. *Style* arching over stamens, dividing just below to just beyond anther apices, branches 2.5–4.0 mm long. *Capsules* ovoid-ellipsoid, 14–16 mm long. *Seeds* ovate, ± 5 × 3 mm, broadly and evenly winged. *Flowering time*: mainly June to early August at low elevations, September to early October at higher elevations.

Distribution and ecology: endemic to the southwestern corner of Western Cape, South Africa, from the Cold Bokkeveld, Ceres and the upper Breede River Valley to Gouda and from Stellenbosch to Somerset West; on stony loam or clay in renosterveld.

Diagnosis: recognised by the narrow, marginally winged lower leaf blade, ± 2 mm wide and ± H-shaped in section with the margins curved inward over the midline, and the relatively long-tubed flowers with crisped, attenuate tepals, the lower streaked and spotted, and the perianth tube 27–36 mm long. *Gladiolus gracilis* has obliquely funnel-shaped blue, rarely pink, flowers with a shorter perianth tube, 12–18 mm long and ± acute tepals.



Distribution of ***Gladiolus recurvus***.

Ser. **Teretifolii** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus inflatus* Thunb.

Plants from winter-rainfall region. *Corms* subglobose; tunics ± leathery to woody and splitting into claws, or coarsely fibrous. *Leaves* green or dry at flowering, usually three, terete and narrowly 4-grooved or X-shaped in section with midrib and margins thickened and raised. *Flowers* small to medium, zygomorphic, funnel- or bell-shaped, often scented; perianth tube usually shorter than dorsal tepal, lower tepals either with dark red median blotch or with ± transverse band of yellow outlined with dark red.

146. **Gladiolus inflatus** *(Thunb.) Thunb.*, Prodromus plantarum capensium: 185 (1800). *G. tristis* var. *inflatus* Thunb.: 12 (1784). Type: South Africa, without precise locality, *Thunberg s.n.* '*Gladiolus inflatus* a' (UPS-THUNB 1033, holo. [photo at BOL]).

Gladiolus tristis var. *hastatus* Thunb.: 13 (1784). *G. hastatus* (Thunb.) Thunb.: 185 (1800). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1032, holo.).

Gladiolus tristis var. *violaceus* Thunb.: 12 (1784). Type: South Africa, Western Cape, without precise locality, *Thunberg s.n.* (UPS-THUNB 1034, holo.).

Gladiolus bolusii Baker: 208 (1892). Type: South Africa, [Western Cape], Winterhoek Mtns near Tulbagh, Nov. 1879, *Bolus 5244* (K, holo.; BM, BOL, iso.).

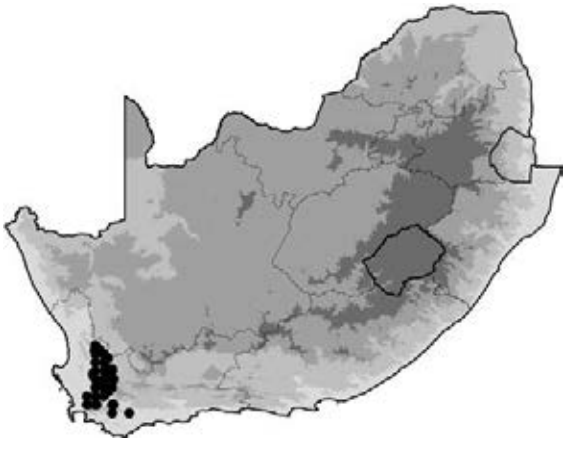
Gladiolus louiseae L.Bolus: 182 (1924). *G. inflatus* var. *louiseae* (L.Bolus) Oberm.: 241 (1972). Type: South Africa, [Western Cape], without precise locality, from the Ceres exhibit, Cape Town Wild Flower Show, Oct. 1921, *Guthrie s.n.* (BOL [BOL14195], holo.; BOL, K, iso.).

[*Gladiolus monostachyus* Thunb. ex Roem. & Schult.: 413 (1817), invalid name as a synonym.]

Plants (120–)200–450 mm high, with cataphylls sometimes scabrid above ground. *Corm* globose, 9–20 mm diam.; tunics usually ± woody, splitting below into claw-like ridges, sometimes cartilaginous becoming fibrous, sometimes forming slender collar around base of stem. *Stem* flexed outward above sheath of second leaf, unbranched. *Leaves* 3, lower 2 basal, lowermost sheathing stem only near ground or for a short distance, reaching to ± base of spike, sheath usually and blade sometimes retrorsely puberulous, terete to subterete with four hairline longitudinal grooves or rarely centric and cross-shaped in section with wide longitudinal grooves, straight or curving outward, ± 1 mm diam., second leaf sheathing lower ⅔ of stem, upper portion fairly short, sheath and blade sometimes puberulous, uppermost leaf sometimes reduced to a sheathing, bract-like scale 20–30 mm long, *Spike* flexed at base, lightly inclined, lightly flexuose, 2- or 3-flowered; bracts pale green to dull greenish grey, veins transparent, outer 18–26(–30) mm long, inner shorter to nearly as long as outer, acute. *Flowers* funnel- or slightly bell-shaped, deep pink to mauve, purple or violet, rarely white, lower tepals with dark spear- or ± spade-shaped purple to red marks in middle ⅓, sometimes throat ringed with red to purple, unscented; perianth tube obliquely funnel-shaped, 12–25(–30) mm long, lower cylindric part 5–12(–20) mm long; tepals with upper ovate, lower lanceolate to spathulate, dorsal largest, 22–27 × 12–17 mm, inclined to horizontal, upper laterals 20–24 × 12–14 mm, straight or recurved distally, lower 3 tepals united with upper laterals for 4–7 mm and sometimes together for ± 1 mm, 17–20 × 9–11 mm, straight or lightly curving downward distally. *Filaments* 12–18 mm long, exserted 5–11 mm from tube; anthers 7–9 mm long, grey-purple; pollen yellow. *Style* arching over stamens, dividing between middle and apex of anthers, branches 3–4 mm long. *Capsules* ellipsoid, subacute, 12–18 mm long. *Seeds* ovate, 5–6 × ± 4.5 mm, broadly and evenly winged. *Flowering time*: late September and October, sometimes to late November at higher elevations.

Distribution and ecology: relatively common in the mountains of southwestern Western Cape, South Africa, from the Cederberg and Cold Bokkeveld to Franschhoek Pass, the Hex River Mtns, Jonaskop in the Riviersonderend Mtns and possibly also the central Langeberg; on rocky sandstone slopes.

Diagnosis: recognised by the three leaves with narrow, terete blades and unscented, funnel-shaped flowers with perianth tube 12–25(–30) mm long, the lower tepals with dark spear- or spade-shaped markings. The species is variable for tube length. Late-flowering plants from the higher mountains around Ceres with pale pink flowers have the longest perianth tubes, up to 30 mm long. These may be confused with *Gladiolus cylindraceus* but this species has salver-shaped flowers with a cylindric perianth tube and shorter filaments, 7–8 mm long. *Gladiolus patersoniae* has consistently short-tubed, sweetly scented flowers with a sharply bent tube 10–12 mm long, the lower tepals with a transverse yellow band.

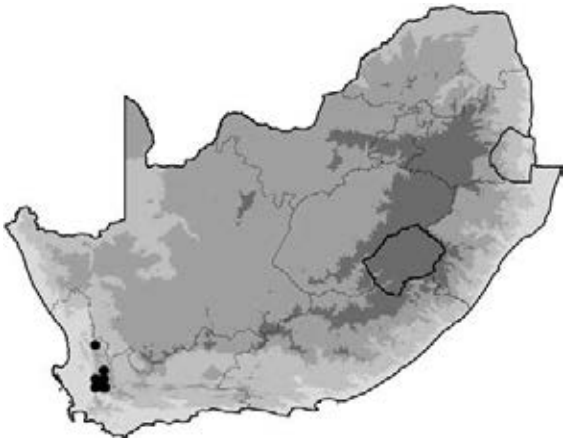


Distribution of ***Gladiolus inflatus***.

147. **Gladiolus cylindraceus** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 183 (1972). Type: South Africa, [Western Cape], Hansiesberg, Ceres District, 5 500–6 000 ft [1 700–1 800 m], 15 Dec. 1963, *Jones s.n.* (NBG, holo.).

Plants 300–500 mm high. *Corm* globose, 12–20 mm diam.; tunics of medium-textured to moderately thick, ± wiry fibres, accumulating in a neck around base of stem. *Stem* flexed outward above sheaths of upper 1 or 2 leaves, unbranched. *Leaves* 3, lower 1 or 2 basal, lowermost sheathing stem for a short distance or only near ground, reaching to between base and apex of spike, suberect, main vein much raised thus cross-shaped in section, 2–3 mm diam., second leaf sheathing lower ½ of stem, overlapping uppermost leaf, blade fairly short with main vein less thickened than basal leaf, uppermost leaf inserted in middle to upper ⅓ of stem, mostly sheathing. *Spike* flexed at base and inclined, lightly flexuose, 5- to 8-flowered; bracts pale greenish grey, outer 18–28 mm long, inner shorter to nearly as long as outer, acute. *Flowers* salver-shaped, pale creamy pink to salmon-coloured, lower 3 tepals with reddish diamond-shaped mark in lower midline, sometimes with white to yellow centre, unscented; perianth tube cylindric, (25–)35–52 mm long, flared only near apex, half again as long to twice as long as bracts; tepals broadly lanceolate or dorsal ovate, dorsal largest, (18–)20–25 × 11–14 mm, lightly inclined or spreading at right angles to tube, upper laterals 18–25 × 9–12 mm, suberect or spreading, lower 3 tepals sometimes united with upper laterals for 1–2 mm and together for ± 2 mm, 15–21 × 7–8 mm, nearly straight, inclined. *Filaments* 7–8 mm long, exserted 3–4 mm from tube; anthers 5–8 mm long, white; pollen cream-coloured. *Style* ± straight, adaxial to stamens, dividing opposite upper third or shortly beyond anthers, branches 3–4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: late November to late January.

Distribution and ecology: a narrow endemic of the western mountains in Western Cape, South Africa, from the Mostertshoek Peaks south of Ceres along the Witzenberg and Skurweberg ranges to the Krakadouwberge in the northern Cederberg; on rocky sandstone at high elevations above 1 500 m, flowering in summer.



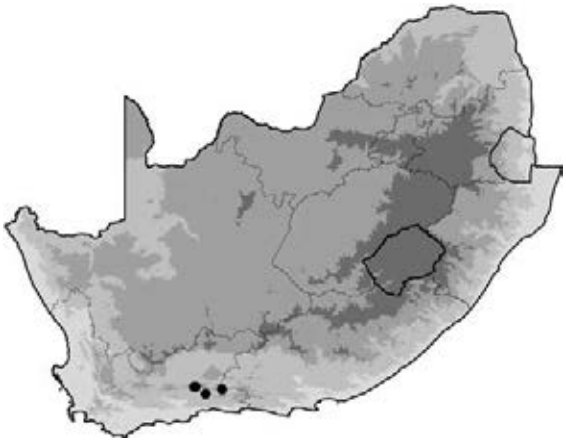
Distribution of ***Gladiolus cylindraceus***.

Diagnosis: recognised by the three leaves with centric, X-shaped blade with four longitudinal grooves or furrows and unscented, salver-shaped flowers with cylindric perianth tube (25–)35–52 mm long, the lower tepals with dark diamond-shaped markings, and relatively short filaments 7–8 mm long. Related *Gladiolus inflatus* has funnel- or almost bell-shaped flowers with longer filaments 12–18 mm long and a shorter perianth tube.

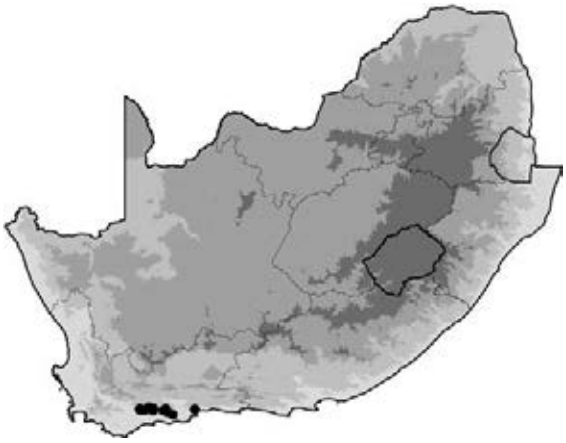
148. **Gladiolus nigromontanus** *Goldblatt* in Journal of South African Botany 50: 456 (1984). Type: South Africa, [Western Cape], Swartberg Pass, Old Toll House, 950 m, 16 Mar. 1981, *Vlok 175* (MO, holo.; K, NBG, PRE, iso.).

Plants 300–400 mm high. *Corm* globose, ± 16 mm diam.; tunics of coarse fibres, accumulating in a collar around base of stem. *Stem* lightly flexed outward above sheaths of upper 2 or all leaves, inclined above, unbranched. *Leaves* 3, lowermost basal and sheathing lower ½ of stem, reaching middle or upper ⅓ of stem, relatively short, straight and erect, terete with 4 longitudinal grooves, ± 1 mm diam., cauline leaves entirely sheathing or with short free apices up to 20 mm long, lower of these fairly long and overlapped by sheath of basal leaf, uppermost short, inserted in upper ⅕ of stem, 40–55 mm long, sometimes overlapped by second leaf, margins of sheaths united around stem. *Spike* inclined, ± straight, 3- to 6-flowered; bracts pale green or flushed greyish purple, apices brown, 14–22 mm long, inner forked, slightly shorter. *Flowers* white to pale pink, lower 3 tepals with dark red longitudinal streaks or lozenge-shaped marks sometimes pale in centre, red in base of tube; perianth tube narrowly and obliquely funnel-shaped, (17–)20–25 mm long, exceeding bracts and emerging between them, curved outward beyond bracts, wider upper part ± 8 mm long; tepals with dorsal largest, obovate, inclined to hooded over stamens 20–24 × 14–16 mm, often recurved apically, upper laterals lanceolate, curving outward, becoming reflexed in upper ½, ± 20 × ± 12 mm, lower 3 tepals united below for ± 4 mm, free parts ± 15 mm long, forming horizontal, lightly channelled claws below, limbs 4–5 mm wide, recurving distally. *Filaments* 12–14 mm long, exserted 3–4 mm from tube; anthers ± 7 mm long, dark purple; pollen cream-coloured. *Style* arching over stamens, dividing 1–2 mm beyond anther tips, branches ± 4.5 mm long. *Capsules* obovoid, obtuse, ± 12 mm long (only immature capsules seen). *Seeds* unknown. *Flowering time*: February to early May.

Distribution and ecology: a narrow endemic of the Swartberg north of Oudtshoorn in Western Cape, South Africa; near perennial streams on sandstone slopes, flowering in midsummer and autumn.



Distribution of ***Gladiolus nigromontanus***.



Distribution of ***Gladiolus engysiphon***.

Diagnosis: recognised by the three leaves with relatively short, terete, longitudinally grooved blades and the white, narrowly funnel-shaped flowers with red median markings on the lower tepals, moderately long perianth tube, (17–)20–25 mm long, and purple anthers.

149. **Gladiolus engysiphon** *G.J.Lewis* in Lewis et al. in Journal of South African Botany, Suppl. 10: 266 (1972). Type: South Africa, [Western Cape], Riversdale District, foothills of the Langeberg at the Vette River, cultivated at Kirstenbosch Gardens, 22 Mar. 1934, *Ferguson s.n. Natl. Bot. Gard. 481/34* (SAM, holo.; BOL, PRE, iso.).

Plants 350–450 mm high. *Corm* ovoid, 9–12 mm diam.; tunics papery, becoming fibrous below. *Cataphylls* puberulous above ground. *Stem* lightly flexed outward above sheath of uppermost leaf, unbranched. *Leaves* 3, all largely or entirely sheathing, lowermost basal and sheathing lower ⅔ of stem, overlapping second leaf, cauline leaves inserted in upper ⅓ of stem, uppermost a bract-like scale 20–30 mm long, margins and main vein heavily raised and thickened, thus ± terete in section with four longitudinal grooves, ± 1 mm diam., sometimes lightly scabrid; non-flowering plants with solitary leaf. *Spike* flexed at base, inclined, straight, 2- to 6-flowered; bracts dull greenish grey to brown, 15–20(–27) mm long, inner slightly shorter to ± as long, forked apically. *Flowers* white or cream-coloured, occasionally lightly flushed with mauve, tube pinkish on reverse, upper lateral and lower 3 tepals with red streak in lower midline, sometimes cream-coloured to yellowish in centre of streak, upper part of tube lightly streaked with red, filaments pink to red or violet, unscented; perianth tube nearly cylindric or narrowly funnel-shaped, (22–)40–60 mm long, widening in upper 5–8 mm, sometimes rather abruptly; tepals narrowly lanceolate, dorsal largest, 16–20 × 9–10 mm, inclined over stamens, upper laterals 14–17 × 5–7 mm, spreading in upper ⅓, lower 3 tepals united with upper laterals for 3–4 mm, free parts 12–15 × 3–4 mm. *Filaments* 10–12 mm long, exserted 3–4 mm from tube; anthers 6–8 mm long, purple; pollen cream-coloured. *Style* arching over stamens, dividing opposite or up to 6 mm beyond anther apices, branches ± 3 mm long. *Capsules* obovoid, 10–14 mm long, 3-lobed above and retuse. *Seeds* oval, 4.5–5.0 × 3.5–4.0 mm, broadly and evenly winged. *Flowering time*: March to early April, occasionally as early as mid-February.

Distribution and ecology: a local endemic of Western Cape, South Africa, restricted to a narrow band along the southern foothills of the Langeberg from Swellendam to Riversdale and Herbertsdale; on clay loam or stony clay at the interface between shale and sandstone, flowering in the autumn.

Diagnosis: recognised by the three, largely sheathing and overlapping leaves with reduced blades, the lowermost sheathing the lower two thirds of the stem, and the white to cream-coloured flowers with long, slender tube (22–)40–60 mm long, produced in autumn.

150. **Gladiolus patersoniae** *F.Bolus* in Journal of Botany, British and foreign 66: 14 (1928). Type: South Africa, [Eastern Cape], Baviaanskloof Mtns, Sept. 1910, *Paterson 17* (GRA, holo.).

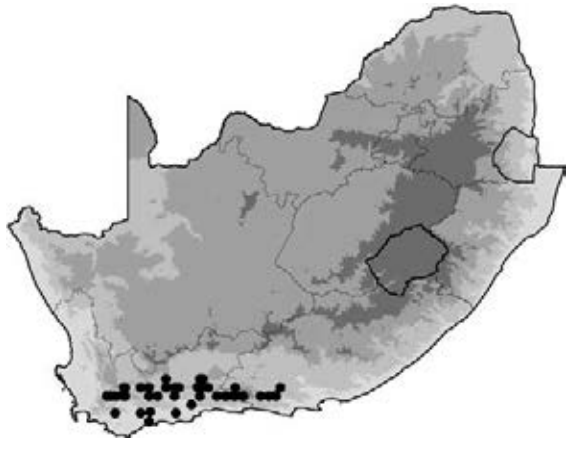
Gladiolus inflatus subsp. *intermedius* G.J.Lewis in Lewis et al.: 241 (1972). Type: South Africa, [Western Cape], Witteberg Mtns, 14 Oct. 1928, *Compton 3326* (BOL, holo.; K, iso.).

Plants 300–600(–1 000) mm high, with cataphylls sometimes puberulous above ground, often concealed by a thick mass of coarse fibres. *Corm* globose, 15–25 mm diam. or more; tunics of hard coarse fibres, usually thickened below into claw-like ridges, accumulating to form a thick collar around base. *Stem* flexed slightly in upper ⅓ above sheath of second leaf, unbranched. *Leaves* 3, lower 2 basal, lowermost usually sheathing only near base of stem, leaf longest, reaching or slightly exceeding spike, straight and ± erect, terete with 4 narrow longitudinal grooves, ± 2 mm diam., second leaf sheathing for most or all of its length, uppermost leaf largely to entirely sheathing and sometimes reduced to a grey-green scale 10–20 mm long, margins united in

lower ½. *Spike* inclined and flexuose, 2- to 4(5)-flowered; bracts greyish green, often flushed purple, margins hyaline, outer 18–37 mm long, inner shorter and enclosed by outer, forked apically. *Flowers* inflated and bell-like, pale to deep blue, slate, greyish, or cream-coloured, dorsal tepal usually more intensely coloured, lower 3 tepals with transverse yellow band or chevron across distal ⅓, usually outlined in dark blue or purple, strongly scented of apple and carnation; perianth tube obliquely funnel-shaped, geniculate, 10–12(–15) mm long, lower ½ erect and cylindric, upper ½ bent at right angles and flaring outward; tepals with upper broadly obovate, dorsal largest, hooded over stamens, 20–30 × 11–28 mm, upper laterals slightly shorter, curved slightly outward apically, lower 3 tepals united with upper laterals for 3–6(–10) mm and together for 2–3 mm, oblanceolate-spathulate, upper margins curving upward, 12–22 × 6–10(–14) mm, laterals slightly exceeding lower median. *Filaments* 10–16 mm long, exserted 6–8 mm from tube but enclosed in flower; anthers 6–8(–11) mm long, reaching to ± middle of upper tepal, whitish; pollen whitish. *Style* arching over stamens, dividing between middle and apices of anthers, branches ± 3.5 mm long. *Capsules* ovoid-ellipsoid, (14–)20–24 mm long. *Seeds* ± 7 × 5–6 mm, broadly and evenly winged. *Flowering time*: mid-August to mid-September at lower elevations, October and November at higher elevations.

Distribution and ecology: endemic to Western Cape, South Africa and relatively widespread through the southern interior, from Worcester along the Hex River Mtns, Bonteberg and southern mountains to Baviaanskloof in Eastern Cape, and on the Potberg near Cape Infanta; on rocky sandstone slopes and alluvium in drier fynbos.

Diagnosis: recognised by the three leaves with narrow, terete blades and fragrant, bluish to grey or cream-coloured, bell-shaped flowers with sharply bent perianth tube 10–15 mm long, the lower tepals with a transverse yellow band outlined with darker colour. *Gladiolus inflatus* from the western and southwestern mountains has unscented, pink to mauve flowers with dark spear- or spade-shaped markings on the lower tepals and a curved perianth tube 12–30 mm long.



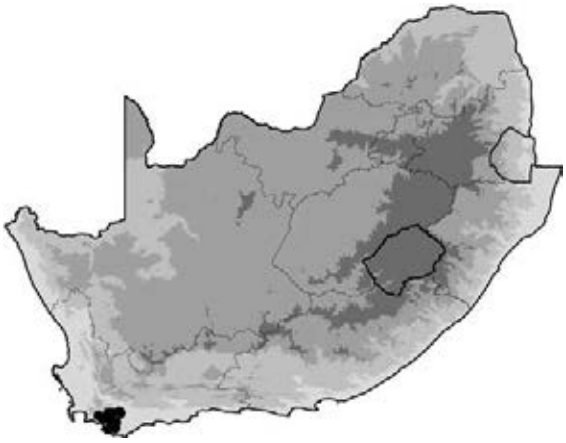
Distribution of ***Gladiolus patersoniae***.

151. **Gladiolus subcaeruleus** *G.J.Lewis* in Flowering Plants of Africa 29: t. 1158 (1953a). Type: South Africa, [Western Cape], Riviersonderend Mtns, southern foothills, Apr.–May 1950, *Lewis & Davis 2316* (SAM, holo.; K, SAM, iso.).

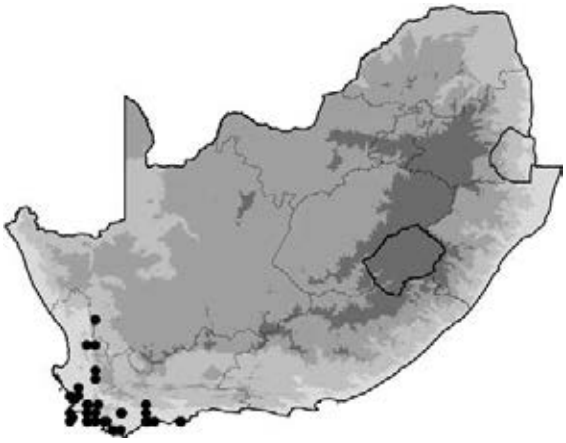
Plants 150–300 mm high, with cataphylls resembling leaves of flowering stem, puberulous above ground. *Corm* conic, 8–12 mm diam.; tunics firm-papery, decaying irregularly and becoming fibrous from the base, forming a fibrous collar around base. *Stem* erect below, flexed lightly above sheaths of upper 2 leaves, unbranched. *Leaves* 3(4), all entirely sheathing, lowermost sheathing lower ⅓–½ of stem, usually 60–80 mm long, second leaf inserted at ± middle of stem, slightly shorter than basal, sometimes just overlapping next leaf, uppermost leaf 20–40 mm long; foliage leaf produced after flowering, solitary, filiform, oval in section with 4 longitudinal grooves, with fine scattered deflexed hairs along groove edges. *Spike* lightly inclined, nearly straight, 3- to 5-flowered; bracts grey-green, outer 11–17 mm long, inner acute, slightly shorter to slightly longer. *Flowers* pale blue, lower lateral tepals with yellow transverse or spear-shaped median markings outlined in dark purple, lower median less prominently marked or unmarked, unscented or with a light metallic odour; perianth tube obliquely funnel-shaped, ± 15–17 mm long, lower cylindric part 8–10 mm long; tepals lanceolate to ovate, unequal, upper 3 largest, ovate, dorsal inclined over stamens, 20–24 × 10–12 mm, upper laterals directed forward, becoming patent in upper ⅓, ± 20 × 9–12 mm, lower 3 tepals united with upper laterals for ± 4 mm and together for ± 2 mm, lower laterals narrowed below into channelled claws ± 9 mm long, limbs ± 7 × 4.5 mm, lower median tepal lanceolate, not distinctly clawed, ± 15 × 7 mm, in profile lower tepals exceeding upper by ± 10 mm. *Filaments* 12–15 mm long, exserted 7–8 mm from tube; anthers 4.5–5.0 mm long, pale mauve; pollen cream-coloured. *Style* arching over stamens, dividing opposite anther apices, branches 2.0–3.5 mm long. *Capsules* obovoid, rounded apically, 10–12 mm long, mature capsules not seen. *Seeds* unknown. *Flowering time*: March and April.

Distribution and ecology: a narrow endemic of the Overberg in Western Cape, South Africa, extending from Bot River along the southern foothills of the Caledon Swartberg to Riviersonderend, southward to Napier and Elim; on clay and loam in renosterveld shrubland.

Diagnosis: an autumn-flowering species recognised by the fibrous corm tunics forming a collar around the base of the stem, three or rarely four, ± entirely sheathing leaves on the flowering stem, and pale blue, funnel-shaped flowers with transverse yellow bands or spear-shaped markings edged with purple on the lower tepals. The solitary foliage leaf, produced from a separate bud later in the season, is terete and 4-grooved, with scattered long hairs along the edges of the grooves. *Gladiolus martleyi* from sandy soils has softly papery or



Distribution of ***Gladiolus subcaeruleus***.



Distribution of ***Gladiolus martleyi***.

membranous corm tunics and pink to mauve flowers with slightly shorter perianth tube, 11–12 mm long, and a glabrous foliage leaf.

152. **Gladiolus martleyi** *L.Bolus* in South African Gardening and Country Life 23: 47 (1933a). Type: South Africa, [Western Cape], without precise locality, Banhoek, Stellenbosch, cultivated at Kirstenbosch Gardens, 29 Mar. 1932, *Martley s.n.* (BOL [*Natl. Bot. Gard. 371;32*], holo.; K, iso.).

Gladiolus pillansii G.J.Lewis: 57 (1935). Type: South Africa, [Western Cape], Melkbosch road, 3 Apr. 1932, *Barnard s.n.* (BOL [*BOL 20518*], holo.; K, iso.).

Gladiolus pillansii var. *roseus* G.J.Lewis: t. 1159 (1953b). Type: South Africa, [Western Cape], Cape Peninsula, Scarborough, damp sandy ground near the vlei, 20 Feb. 1953, *Minicki s.n. SAM 60953* (SAM, holo.).

Plants (200–)300–600 mm high. *Corm* globose, 15–30 mm diam.; tunics softly papery or membranous, fragmenting irregularly or becoming somewhat fibrous. *Stem* erect below, inclined above, unbranched. *Leaves* 2 or 3, entirely sheathing, evenly spaced along stem or lowermost sometimes shortly overlapping one above, 50–150 mm long, progressively shorter, uppermost with margins free to base; foliage leaf produced after flowering, solitary, terete with four narrow longitudinal grooves, ± 1 mm diam. *Spike* weakly inclined, lightly flexuose, (3)5- to 11-flowered; bracts greyish to purplish green, outer 14–22 mm long, inner ± as long or slightly shorter, acute. *Flowers* pale to deep pink or lilac to mauve, lower lateral tepals with transverse band or spear-shaped to trilobed-spathulate yellow mark edged with darker pink or purple, often with strong sweet fragrance; perianth tube obliquely funnel-shaped, 11–12 mm long, cylindric lower part ± 7.5 mm long; tepals narrowly to broadly lanceolate, dorsal largest, inclined over stamens, curving upward distally, 22–27 × 11–12 mm, upper laterals recurving distally, 19–22 × 8.5–10.0 mm, lower 3 tepals united with upper laterals for 2–5 mm and together for 3–4 mm, free parts 15–19 mm long, gradually narrowed below into channelled claws, limbs arching downward, laterals ± 6 mm wide, lower median ± 8 mm wide. *Filaments* 12–13 mm long, exserted ± 8 mm from tube; anthers 6.0–8.8 mm long, dark purple-blue; pollen pale grey-blue. *Style* arching over stamens, dividing close to or slightly beyond anther apices, branches ± 3 mm long. *Capsules* narrowly ellipsoid, ± 12–20 mm long. *Seeds* oval, ± 7 × 4–5 mm, broadly and evenly winged. *Flowering time*: mainly March to April, occasionally in mid-February and as late as May.

Distribution and ecology: extending in Western Cape, South Africa, from the Gifberg in the north to Albertinia in the southeast; in deep sandy soils or sometimes loam in fynbos, flowering in autumn.

Diagnosis: an autumn-flowering species recognised by the softly papery or finely fibrous corm tunics, the foliage reduced to three, ± entirely sheathing leaves on the flowering stem, and pink to mauve, funnel-shaped flowers with transverse yellow bands or spear-shaped marking edged with red on the lower tepals. The solitary foliage leaf, produced from a separate bud later in the season, is terete and 4-grooved. *Gladiolus jonquilliodorus* from the Cape Peninsula and nearby Atlantic Coast has similar pale yellow or pearly grey flowers produced in midsummer, and two or three foliage leaves. *Gladiolus subcaeruleus* from clay soils has coarsely fibrous corm tunics forming a collar around the base of the stem and pale blue flowers with a slightly longer perianth tube, 15–17 mm long, and a thinly hairy foliage leaf.

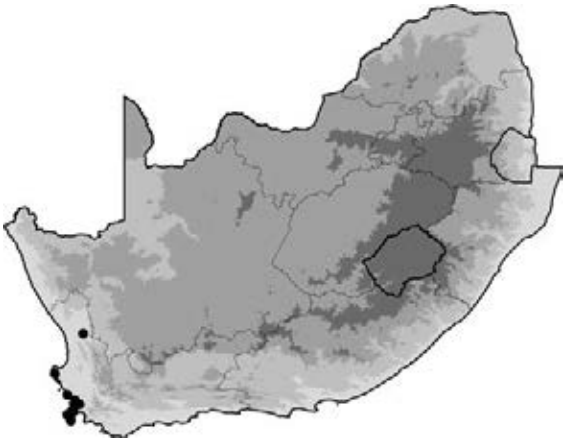
153. **Gladiolus jonquilliodorus** *Eckl. ex G.J.Lewis* in Annals of the South African Museum 40: 124 (1954). Type: South Africa, [Western Cape], Cape Flats, damp places, Feb., *Zeyher 450* [SAM, lecto., designated by Lewis et al.: 287 (1972)].

Plants (250–)400–700 mm high, with dry, brown cataphylls. *Corm* globose, 20–40 mm diam.; tunics membranous to soft-papery, becoming finely fibrous. *Stem*

straight and erect, unbranched. *Leaves* 2 or 3, entirely sheathing, lowermost usually overlapping next; foliage leaves produced after flowering, 2 or 3, 300–500 mm long, terete with four narrow longitudinal grooves, ± 1 mm diam., dry and dead at flowering time, often lacking. *Spike* lightly flexed at base and inclined, (4)7- to 14-flowered; bracts soft-textured, yellowish green to grey, outer 14–18 mm long, inner slightly shorter. *Flowers* cream-coloured or pale yellow to pearly grey, sometimes flushed with pink or light mauve, lower 3 tepals or only lower laterals with transverse yellow band and often streaked with narrow purple lines below, sweetly scented during day, partially closing at night, then scentless; perianth tube obliquely funnel-shaped, 8–9 mm long, largely enclosed in bracts; tepals narrowly oblanceolate, unequal, dorsal ± 20 × 9 mm, extending horizontally over stamens, upper laterals slightly shorter, directed forward and twisted obliquely to overlap dorsal tepal, curving outward distally, lower tepals united to one another for ± 5 mm, free parts 8–10 mm long, narrowed below into claws, abruptly expanded into limbs ± 5 mm long, arching downward. *Filaments* ± 10 mm long, exserted ± 5 mm from tube; anthers ± 6 mm long, mauve; pollen pale yellow. *Style* arching over stamens, usually dividing at or just beyond anther apices, branches 1.0–1.5 mm long. *Capsules* ellipsoid, 16–19 mm long. *Seeds* ovate, ± 6 × 3.5 mm, broadly and evenly winged. *Flowering time*: mainly December to mid-January, occasionally in late November or early February.

Distribution and ecology: a rare and local endemic of the extreme southwestern corner of Western Cape, South Africa, from Saldanha to the southern Cape Peninsula but recently recorded southwest of Klawer; on sandy coastal flats and plateaus in fynbos, flowering in midsummer.

Diagnosis: a summer-flowering species recognised by the softly papery or finely fibrous corm tunics, leaves of the flowering stem only three and ± entirely sheathing and pale yellow to pearly grey, funnel-shaped flowers with a transverse yellow band on the lower tepals. The flowers close at night. The two or three foliage leaves, produced from a separate bud later in the season, are terete and 4-grooved. *Gladiolus martleyi* has similarly shaped but pink to mauve flowers produced in autumn and a solitary foliage leaf.



Distribution of ***Gladiolus jonquilliodorus***.

154. **Gladiolus trichonemifolius** *Ker Gawl.* in Curtis's Botanical Magazine 36: t. 1483 (1812). Type: South Africa, without precise locality, cultivated in Great Britain at Royal Botanic Gardens, Kew, *Masson s.n.* (BM, holo.).

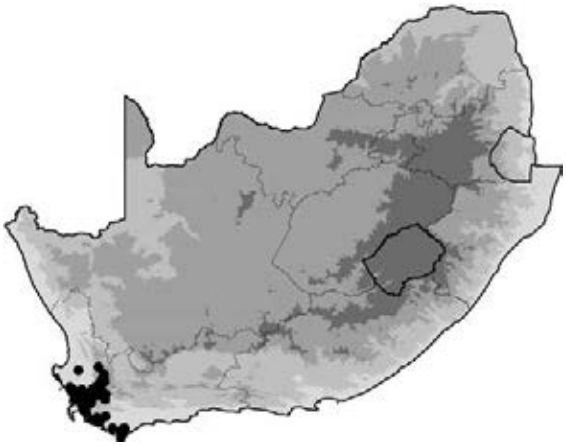
Gladiolus citrinus Klatt: 340 (1882). Type: South Africa, [Western Cape], between Paarl Mtns and Paardeberg, 1840, *Drège 8457* (?B, holo.; BM, G, K, L, S, iso.).

Gladiolus erectiflorus Baker: 146 (1896), illegitimate homonym, not *G. erectiflorus* Baker (1895). Type: South Africa, [Western Cape], sandy places near Malmesbury, Oct. 1892, *Macowan 1548* (K, holo.; BOL, G, SAM, iso.).

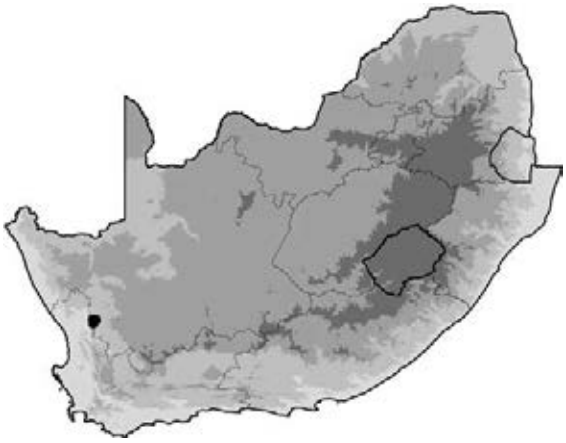
Gladiolus symmetranthus G.J.Lewis: 122, t. 4 (1954). *G. trichonemifolius* f. *symmetranthus* (G. J.Lewis) Bullock: t. 357 (1960). Type: South Africa, Cape, near Koelenhof, between Stellenbosch and Muldersvlei, 14 Sept. 1950, *Lewis 2237* (SAM, holo.; K, PRE, iso.).

[*Ixia spathacea* Sol. ex Ker Gawl.: t. 1483 (1812), invalid name as a synonym.]

Plants 120–250 mm high. *Corm* globose, 7–12 mm diam.; tunics woody to leathery, splitting into claw-like segments. *Stem* erect below, flexed outward above sheaths of two upper leaves, unbranched. *Leaves* 3, lower 2 basal, lowermost sheathing lower ⅔ of stem, usually shortly exceeding spike, oval in cross-section to terete and longitudinally 4-grooved, margins and midribs heavily thickened, 1–2 mm diam., second leaf sheathing for ½ its length, reaching to ± base of spike, uppermost leaf inserted in upper ⅓ of stem, mostly sheathing. *Spike* inclined or erect, flexuose, 1- to 3(4)- flowered; bracts dark green, veins nearly transparent, attenuate, outer 30–40(–50) mm long, inner shorter. *Flowers* weakly zygomorphic or subactinomorphic, creamy-white to yellow, outer tepals often flushed purple on reverse, lower 3 tepals with paired brown lines either side of midline in lower half and deeper yellow across middle, sometimes purplish toward apices, mouth of tube edged with star-shaped purple band or base of tepals and upper part of tube with blackish star-shaped mark, often with a strong sweet freesia- or violet-like scent, or unscented; perianth tube straight or obliquely and narrowly funnel-shaped, 16–20 mm long; tepals with upper 3 slightly larger than lower 3, or subequal, or outer 3 slightly larger than inner, lanceolate-elliptic, 24–35(–40) mm long, dorsal 10–13(–18) mm wide, lower 3 usually united for 1–4 mm, 22–35(–44) × 7–9 mm, arching outward in upper half. *Filaments* 8–15 mm long, exserted ± 2 mm from tube; anthers 8–10 mm long, pale yellow; pollen cream-coloured. *Style* arching over stamens or occasionally nearly straight, dividing just below anther apices, branches 4–5 mm long. *Capsules* ovoid-ellipsoid, 12–15 mm long. *Seeds* ovate, 4–5



Distribution of ***Gladiolus trichonemifolius***.



Distribution of ***Gladiolus sufflavus***.

× ± 3.0–3.5 mm, broadly and evenly winged. *Flowering time*: August to mid-September, occasionally in late July or late September.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, from Hopefield to Bredasdorp and inland to the Cold Bokkeveld; on seasonally marshy flats in loamy or sandy soils.

Diagnosis: recognised by the woody corm tunics, three leaves with slender, oval to terete and 4-grooved blades, and the creamy white to yellow, weakly zygomorphic flowers with funnel-shaped perianth tube 16–20 mm long and subequal tepals, the lower deeper yellow toward the base and with dark purple lines or streaks in the throat. White-flowered plants occur in the Hottentots Holland Mtns and around Bredasdorp.

155. **Gladiolus sufflavus** *(G.J.Lewis) Goldblatt & J.C. Manning*, *Gladiolus* in southern Africa: 287 (1998). *G. pritzelii* var. *sufflavus* G.J.Lewis in Lewis et al.: 250 (1972). Type: South Africa, [Northern Cape], Calvinia District, Glenridge Farm, Nieuwoudtville, 20 Aug. 1960, *Lewis 5730* (NBG, holo.; K, iso.).

Plants 450–700 mm high, with cataphylls puberulous to villous above ground. *Corm* 18–25 mm diam.; tunics leathery, becoming ± fibrous, often accumulating in collar around base of stem. *Stem* erect, flexed outward above sheathing part of two upper leaves, unbranched. *Leaves* (3)4, lower 2 basal, sheathing only near base, reaching to between base and middle of spike, ± terete with 4 longitudinal grooves or cross-shaped in section, 2–3 mm diam., smooth on both sheath and blade, remaining leaves villous on sheaths, second leaf sheathing stem for most of its length, upper 2 leaves cauline and largely sheathing. *Spike* inclined, lightly flexuose, 4- to 6-flowered; bracts olive-green, outer 20–30 mm long, inner nearly as long. *Flowers* bell-shaped, pale yellow to greenish, lower tepals with obscure greenish, dark yellow or brown markings, with sweet lily-like fragrance; perianth tube obliquely funnel-shaped, geniculate, 14–15 mm long, lower half erect and cylindric, upper half bent at right angles and flaring outward; tepals with upper broadly ovate, lower spathulate, dorsal largest, arched to hooded over stamens, 18–20 × 13–16 mm, upper laterals slightly smaller, curving outward near margins, lower laterals united with upper laterals for 4–5 mm, forming a shallow spoon, ± 11 × 8 mm, not differentiated into claws below, curving upward below and deflexed apically. *Filaments* 13–14 mm long, exserted from tube for 7–8 mm but included in flower; anthers 6–7 mm long, purple; pollen cream-coloured. *Style* arched over stamens, dividing just below anther apices, branches ± 3.5 mm long. *Capsules* ovoid-ellipsoid, 17–21 mm long. *Seeds* ovate, 5–6 × 4 mm, broadly and evenly winged. *Flowering time*: late August and September.

Distribution and ecology: a local endemic of the Bokkeveld Escarpment near Nieuwoudtville in Northern Cape, South Africa; on sandstone along seasonal streams, ponds and seepages in arid fynbos.

Diagnosis: recognised by its stiffly erect stems with three or four leaves, the lowermost or lower two subbasal with a centric blade, terete or X-shaped in section and the remainder largely sheathing with softly villous sheaths, and nodding, pale yellow to yellow-green, bell-shaped flowers with a sharply bent perianth tube 14–15 mm long. *Gladiolus pritzelii* has bright yellow flowers, often conspicuously marked with brown on the lower tepals, and plane leaves with one or two raised veins but unthickened margins.

156. **Gladiolus pritzelii** *Diels* in Botanische Jahrbücher für Systematik 44: 118 (1909). Type: South Africa, [Northern Cape], Hantamsberg, Sept. 1900, *Diels & Pritzel 738* (B, holo. [photo at NBG, PRE]; Z, iso.).

Plants 200–600 mm high, with cataphylls often puberulous above ground. *Corm* globose, 15–20 mm diam.; tunics woody to leathery, splitting from below into coarse teeth or becoming fibrous. *Stem* ± erect throughout,

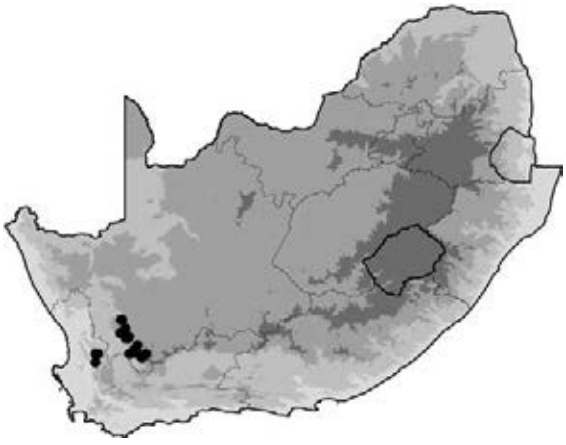
flexed above sheaths of upper two leaves, unbranched. *Leaves* 3, lowermost basal and reaching to ± base of spike, smooth or puberulous to villous, sheathing lower ⅓ of stem, linear, 1,0–3.5 mm wide, usually with 2 raised central veins, margins not noticeably thickened, second leaf sheathing stem to shortly below spike, blade short, third leaf inserted shortly below spike. *Spike* weakly inclined, flexuose, 1- to 3(5)-flowered; bracts pale to olive-green, margins membranous, outer 20–40 mm long, inner shorter, minutely forked. *Flowers* zygomorphic, bell-shaped, clear to dull yellow, upper lateral tepals sometimes with reddish markings, lower lateral tepals with bright yellow transverse band outlined in red to purple or brown, lower median with spade-shaped yellow mark outlined in red or purple, lower part of throat streaked with dark colour, sweetly fragrant; perianth tube obliquely funnel-shaped, geniculate, 11–12 mm long, lower ½ erect, cylindric for ± 6 mm, upper ½ bent sharply and flaring outward; tepals with upper 3 ovate, dorsal largest, arched over stamens, (16–)22–24 × 13–20 mm, upper laterals slightly smaller, recurving apically, lower 3 tepals united with upper laterals for 4–6 mm and together for 2–3 mm, scabrid in lower midlines, curving downward distally, laterals spathulate, 12–16 × ± 7 mm, lower median ± as long, lanceolate. *Filaments* 10–12 mm long, exserted 5–6 mm from tube but included in flower; anthers ± 8.5 mm long, reddish to brown; pollen yellow. *Style* arching over stamens, dividing shortly below anther apices, branches 3–4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: late August and September.

Distribution and ecology: a montane species recorded from the southern Cederberg and Cold Bokkeveld in Western Cape, South Africa and inland in the Northern Cape from the Hantamsberg and the higher parts of the Roggeveld; on rocky sandstone slopes in fynbos or in the interior in dolerite outcrops in renosterveld.

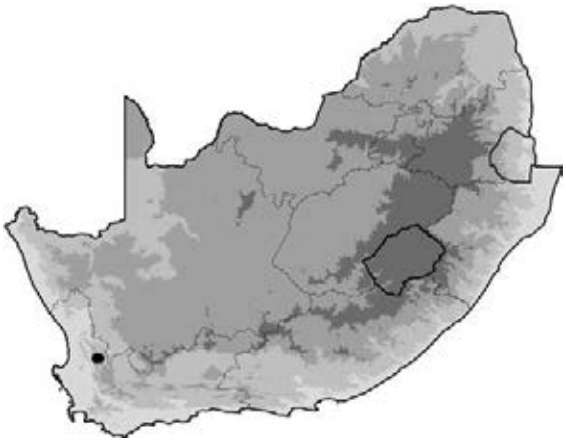
Diagnosis: recognised by the three smooth to pubescent leaves with a pair of thickened and raised veins on one side but with the margins unthickened and bell-shaped, yellow flowers with short, sharply bent perianth tube 11–12 mm long. *Gladiolus delpierrei* has similar leaves but softly fibrous corm tunics and funnel-shaped, pale yellow to cream-coloured flowers with a very short perianth tube ± 8 mm long. *Gladiolus sufflavus* from the Bokkeveld Escarpment has X-shaped leaves with thickened margins and midrib, and greenish flowers.

157. **Gladiolus delpierrei** *Goldblatt* in Journal of South African Botany 45: 84 (1979). Type: South Africa, [Western Cape], Cederberg Mtns, Sneeuberg, 5 Jan. 1975, *Delpierre 456* (NBG, holo.).

Plants 550–650 mm high, with cataphylls lightly mottled above ground but dry and pale at flowering time. *Corm* globose, ± 20 mm diam.; tunics finely fibrous, forming thin collar around base. *Stem* unbranched. *Leaves* 3, lowermost basal and reaching to ± base of spike, linear, 3–4 mm wide, main vein and one other vein or vein pair moderately thickened and prominent, margins lightly thickened, sheaths of 2 lower leaves lightly scabrid on veins, remaining 2 leaves cauline, widely spaced, entirely sheathing, margins united below around stem. *Spike* lightly inclined, 5- to 7-flowered; bracts pale grey-green or flushed light purple, outer 18–20 mm long, inner slightly shorter. *Flowers* creamy yellow, upper lateral tepals reddish along midline toward base, lower tepals dark yellow in lower ⅓ with fine red lines or feathering at base, mouth of tube dark red; perianth tube narrowly funnel-shaped, ± 8 mm long; tepals with upper ovate, dorsal largest, ascending to inclined over stamens, ± 21 × 11 mm, upper laterals ± 17 × 8.5 mm, in profile sometimes narrowly windowed between dorsal and upper laterals, lower tepals lanceolate, joined to upper laterals for ± 3 mm, 12–13 mm long, narrowed below into channelled claws, limbs minutely puberulous in lower midline, recurved or sharply deflexed from middle, lowermost slightly longer than lower laterals. *Filaments* ± 12.5 mm long, exserted ± 9 mm from tube; anthers ± 8 mm long, light mauve; pollen cream-coloured. *Style* arching over stamens, dividing just below anther apices, branches 2–3 mm long. *Capsules* and *seeds* unknown. *Flowering time*: December and early January.



Distribution of ***Gladiolus pritzelii***.



Distribution of ***Gladiolus delpierrei***.

Distribution and ecology: a local endemic of the Cederberg in Western Cape, South Africa, recorded only from the upper slopes of Sneeuberg; in seeps on sandstone, above 1 800 m elevation, flowering in midsummer.

Diagnosis: recognised by the three linear leaves, the lowermost with one or two veins thickened and raised and the margins lightly thickened, and small, funnel-shaped, pale creamy yellow flowers with a red throat and red streaks at the base of the upper and lower lateral tepals, with a very short perianth tube ± 8 mm long. *Gladiolus pritzelii* has similar leaves, with two veins thickened and raised and the lower tepals also puberulous in the lower midline, but coarsely fibrous tunics and bell-shaped, yellow flowers with a sharply bent perianth tube 11–12 mm long.

Ser. **Tristes** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus tristis* L.

Plants from winter- and summer-rainfall regions. *Corms* subglobose; tunics ± leathery to woody and splitting into claws, or coarsely fibrous. *Leaves* three, green at flowering, lowermost markedly longest, centric or linear with midrib and margins thickened and raised at right angles to blade thus with two furrows or grooves on each side. *Flowers* small to medium, zygomorphic or rarely subactinomorphic, usually trumpet-shaped and nocturnal with spicy scent, cream-coloured to brownish and variously mottled, rarely cup-shaped and pink, often hyaline along tepal sinuses and especially lower margins of dorsal tepal; perianth tube usually as long as or longer than dorsal tepal, rarely very short. *Capsules* oblong-ellipsoid or cylindric.

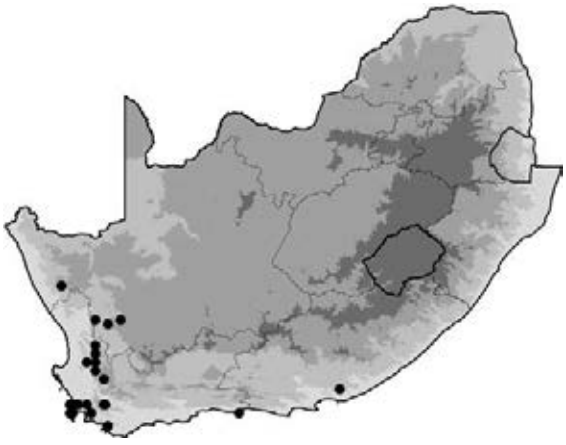
158. **Gladiolus hyalinus** *Jacq.*, Icones plantarum rariorum 2: conspectus tabularum, nec t. 242 (1795 [1788–1795]), replacement name for *G. strictus* Jacq.: 170 (1791), illegitimate homonym, not *G. strictus* Aiton (1789). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 242 (1795 [1788–1795]).

Gladiolus confusus N.E.Br.: 31 (1928). Type: South Africa, [Western Cape], Devil's Peak near Mowbray, in rocks at foot of mountain, 300 ft [90 m], Aug. 1883, *H. Bolus 4890* (K, holo.; BOL, iso.).

Plants (120–)300–600 mm high. *Corm* globose-conic, 10–12 mm diam.; tunics ± woody, splitting below into claw-like segments. *Stem* erect below, flexed outward above sheaths of upper 2 leaves, unbranched. *Leaves* 3, imbricate, lowermost markedly longest, reaching to ± base of spike, linear, 1.7–2.5 mm wide, margins and main vein strongly thickened and raised, thus with two fairly wide grooves on each surface, second leaf sheathing lower ½ of stem, upper leaf sheathing for ± ½ its length. *Spike* inclined, ± straight, 1- to 3(6)-flowered; bracts pale green to greyish, sometimes long-attenuate, outer 36–50 mm long, usually exceeding perianth tube, inner slightly shorter, minutely forked. *Flowers* light to reddish brown on a pale cream-coloured background, tepals usually darker along midlines, lower ½ of dorsal tepal transparent on edges, abaxial part of throat transparent with dark spots and streaks, entire perianth becoming translucent after dark, unscented or rarely sweetly scented, especially at night; perianth tube 25–36 mm long, erect and cylindric below for 20–24 mm, abruptly bent and flared outward for 10–12 mm; tepals lanceolate to ovate, dorsal largest, arching over stamens, 23–30 × 12–16 mm, upper laterals 23–30 × 7–8 mm, lower 3 tepals united for 2–4 mm, lower laterals 14–20 mm long, curving obliquely away from lower median in upper ½, lower median ± straight, 16–25 × 5–6 mm. *Filaments* 12–16 mm long, exserted 2–5 mm from tube; anthers 9–11 mm long, cream-coloured; pollen yellow. *Style* arching over stamens, dividing at or shortly beyond anther apices, branches 2–3 mm long. *Capsules* elongate-ellipsoid, triangular in section, (20–)25–30 mm long, enclosed in bracts. *Seeds* ± ovate, 4–7 × 3–4 mm, broadly and evenly winged. *Flowering time*: June to mid-August, at higher elevations until late September, rarely in October.

Distribution and ecology: widely scattered through the South African winter-rainfall region, along the western escarpment from Steinkopf to Springbok, the Kamiesberg and Bokkeveld Mtns in Northern Cape, and south to the Cape Peninsula and Riviersonderend Mtns in Western Cape, with outlying records from near Mossel Bay, and Plettenberg Bay and Kenton-on-Sea in Eastern Cape; mostly on loamy or clay soils in renosterveld or transitional fynbos.

Diagnosis: *Gladiolus hyalinus* is recognised by the linear lower leaf with heavily thickened margins and midrib, and moderate-sized, dull-coloured flowers with upper tepals 23–30 mm long and perianth tube 25–36 mm long, with the lower lateral tepals obliquely twisted away from the lower median. The broad transparent lower edges of the dorsal tepal are striking. *Gladiolus liliaceus* has larger flowers, the upper tepals 40–45 mm long and the perianth tube 40–53 mm long, with the lower lateral tepals not obliquely twisted.



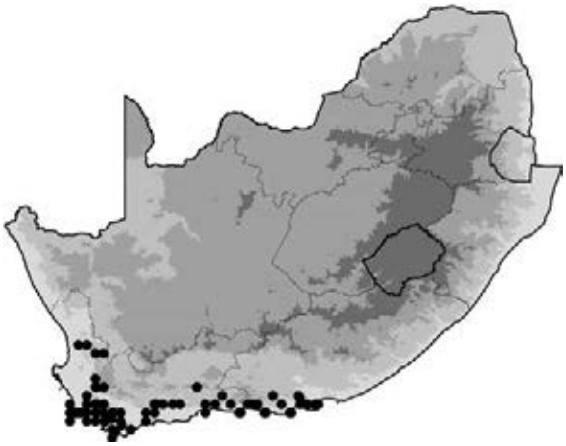
Distribution of ***Gladiolus hyalinus***.

159. **Gladiolus liliaceus** *Houtt.*, Natuurlijke historie 2, 12: 55, t. 79, f. 2 (1780). Type: South Africa, without precise locality or collector, cultivated in Holland, *Houttuyn s.n.* (G: Herb. Burman, holo.).

Gladiolus tristis var. *grandis* Thunb.: 12 (1784). *G. grandis* (Thunb.) Thunb.: 185 (1800). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1031, holo. [photo at BOL, K]).

Gladiolus versicolor Andrews: t. 19 (1798a). *G. versicolor* var. *major* Ker Gawl.: sub t. 556 (1802a). 8). Type: South Africa, without precise locality, *Pringle s.n.*, cultivated in Great Britain at Hammersmith, London, illustration in Andrews: t. 19 (1798a).

Plants 300–800 mm high. *Corm* globose, 12–18 mm diam.; tunics ± woody to leathery, splitting below into claw-like segments. *Stem* usually inclined below, sharply flexed outward above sheathing part of uppermost leaf and strongly inclined above, unbranched. *Leaves* 3, overlapping, 2 lowermost basal, lowermost markedly longest, reaching to between base and shortly beyond apex of spike, sheathing lower part of stem or only near base, second leaf sheathing lower ½ of stem, linear, (1.5–)2.0–4.0(–6.0) mm wide, margins and midribs strongly thickened and raised, thus with two narrow or broad grooves or furrows on each surface, margin and main vein edges minutely scabrid, uppermost leaf inserted between middle and upper ¼ stem. *Spike* inclined, lightly flexuose, 1- to 4(6)-flowered; bracts pale green or suffused dull grey, outer 55–80(–115) mm long, long-attenuate and often twisted above, especially lowermost, lower margins united around spike axis, inner shorter, twisted around to lie against outer, forked. *Flowers* light brown to dull pinkish red, tan, purplish or cream-coloured to greenish yellow, tepals darker along midlines, lower tepals pale yellow to cream-coloured in lower ⅓, abaxial ½ of throat speckled with dark brown, lower edges of dorsal tepal and sutures between tepals transparent, entire perianth changing colour after dark, becoming bluish to mauve and then intensely sweetly clove-scented; perianth tube narrowly and obliquely funnel-shaped, 40–45(–53) mm long, wider upper part 12–20 mm long, exserted between bracts, sometimes lightly pubescent in lower part of tube; tepals lanceolate-attenuate, slightly twisted in upper ½, margins undulate, sometimes crisped distally, dorsal largest, strongly inclined over stamens, curving upward distally, 38–45 × 14–20 mm, upper laterals 37–44 × 10–15 mm, arching outward from base, lower 3 tepals joined to upper laterals for 3–6 mm and sometimes together for up to 2 mm, curving outward distally, 31–40 × 10–15 mm. *Filaments* 15–25 mm long, usually exserted 1.5–5.0 mm from tube or sometimes only reaching top of tube, lightly pubescent below; anthers 11–16 mm long, brown or dull purple; pollen pale yellow or cream-coloured. *Style* arching over stamens, usually dividing opposite anther apices, branches ± 3 mm long. *Capsules* oblong-ellipsoid, triangular in section, 30–50 mm long. *Seeds* 4–5 × 3.0–3.5 mm, broadly and evenly winged. *Flowering time*: late August to mid-September at lower elevations, occasionally later especially at higher elevations; a late-blooming form blooms in November and December.



Distribution of ***Gladiolus liliaceus***.

Distribution and ecology: widespread through the winter-rainfall region of Western and Eastern Cape, South Africa, from the Cederberg to Bredasdorp and along the foothills of the coastal mountains to Port Elizabeth; in clay soils in renosterveld, mainly in lowland habitats.

Diagnosis: diagnosed by the linear lower leaf with heavily thickened and raised margins and midrib, and relatively large, dull, trumpet-shaped flowers with upper tepals 37–45 mm long and perianth tube 40–53 mm long. The lowermost bracts are conspicuously attenuate. Similar *Gladiolus hyalinus* has smaller flowers, the upper tepals 23–30 mm long and the perianth tube 25–36 mm long, with the lower laterals obliquely twisted away from the median. *Gladiolus tristis* has X-shaped leaves and mostly cream-coloured to yellowish flowers with shorter, acute to obtuse bracts up to 50 mm long.

160. **Gladiolus tristis** *L.*, Species plantarum, edn. 2, 1: 53 (1762). Type: South Africa, without precise locality or collector, *Herb. Linn. 59.9* (LINN, holo.).

Gladiolus tristis var. *odorus* Thunb.: 11 (1784). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1080, holo.).

Gladiolus concolor Salisb.: t. 8 (1806). *G. tristis* var. *concolor* (Salisb.) Baker: 172 (1877). Type: South Africa, without precise locality, cultivated in Britain, figure in Salisb.: t. 8 (1806).

Gladiolus versicolor var. *longifolius* Ker Gawl.: sub. t. 556 (1802a). *G. spiralis* Pers.: 43 (1805). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 245 (1792 [1788–1795]) '*G. tristis* var.' .

Gladiolus aestivalis Ingram: 301 (1930). *G. tristis* var. *aestivalis* (Ingram) G.J.Lewis in Lewis et al.:

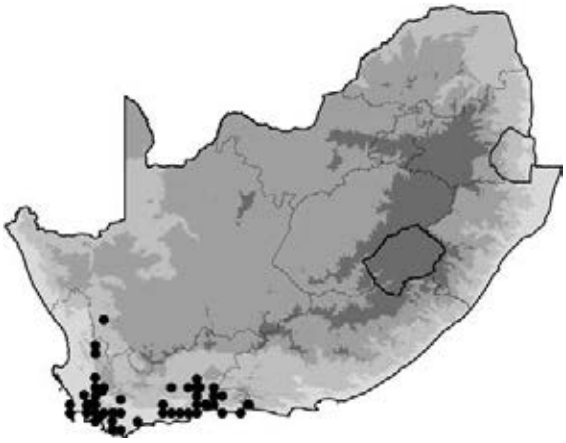
195 (1972). Type: South Africa, Western Cape, Drakenstein Mtns, flowered in Britain, 1930, *Ingram s.n.* (location unknown, not at BM or K).

Gladiolus flavidus Ingram: 302, with fig. (1930). Type: South Africa, [Eastern Cape], Tsitsikamma, estuary of Groot River, 13 Nov. 1927, *Ingram s.n.* (location unknown, not at BM or K).

Gladiolus fulvescens Ingram: 301 (1930). Type: South Africa, Western Cape, dry ground near Elgin, 11 Oct. 1927, *Ingram s.n.* (location unknown, not at BM or K).

Plants (170–)400–1 200 mm high. *Corm* 12–18 mm diam.; tunics firm-papery or leathery, splitting from below into coarse fibres. *Stem* erect or inclined, usually flexed above sheaths of upper 2 leaves, unbranched. *Leaves* 3, rarely a fourth bract-like leaf below spike, lower 2 basal, lowermost markedly longest, reaching to base of spike or exceeding it, sheathing stem up to middle, 2–4 mm diam., X-shaped in section with main vein raised and margins slightly thickened, sometimes thickened edges of margins and main vein almost meeting and leaf thus appearing terete, upper 2 leaves largely to entirely sheathing. *Spike* lightly inclined, ± straight, mostly 3- to 5(11)-flowered; bracts pale to dark green, sometimes flushed grey above, outer (25–)40–50 mm long, inner slightly shorter to ± as long, acute or forked, twisted to lie against outer bract. *Flowers* pale to creamy yellow to greenish yellow, tepals darker coloured on midlines, or sometimes with purple to reddish median streaks, reverse of tepals usually dark grey-purple to reddish along midline and sometimes apices, sutures between tepals transparent for ± 10 mm, most conspicuously so between dorsal and upper laterals, weakly scented during day but strongly scented of carnation and cloves in early evening; perianth tube narrowly and obliquely funnel-shaped, 40–63 mm long, narrow cylindric part 20–30 mm long, lightly papillose in lower throat; tepals broadly lanceolate, unequal, dorsal largest, inclined to almost horizontal, 22–28 × 16–20 mm, upper laterals arching outward from base, 22–28 × 9–16 mm, lower tepals united with upper laterals for ± 2 mm and sometimes together for up to 2 mm, ± straight or curving outward distally, 16–22 × 9–12 mm. *Filaments* (15–)18–25 mm long, included or shortly exserted up to 2 mm; anthers 10–17 mm long, lower 4–5 mm included in tube, pale yellow to light purple; pollen pale yellow. *Style* arching over stamens, minutely scabridulous below, dividing between upper third and apex of anthers, branches (2–)4–6 mm long. *Capsules* ± oblong-ellipsoid, 34–36 mm long, ± as long or slightly longer than outer bract. *Seeds* oval, 5–7 × 4–5 mm, broadly and evenly winged. *Flowering time*: September to November, rarely in August, occasionally in December or early January at high elevations.

Distribution and ecology: widespread in the winter-rainfall parts of Northern, Western and Eastern Cape, South Africa, from the Bokkeveld Mtns to Bredasdorp and along the coastal forelands to Humansdorp and in the Swartberg; on damp sandy flats and marshes, seeps, streamsides and moist south-facing slopes in fynbos, flowering mainly in spring but summer-flowering forms occur at higher elevations.



Distribution of ***Gladiolus tristis***.

Hybrids with *Gladiolus caryophyllaceus* have been recorded in the Swartberg and were described as *G. lewisiae* [see Excluded Species].

Diagnosis: diagnosed by the ± x-shaped lower leaf with heavily thickened and raised main vein and thickened margins and relatively large, cream-coloured to pale yellowish, trumpet-shaped flowers, sometimes ± shaded with grey-brown on the reverse of the tepals, upper tepals 22–28 mm long and perianth tube 40–63 mm long. The bracts are relatively short and blunt, (25–)40–50 mm long. *Gladiolus liliaceus* has linear, grooved leaves and mostly brownish-mottled flowers with longer bracts, 55–115 mm long, those of the lower flowers always long-attenuate and much longer than the perianth tube. *Gladiolus longicollis* has shorter filaments, 5–13 mm long, and occurs mostly east of Port Elizabeth but also occurs in the Swartberg and Kammanassie Mtns.

161. **Gladiolus diluvialis** *Goldblatt & J.C.Manning* in Bothalia 41: 290 (2011b), replacement name for *G. halophilus* [as *halophila*] Goldblatt & J.C.Manning: 791 (2011ab), illegitimate homonym, not *G. halophilus* Boiss. & Heldr. in Boiss. (1854). Type: Namibia, Keetmanshoop, tributary valley of Fish River S of Snyfontein, in saline seep at base of cliffs in dry river course, 10 Aug. 2010, *Mannheimer 4383* (WIND, holo.; EBH, K, MO, MSB, NBG, PRE, iso.).

Plants (150–)300–600(–1 000) mm high. *Corm* 15–20 mm diam., tunics firm-papery layers, splitting from below into coarse fibres. *Stem* stiffly erect or flexed slightly outward above second leaf, usually unbranched but very rarely with small branch in axil of uppermost leaf. *Leaves* 3, lower 2 basal, lowermost markedly longest, usually reaching at least to base of spike, 1.0–2.5(–3.0) mm diam., cross-shaped in section with midrib raised at right angles to blade, thus with two furrows ± 0.5 mm wide on each surface, second leaf largely or entirely sheathing

lower ± ⅔ of stem, sheath with hyaline longitudinal suture running entire length, uppermost leaf distant from second leaf, bract-like. *Spike* suberect, ± straight, 1- to 5(–7)-flowered; bracts pale green or flushed grey, outer 22–25 mm long, inner slightly shorter to slightly longer than outer, minutely notched. *Flowers* pale mauve or opalescent with darker mauve feathering along midline, especially on upper lateral tepals, mauve speckled on reverse, lower tepals white in basal half and in throat, yellow-green midline and spotted with purple, tube pale creamy yellow, weakly scented during day but strongly scented of carnations and cloves at night; perianth tube narrowly and obliquely funnel-shaped, 35–40 mm long, narrowly cylindric portion 25–30 mm long, minutely puberulous in lower throat; tepals broadly lanceolate-attenuate, unequal, dorsal largest, weakly hooded and ± horizontal over stamens, 25–30 × 10–12 mm, upper laterals arching or spreading distally, 25–30 × 8–10 mm, lower laterals united with upper laterals for 2–4 mm and together for 2 mm, recurved or deflexed distally, 23–25 × 6–8 mm. *Filaments* ± 14 mm long, included in tube or exserted for up to 1 mm; anthers ± 13 mm long, barely exserted, lilac with dark purple thecae; pollen pale yellow. *Style* arching over stamens, minutely puberulous below, dividing just below to just beyond anther apices, branches 3–4 mm long. *Capsules* oblong-ellipsoid, 35–40 × 6–7 mm, much longer than outer bracts. *Seeds* elliptic to oblong, 5.5–7.5 × 3.5–4.5 mm, broadly and unequally winged with wings broader at chalazal and micropylar ends. *Flowering time*: August.

Distribution and ecology: a narrow endemic of the Karas Region in southern Namibia, along the Fish River Canyon west of Keetmanshoop; in saline seeps and drainage lines among sedges. Flowers open shortly after sunset and wither the following evening. The species is self-compatible and facultatively autogamous.

Diagnosis: diagnosed by the ± X-shaped lower leaf with heavily thickened and raised margins and midrib, and the relatively large, pale mauve or opalescent, trumpet-shaped flowers that last only one day, the upper tepals 25–30 mm long and the perianth tube 35–40 mm long. The bracts are relatively short and blunt, 22–25 mm long. Similar *Gladiolus tristis* from the south-western South Africa has cream-coloured to pale yellow flowers lasting several days, a longer perianth tube, 40–63 mm long and longer filaments, (15–)18–25 mm long.

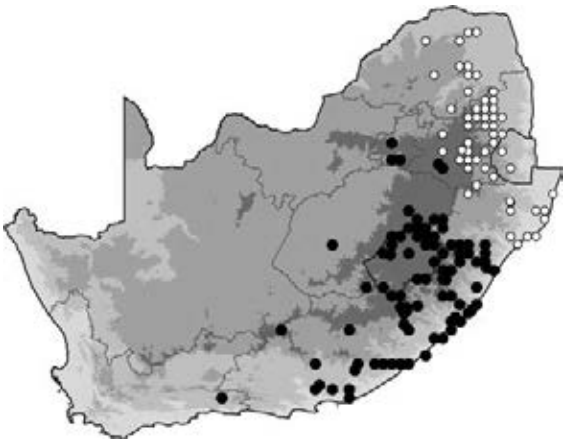


Distribution of ***Gladiolus diluvialis***.

162. **Gladiolus longicollis** *Baker* in Journal of Botany, British and foreign 14: 182 (1876a). *Acidanthera longicollis* (Baker) R.C.Foster: 42 (1936). Type: South Africa, [Eastern Cape], Baziya Mt, 3 000–4 000 ft [900– 1 200 m], Oct.–Nov., *Baur 505* (K, holo.; BOL, NU, iso.).

Plants (200–)300–500(–600) mm high. *Corm* conic, (7–)10–14 mm long, tunics of fairly fine to moderately coarse fibres, sometimes thickened and ± claw-like below. *Stem* erect, usually flexed outward just above sheathing part of second leaf, unbranched. *Leaves* 3, only lowermost with well-developed blade ± ⅔ as long as stem, X-shaped in section to terete with four narrow longitudinal grooves, second leaf sheathing stem for 100–150 mm, channelled throughout or with a short blade, third leaf inserted in upper ¼ of stem and largely sheathing. *Spike* 1- to 3(7)- flowered; bracts grey-green, outer shortly acuminate, 35–50(–65) mm long, inner shorter to slightly longer, acuminate or notched apically. *Flowers* white to pale yellow, often lightly to heavily mottled with brown, more densely so along midlines, outer tepals flushed and veined purplish to brown or green on reverse, tube obscurely lined with green or purple on veins, perianth expanding in evening or during misty weather, then scented of carnation and cloves, closing next morning; perianth tube slender and cylindric, ± horizontal and slightly curved above or erect below and curving outward above, (45–)50–110 mm long, 2–3 mm diam. in midline, papillose in lower throat; tepals subequal or unequal, outer whorl equal and larger than inner whorl, acute to acuminate or attenuate, dorsal nearly horizontal or curving upward distally, 25–32 × 12–17 mm, upper lateral 25–42 × 10–19 mm, lower tepals sometimes joined to upper laterals for up to 2 mm and together for up to 2 mm, lower lateral tepals 22–32 × 9–14 mm, lower median 25–32 × 12–14 mm. *Filaments* 5–13 mm long, usually included in tube or exserted 1–2 mm; anthers 9–15 mm long, included in tube for up to ½ their length or shortly exserted 1–2 mm beyond tube, green or purplish; pollen cream-coloured to yellow. *Style* arching over stamens, puberulous in lower half, dividing opposite upper third of anthers, branches 3–6 mm long. *Capsules* ellipsoid or subcylindric, 20–25 × ± 6 mm. *Seeds* ovate, 5–6 × 3.5–4.0 mm, broadly and evenly winged. *Flowering time*: October to mid-February.

Distribution and ecology: widespread through the south-eastern and eastern southern Africa, from the Swartberg in Western Cape, South Africa through Eastern Cape, KwaZulu-Natal, Lesotho, western Free State, Gauteng, Mpumalanga and Eswatini to Limpopo; in stony grassland. Flowering may take place over an extended period even within a single population.



Distribution of ***Gladiolus longicollis*** subsp. ***longicollis***, ●; subsp. ***platypetalus***, ○ .

Diagnosis: diagnosed by the ± X-shaped or terete lower leaf with heavily thickened and raised margins and midrib, and the long-tubed, trumpet-shaped flowers, cream-coloured or ± mottled with brown, the dorsal tepal 25–32 mm long and the upper laterals up to 45 mm long, and the perianth tube 45–110 mm long, with the filaments entirely or mostly included and 5–13 mm long. The bracts are relatively short and blunt, 35–65 mm long. *Gladiolus tristis* has longer filaments, (15–) 18–25 mm long, and occurs mostly west of Port Elizabeth but has also in the Swartberg Mtns.

Key to subspecies

1a Perianth tube 45–60(–65) mm long; tepals lanceolate and tapered distally; anthers entirely or mostly exserted; spike with 2 to 7 flowers . . . . . 162a. subsp. *longicollis*

1b Perianth tube 65–110 mm long; tepals broadly lanceolate to ovate, acute; anthers half-included; spike with 1 or 2(3) flowers . . . 162b. subsp. *platypetalus*

162a. subsp. **longicollis**

Gladiolus cygneus Ingram: 347, t. 144 (1931b), new synonym. Type: South Africa, [KwaZulu-Natal], Mont aux Sources, 9 500–10 000 ft [2 900–3 000 m], cultivated in Britain, 1930, *Ingram s.n.* (BM, holo.).

Spike (1)2–4(7)-flowered; bracts grey-green, outer 35–40 mm long, inner shorter. *Flowers* cream-coloured to yellow and variously speckled or mottled with brown; perianth tube usually erect below, curving outward above, 45–65 mm long, sometimes only shortly exserted from bracts; tepals lanceolate, attenuate, subequal, 30–35 × 8–12 mm. *Filaments* 10–12 mm long, reaching to mouth of tube; anthers ± 9 mm long, exserted or sometimes bases included in tube. *Style* dividing opposite anther apices, branches ± 3 mm long. *Flowering time*: October to November.

Distribution and ecology: extending from Gauteng, south western Mpumalanga and central KwaZulu-Natal through the eastern Free State, Lesotho and Eastern Cape to the Swartberg and Kammanassie Mtns in Western Cape.

162b. subsp. **platypetalus** *(Baker) Goldblatt & J.C.Manning*, *Gladiolus* in southern Africa: 197 (1998). *Acidanthera platypetala* Baker: 339 (1876b). *G. longicollis* var. *platypetalus* (Baker) Oberm. in Lewis et al.: 190 (1972). Type: Natal, Attercliffe, 30 Sept. 1860, *Sanderson 265* (K, holo.; BOL, probable iso.).

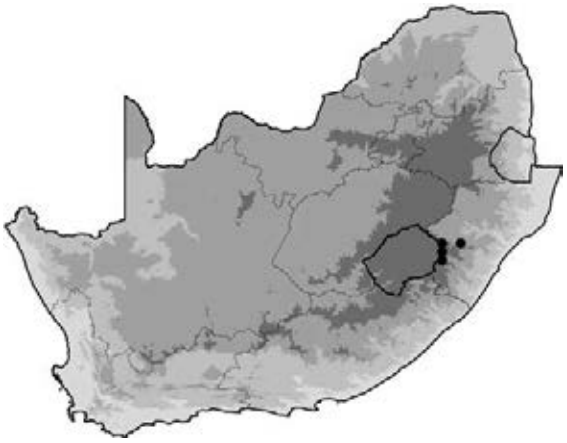
Gladiolus praelongitubus G.J.Lewis: 27 (1941). Type: South Africa, [Mpumalanga], Barberton District, Saddleback Range, 3 000–5 000 ft [900–1 500 m], Sept.–Oct. 1889, *Galpin 530* (SAM, holo.; BOL, K, PRE, iso.).

Spike 1- or 2(3)-flowered; bracts green or flushed purple, outer 45–55 mm long, shortly acuminate, inner shorter to slightly longer. *Flowers* white or cream-coloured, outer tepals flushed and veined purplish to brown or green on reverse, tube obscurely lined with green or purple; perianth tube slender and cylindric, ± horizontal and slightly curved, 65–110 mm long, well exserted from bracts; tepals lanceolate, outer whorl subequal and larger than inner whorl, dorsal 30–32 × 14–17 mm, upper lateral and lower median tepals 40–42 × 15–19 mm. *Filaments* 5–9 mm long, included in tube; anthers 11–13 mm long, lower half included in tube. *Style* dividing between middle and apex of anthers, branches 5–6 mm long. *Flowering time*: October to December, occasionally until mid-February.

Distribution and ecology: from central KwaZulu-Natal through Eswatini and Mpumalanga to Limpopo.

163. **Gladiolus symonsii** *F.Bolus* in Annals of the Bolus Herbarium 2: 99 (1917). Type: South Africa, [KwaZulu-Natal], Underberg District, Bushman's Peak, 9 500 ft [2 900 m], 8 Jan. 1915, *Symons 336* (BOL, holo.).

Plants 250–450 mm high. *Corm* globose, ± 10 mm diam.; tunics of fine to wiry fibres. *Stem* erect, unbranched, usually flexed outward just above sheathing part of second leaf. *Leaves* 3, lowermost markedly longest, sheathing lower ⅓ of stem, reaching to ± upper ⅓ of stem, 60–120 mm long, X-shaped in section with main vein raised and margins thickened, thus with 4 broad longitudinal grooves or furrows, remaining leaves without blades, second leaf sheathing stem for 80–150 mm, third leaf inserted near stem apex. *Spike* inclined, 2- to 4-flowered; bracts soft-textured, dull green, 20–30 mm long, inner shorter. *Flowers* subactinomorphic, with unilateral stamens and style, bright pink to pale rose, whitish in throat, lower 3 tepals feathered or streaked with fine red lines or spots at base, apparently unscented; perianth tube obliquely funnel-shaped, 8–12 mm long; tepals subequal, lanceolate, dorsal slightly larger, 20–25 × 10–13 mm, inclined over stamens, upper laterals suberect, slightly shorter than dorsal, lower 3 tepals



Distribution of ***Gladiolus symonsii***.

19–23 × 10 mm. *Filaments* ± 7 mm long, included or exserted up to 1 mm from tube; anthers 8–10 mm long, yellow; pollen yellow. *Style* arching over stamens, dividing opposite upper ¼ of anthers, branches ± 3.5 mm long. *Capsules* and *seeds* unknown. *Flowering time*: December to late January.

Distribution and ecology: a narrow endemic of the eastern Drakensberg in KwaZulu-Natal, South Africa and eastern Lesotho, extending from Bushman's Nek to Giant's Castle; in short grassland or on sandstone or basalt pavement, from 1 800 to 2 500 m.

Diagnosis: diagnosed by the ± X-shaped lower leaf with heavily thickened and raised margins and midrib, and the pink, funnel-shaped flowers with subactinomorphic perianth with a very short tube, 8–12 mm long and short filaments ± 7 mm long scarcely exserted from the tube.

Ser. **Homoglossum** *Goldblatt & J.C.Manning*, new series. Type species: *Gladiolus watsonius* Thunb.

Plants mainly from winter-rainfall region. *Corms* subglobose; tunics ± leathery to woody and splitting into claws, or coarsely fibrous. *Leaves* three, green at flowering, lowermost markedly longest, centric or linear with midrib and margins thickened and raised at right angles to blade thus with two furrows or grooves on each surface. *Flowers* medium, zygomorphic, sometimes strongly so with lower tepals reduced, trumpet-shaped, mostly orange to red, unscented; perianth tube longer than dorsal tepal, dimorphic with slender, suberect lower part abruptly expanded into wider, ± horizontal, cylindric upper part. *Capsules* oblong-ellipsoid.

164. **Gladiolus watsonius** *Thunb.*, Dissertatio de Gladiolo no. 14 (1784). *Watsonia revoluta* Pers.: 42 (1805), replacement name for *G. watsonius* Thunb. (1784). *Antholyza watsonius* (Thunb.) Pax in Engler & Prantl.: 156 (1888) [as *watsoniana*]. *Homoglossum watsonium* (Thunb.) N.E.Br.: 278 (1932a). Type: South Africa, [Western Cape], 'Lions Rump and elsewhere on the Cape Peninsula', *Thunberg s.n* (UPS-THUNB 1092, holo.).

Gladiolus praecox Andrews: t. 38 (1798c) [as *G. praecox* var. *flore-rubro*]. *Watsonia praecox* (Andrews) Pers.: 42 (1805). *Homoglossum praecox* (Andrews) Salisb.: 325 (1812). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 38 (1798c).

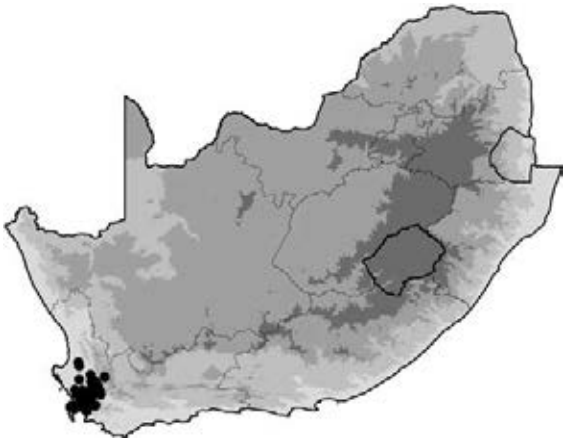
Homoglossum revolutum var. *gawleri* Baker: 161 (1877). *Gladiolus gawleri* (Baker) Klatt: 341 (1882). *Antholyza gawleri* (Baker) L.Bolus: 11 (1920). *Homoglossum gawleri* (L.Bolus) N.E.Br.: 278 (1932a). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 569 (1802c) '*Gladiolus watsonius* var. ß, *corollis majoribus luteo-variegatus*'.

Antholyza acuminata N.E.Br.: 133 (1929a), replacement name for *Gladiolus recurvus* Houtt.: 49 (1782), illegitimate homonym, not *G. recurvus* L. (1767). *Homoglossum acuminatum* (N.E.Br.) N.E.Br.: 278 (1932a). Type: South Africa, without precise locality or collector, *Burman s.n.* (G: Herb. Burman '*Gladiolus recurvus*', holo.).

Homoglossum flexicaule N.E.Br.: 279 (1932a) [*Gladiolus watsonius* sensu Jacq.: t. 233 (1792 [1788–1795]). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 233 (1792 [1788–1795]) '*Gladiolus watsonius*'.

Gladiolus watsonius var. *maculosus* M.P.de Vos & Goldblatt: 421 (1990). Type: South Africa, [Western Cape], Kapteinskloof, Farm Banghoek, 22 Aug. 1989, *De Vos 2711* (NBG, holo., iso.).

Plants 300–700 mm high. *Corm* globose, 12–20 mm diam., often with numerous small cormlets around base; tunics ± woody to leathery, splitting below into claw-like segments. *Stem* barely flexed outward above sheath of terminal leaf, unbranched. *Leaves* 3, imbricate, lower 2 basal, lowermost sheathing lower thirds of stem and markedly longest, reaching to base or sometimes exceeding spike, linear, (1.5–)4.0–6.0 mm wide, midrib moderately thickened and raised, margins heavily thickened and forming wings extended at right angles to blade, thus with two grooves or furrows on each surface, second leaf sheathing stem for ⅔ of its length with a short blade, uppermost leaf inserted on upper ½ of stem, sheathing for ½ its length, lower margins united around stem. *Spike* erect and ± straight, (2)4- to 6(8)-flowered; bracts pale green or flushed light brown, outer (35–)40–55(–70) mm long, lower margins closed around stem, inner shorter to nearly as long. *Flowers* orange-red to scarlet, lower tepals often translucent, occasionally yellowish below and speckled dark red near base, dorsal tepal with edges translucent in lower ½, unscented; perianth tube 44–53 mm long, narrow and cylindric in lower 15–25 mm, abruptly expanded and curved outward into a wider cylindric, horizontal



Distribution of ***Gladiolus watsonius***.

upper part 30–38 mm long, 6–10 × 4–6 mm diam.; tepals broadly lanceolate, dorsal largest, extended horizontally over stamens, 26–33 × 12–18 mm, upper laterals 25–32 × 7–12 mm, ± spreading, lower 3 tepals arching outward from base, laterals 20–26 × 5–11 mm, lower median 23–32 × 6–12 mm. *Filaments* 32–40 mm long, exserted 8–13 mm from tube; anthers 7–10 mm long, dark purple; pollen cream-coloured to pale yellow. *Style* arching over stamens, dividing between upper ⅓ and apex of anthers, branches 4–6 mm long. *Capsules* elongate-ellipsoid, 40–45 × ± 14 mm. *Seeds* discoid, 6–9 × 5–6 mm, broadly and evenly winged. *Flowering time*: August to mid-September, occasionally in July.

Distribution and ecology: restricted to the southwestern forelands of Western Cape, South Africa, from Piketberg to the Cape Peninsula and inland to Worcester; on lower slopes and flats on clay and granite soils in renosterveld.

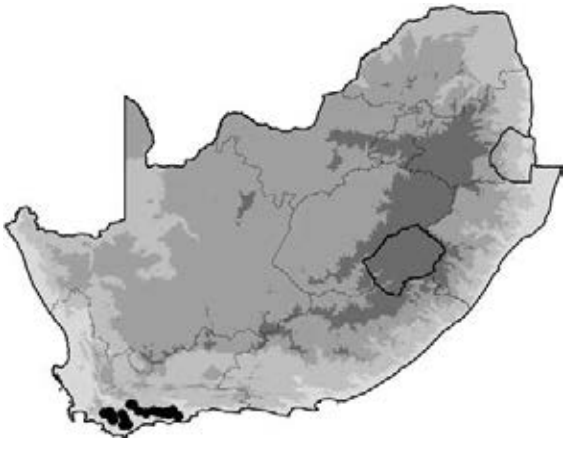
Diagnosis: distinguished from allied species in the series with similar flowers by the linear leaves, mostly 4–6 mm wide, with the main vein and margins heavily thickened, the blade thus with four longitudinal grooves. *Gladiolus teretifolius* from the Overberg has narrow, terete leaves 1–2 mm wide, and *G. quadrangularis* from inland near Ceres has centric blades x-shaped in section and softer corm tunics.

165. **Gladiolus teretifolius** *Goldblatt & M.P.de Vos* in Adansonia 11: 422 (1990), as a replacement name for *Antholyza muirii* L.Bolus: 12 (1920) [not *G. muirii* L.Bolus (1915)]. *Homoglossum muirii* (L.Bolus) N.E.Br.: 279 (1932a). Type: South Africa, [Western Cape], south slopes of the Langeberg behind Albertinia, 20 May 1914, *Muir 1348* (BOL, holo.; SAM, iso.).

Plants 400–700 mm high. *Corm* globose, 12–20 mm diam., often with numerous cormlets around base; tunics ± woody to leathery, splitting from below into claw-like segments. *Stem* usually slightly inclined above sheath of uppermost leaf, unbranched. *Leaves* 3, lower 2 basal, lowermost markedly longest, reaching ± the spike, 1–2 mm diam., oval to nearly terete in transverse section with margins and main vein thickened, thus with 2 narrow longitudinal grooves on each surface, second leaf sheathing stem for most of its length, blade 10–25 mm long, uppermost leaf inserted in upper ¼ of stem, almost entirely sheathing, overlapped by second leaf. *Spike* ± straight, 1- to 5(7)-flowered; bracts grey-green, sometimes flushed with purple, outer 35–45(–50) mm long, inner shorter. *Flowers* orange-red to scarlet (rarely cream-coloured), dorsal tepal translucent along lower edges, tube pale with red speckles and paired red lines from base of upper lateral tepals, unscented; perianth tube 35–45 mm long, straight and narrowly cylindric in lower 12–17 mm, abruptly expanded and curved outward into a wider cylindric upper part, 22–27 mm long, 6–7 mm diam.; tepals obovate, dorsal largest, 20–27 × 12–15 mm, extended horizontally, upper laterals patent, 16–25 × 10–12 mm, lower tepals arching outward and downward, laterals 12–18 × 8–12 mm, lower median 15–22 mm long. *Filaments* ± horizontal 32–38 mm long, exserted 9–12 mm from tube; anthers 7–9 mm long, dark violet; pollen yellow. *Style* arching over stamens, dividing opposite anther apices, branches ± 3.5 mm long. *Capsules* ovoid-ellipsoid, acute, ± 20 mm long. *Seeds* ovate, ± 4.5 × ± 3 mm, broadly and evenly winged. *Flowering time*: mid-July to end of August.

Distribution and ecology: restricted to the southwestern forelands of the Overberg in Western Cape, South Africa, from Bot River to east of Riversdale and the Langeberg near Albertinia; on lower slopes and flats on clay soils in renosterveld.

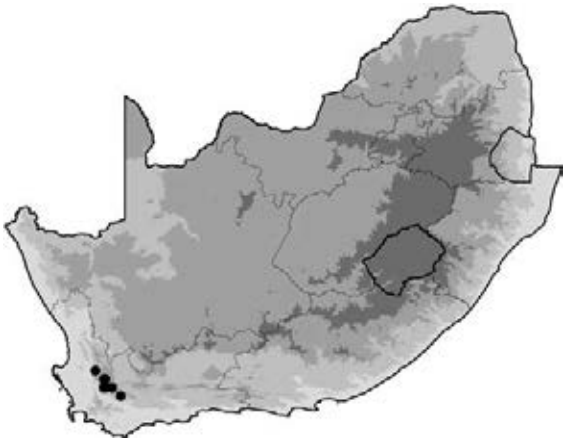
Diagnosis: distinguished from allied species in the series with similar flowers by the terete leaves, 1–2 mm diam., with the main vein and margins heavily thickened and thus with four fine longitudinal grooves. *Gladiolus watsonius* from west of the Hottentots Holland Mtns has linear leaves, mostly 4–6 mm wide with two furrows on each surface, and *G. quadrangularis* from inland near Ceres has centric blades that are x-shaped in section and 2.5–4.0 mm diam., and softer corm tunics.



Distribution of ***Gladiolus teretifolius***.

166. **Gladiolus quadrangularis** *(Burm.f.) Ker Gawl.* in Curtis's Botanical Magazine 16: t. 567 (1802b) [misapplied to *G. abbreviatus* Andrews]. *Antholyza quadrangularis* Burm.f.: 1 (1768). *Anisanthus quadrangularis* (Burm.f.) Sweet: 397 (1826). *Petamenes quadrangularis* (Burm.f.) Salisb. ex J.W.Loudon: 42 (1841). *Homoglossum quadrangulare* (Burm.f.) N.E.Br.: 279 (1932a). Type: South Africa, without precise locality or collector, *Burman s.n.* (G: Herb. Burman, holo.).

Plants 350–700 mm high. *Corm* globose-conic, 12–20 mm diam.; tunics papery to leathery, decaying into fine or medium-textured vertical fibres below. *Stem* erect, flexed outward above sheaths of two upper leaves, unbranched. *Leaves* 3, lowermost markedly longest, reaching to between base and apex of spike, sheathing lower part of stem for 50–80 mm, erect or trailing above, centric, 2.5–4.0 mm wide, cross-shaped in section with midrib raised on either side of surface into wing-like ridges, edges of midrib wings and margins lightly thickened, second leaf sheathing stem for ± ⅔ of its length with a short blade, third leaf inserted shortly below spike, sheathing below. *Spike* erect, nearly straight, 4- to 8(11)-flowered; bracts green, outer 30–45 mm long, inner shorter, forked apically. *Flowers* scarlet to brick-red, rarely pink, dorsal and lower lateral tepals becoming transparent along lower edges, occasionally lower tepals orange toward bases, unscented; perianth tube (35–)43–55 mm long, lower part slender and cylindric (10–)12–22 mm, abruptly expanded and curved outward into a wider cylindric upper part (15–)24–32 mm long, 5–7 × 4–6 mm wide; tepals lanceolate, dorsal largest, extended horizontally over stamens, (20–)25–29 × (8–)12–15 mm, upper laterals spreading outward almost from base, (16–)20–28 × (6–)9–11 mm, lower tepals curving outward from base, laterals 10–15 × 4.5–6.5 mm, lower median (12–)15–20 × (3–)5–6 mm. *Filaments* ± horizontal 30–40 mm long, exserted (4–)6–10 mm from tube; anthers 9–11(–14) mm long, yellow; pollen yellow. *Style* extending horizontally over stamens, dividing between middle and apices of anthers, branches 3.5–4.5 mm long. *Capsules* ellipsoid, ± 25 mm long. *Seeds* unknown. *Flowering time*: mainly in late September, occasionally until late October at high elevations.



Distribution of ***Gladiolus quadrangularis***.

Distribution and ecology: centred in the Cold Bokkeveld in Western Cape, South Africa, extending from the southern Cederberg to Ceres; on slopes and plateaus on clay and loam soils in renosterveld shrubland.

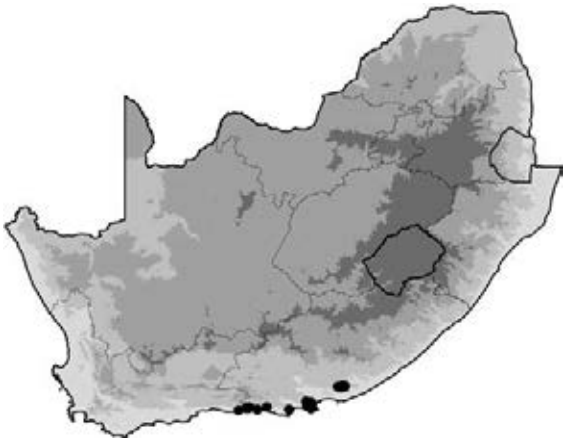
Diagnosis: distinguished from allied species in the series with similar flowers by the softer corm tunics and centric leaves, 2.5–4.0 mm diam., x-shaped in section with main vein raised on either side of surface into wing-like ridges. *Gladiolus watsonius* from the western lowlands has linear leaves, mostly 4–6 mm wide with two furrows on each surface, and *G. teretifolius* from the Overberg has terete leaves, 1–2 mm diam., with the main vein and margins heavily thickened and thus with four fine longitudinal grooves. Both of these species have hard, clawed corm tunics.

167. **Gladiolus huttonii** *(N.E.Br.) Goldblatt & M.P.de Vos* in Adansonia 11: 422 (1990). *Homoglossum huttonii* N.E.Br.: 278 (1932a). Type: South Africa, [Eastern Cape], Albany District, without date, *Hutton s.n.* (K, holo.).

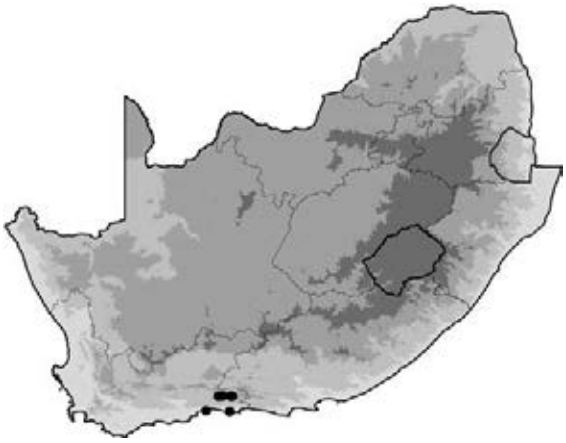
Homoglossum hollandii L.Bolus: 47 (1933a). Type: South Africa, [Eastern Cape], hills at Bethelsdorp, 4 miles from Port Elizabeth (bought from a flower seller), July 1931, *Bolus s.n.* (BOL [*BOL* 20077], lecto., designated by Goldblatt & Manning: 303 (1998); BOL, K, SAM, isolecto.).

Homoglossum hollandii var. *zitzikammense* L.Bolus: 47 (1933a). Type: South Africa, [Eastern Cape], flats at Ratelsbosch, Aug. 1905, *Fourcade 59* (BOL, holo., iso.).

Plants 200–450(–800) mm high. *Corm* globose, 8–12 mm diam.; tunics cartilaginous, splitting from below into coarse fibres or woody segments. *Stem* very lightly flexed above sheathing part of second leaf, unbranched. *Leaves* 3, lower 2 basal, lowermost markedly longest, sheathing only near ground, ± as long or slightly longer than spike, centric and cross-shaped in section with main vein raised into flanges up to 1.2 as wide as blade, 2–3 mm wide, second leaf sheathing lower ⅔ of stem, blade short, uppermost leaf inserted in upper ⅓ of stem. *Spike* erect or very slightly inclined, 3- or 4(8)-flowered; bracts green or flushed purple, outer 30–55 mm long, clasping stem below, seldom exceeding lower part of tube, inner slightly shorter, notched. *Flowers* orange-red, dorsal tepal with broad translucent edges in lower ½, lower tepals light orange to yellow in lower half, sometimes yellow on reverse, reverse of tube with deep red along tepal sutures, unscented; perianth tube 50–53 mm long, narrow and cylindric below for 20–32 mm, abruptly expanded into a tubular upper part 22–33 mm long, 5 × 6.5 mm wide, ascending; tepals broadly lanceolate, dorsal largest, ascending, 25–40 × 15–25 mm, upper laterals 22–32 × 12–18 mm, spreading in upper ½, lower 3 tepals much



Distribution of ***Gladiolus huttonii***.



Distribution of ***Gladiolus fourcadei***.

smaller, lower laterals 12–20 × 10–14 mm, lower median 13–22 × 7–10 mm. *Filaments* 32–45 mm long, exserted 13–15 mm from tube; anthers 8–10 mm long, orange; pollen yellow. *Style* arching over stamens, dividing at or shortly beyond anther apices, branches ± 4 mm long. *Capsules* elongate–ellipsoid, 38–40 mm long, as long or slightly longer than outer bracts. *Seeds* oval, 5–6 × 3.5–4.5 mm, usually broadly and evenly winged. *Flowering time*: August to mid-September.

Distribution and ecology: restricted to the southern coastal plain of Eastern Cape, South Africa, from Plettenberg Bay to East London and inland to near Grahamstown; on loam or clay soils.

Diagnosis: recognised by the long lower leaf with x-shaped blade and the large, orange flowers with dimorphic tube 50–53 mm long marked with characteristic red longitudinal lines, and the reduced lower tepals ± half as large as the upper.

168. **Gladiolus fourcadei** *(L.Bolus) Goldblatt & M.P.de Vos* in Adansonia 11: 422 (1990). *Antholyza fourcadei* L.Bolus: 117–118 (1927a). *Homoglossum fourcadei* (L.Bolus) N.E.Br.: 279 (1932a). Type: South Africa, [Eastern Cape], near Uniondale, headwaters of Wagenboom River, 1 900 ft [580 m], Sept. 1922, *Fourcade 2337* (BOL, lecto., designated by Goldblatt & J.C.Manning: 305 (1998); K, NBG, isolecto.).

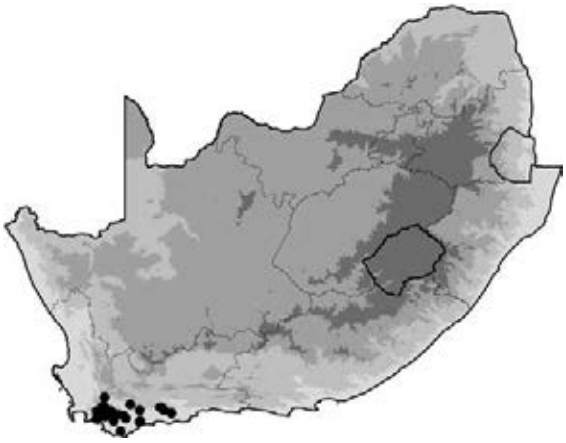
Plants 400–600 mm high. *Corm* globose-obconic, 10–12 mm diam.; tunics cartilaginous, splitting from below into soft fibres. *Stem* flexed outward above sheath of second leaf, then erect again, unbranched. *Leaves* (2)3, lower (1)2 basal, lowermost markedly longest, reaching to ± middle of spike, centric and cross-shaped in section, midrib raised into flanges up to half as wide as blade, margins and edges of midrib wings thickened, remaining leaves without blades, second leaf sheathing lower half of stem, uppermost leaf inserted on upper ⅓ of stem, largely or entirely sheathing, margins fused below. *Spike* erect and ± straight, 3- to 5-flowered; bracts pale brownish green, sometimes lightly flushed purple, outer 42–60 mm long, enclosing base of upper part of tube, inner bract shorter, minutely forked, twisted to lie against outer bract. *Flowers* yellow-green with upper tepals flushed and veined with dusky red, reverse of tepals and tube red, somewhat streaked on tepals, lower 3 tepals sometimes speckled with minute dark red spots in lower ½, unscented; perianth tube 35–46 mm long, slender and cylindric below for 15–18 mm, curving abruptly into a wider cylindric part 20–28 mm long, ± 5 mm diam., ascending to almost horizontal; tepals with dorsal ovate, ascending, 15–20 × ± 12 mm, upper laterals spreading, 14–15 × ± 10 mm, lower 3 tepals much smaller, patent, subequal, ± 9 × 7 mm, directed downward. *Filaments* 26–32 mm long, exserted 4–8 mm from tube; anthers 8–10 mm long, light purple; pollen yellow. *Style* extending horizontally over stamens, dividing opposite upper ⅓ of anthers, branches 4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: occasionally in September, mostly October to November.

Distribution and ecology: a narrow endemic of Eastern Cape, South Africa, centred in the upper Long Kloof near Uniondale but recorded also near Knysna and on the southern slopes of the Kammanassie Mtns; in loam or clay soils.

Diagnosis: recognised by the long lower leaf with x-shaped blade and the relatively small flowers with dimorphic perianth tube 35–46 mm long, the upper tepals yellowish green flushed and veined with dusky red, and the smaller lower tepals ± half as long as the upper.

169. **Gladiolus abbreviatus** *Andrews*, The Botanist's Repository 3: t. 166 (1801). *Antholyza abbreviata* (Andrews) Pers.: 42 (1805). *Petamenes abbreviata* (Andrews) N.E.Br.: 276 (1932a). *Homoglossum abbreviatum* (Andrews) Goldblatt: 443 (1971). Type: South Africa, without precise locality or collector, cultivated in Great Britain at Hammersmith, London, illustration in Andrews: t. 166 (1801).

Plants 350–550 mm high. *Corm* globose-obconic, 10–12 mm diam.; tunics cartilaginous, splitting into fibres. *Stem* straight and erect, unbranched, often flushed red or purple. *Leaves* 3, lower 2 basal, lowermost markedly longest, reaching or shortly exceeding top of spike, centric, X-shaped in section, 3–4 mm wide, main raised into ridges up to half as wide as blade, margins lightly thickened, second leaf sheathing stem almost to base of spike and overlapping third leaf, with filiform blade up to 50 mm long, uppermost leaf inserted on upper ¼ of stem, entirely sheathing and bract-like, often dull purple. *Spike* erect, nearly straight, 4- to 6(9)-flowered; bracts greenish grey flushed dark red, or olive-green flushed brown or orange, outer 45–60(–70) mm long, inner much shorter, acute or barely notched apically. *Flowers* predominantly red to orange, dorsal tepal flushed brownish and pale to almost transparent on lower edges, upper lateral and lower tepals darker red, brown, or green, unscented; perianth tube 40–52 mm long, lower half narrow and cylindric, ascending, 17–25 mm long, abruptly expanded into a wide cylindric upper part, 24–30 mm long, ascending, 5–6 mm diam.; tepals with dorsal longest, elliptic, 16–31 × 11–15 mm, extended horizontally, upper laterals joined to dorsal for ± 3 mm, ovate-apiculate, 7–11 mm long, suberect, lower laterals deltoid, 5–6 mm long, lower median 3–4 mm long. *Filaments* 28–44 mm long, exserted 8–17 mm from tube; anthers 8–12 mm long, dull reddish; pollen yellow. *Style* arching over stamens, dividing opposite upper ⅓ of anthers, branches 4–6 mm long. *Capsules* elongate-elliptic, (20–)30–38 mm long. *Seeds* ovate, usually tapering at one end, 6–7 × ± 4 mm, broadly and evenly winged. *Flowering time*: mid-June to mid-August, occasionally in September.



Distribution of ***Gladiolus abbreviatus***.

Distribution and ecology: restricted to the lowlands of the Overberg in Western Cape, South Africa, from Villiersdorp and Bot River to Stormsvlei; on clay slopes in renosterveld.

Diagnosis: recognised by the long lower leaf with x-shaped blade and the obliquely tubular flowers with dimorphic perianth tube 40–52 mm long, the upper lateral tepals ± half the size of the dorsal and the lower tepals reduced to small triangular scales 3–6 mm long.

UNCERTAIN SPECIES

Gladiolus bakeri *Klatt* in Th.Durand & H.Schinz, *Conspectus florae africae* 5: 213 (1894), as a replacement name for *G. micranthus* Baker, Handbook of the Irideae: 212 (1892), illegitimate homonym, not *G. micranthus* Stapf (1885). Type: Botswana, Leshumo Valley, *Holub s.n.* (location unknown). Type not located and identity uncertain.

EXCLUDED SPECIES

[*Gladiolus aethiopicus* Drapiez ex Jackson, Index Kewensis 1: 1029 (1895), name without description. Published references to this name, either as *G. aethiopicus* Drapiez, *Dictionnaire classique des sciences naturelles* 5: 129 (1853) or as the combination *G. aethiopicus* (L.) Drapiez *ibid.* are incorrect as it does not appear in that publication.]

Gladiolus × *lewisiae* Oberm. in Flowering Plants of Africa 40: t. 1596 (1970). This is a natural hybrid *G. caryophyllaceus* × *G. tristis* and probably extinct.

REFERENCES

AITON, W. 1789. *Hortus Kewensis*1. Nicol, London.

ANDREWS, H. 1796. *Gladiolus roseus.* Rose-coloured Gladiolus. *The Botanist's Repository* 1: t. 11.

ANDREWS, H. 1798a. *Gladiolus versicolor.* Changeable Gladiolus. *The Botanist's Repository* 1: t. 19.

ANDREWS, H. 1798b. *Gladiolus ringens* var. *cinereo-odorata.* Gaping Ash-coloured sweet Gladiolus. *The Botanist's Repository* 1: t. 27.

ANDREWS, H. 1798c. *Gladiolus praecox* var. *flore-rubro.* Red early-flowering Gladiolus. *The Botanist's Repository* 1: t. 38.

ANDREWS, H. 1800. *Gladiolus striatus.* Streaked-flowered Gladiolus. *The Botanist's Repository* 2: t. 111.

ANDREWS, H. 1801. *Gladiolus abbreviatus.* Shortened-petalled Gladiolus. *The Botanist's Repository* 3: t. 166.

ANDREWS, H. 1802. *Gladiolus carneus.* Flesh-coloured gladiolus. *The Botanist's Repository* 4: t. 240.

ANDREWS, H. 1803. *Gladiolus ringens* var. *undulatus. The Botanist's Repository* 4: t. 275.
BAKER, J.G. 1875. *Gladiolus cooperi. Curtis's Botanical Magazine* 101: t. 6202.
BAKER, J.G. 1876a. On new bulbous plants from the Eastern Provinces of Cape Colony. *Journal of Botany, British and foreign* 14: 181–184.
BAKER, J.G. 1876b. New Gladioleae. *Journal of Botany, British and foreign* 14: 333–339.
BAKER, J.G. 1877 ['1878']. Systema iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.
BAKER, J.G. 1886. New garden plants. *Gardeners' Chronicle,* ser. 2, 38.
BAKER, J.G. 1889a. New or noteworthy plants. *Gardeners' Chronicle,* ser. 3, 5: 233.
BAKER, J.G. 1889b. New or noteworthy plants. *Gardeners' Chronicle,* ser. 3, 6: 154.
BAKER, J.G. 1890. New or noteworthy plants. *Gardeners' Chronicle,* ser. 3, 8: 524.
BAKER, J.G. 1891. Novitates capensis. *Journal of Botany, British and foreign* 29: 68–74.
BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell & Sons, London.
BAKER, J.G. 1893. New or noteworthy plants. *Gardeners' Chronicle,* ser. 2, 14: 456.
BAKER, J.G. 1895. Diagnoses africanae. IX. *Bulletin of Miscellaneous Information Kew* 1895: 288–293.
BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.
BAKER, J.G. 1897a. Addenda. In W.T. Thiselton-Dyer, *Flora capensis* 6: 528–536. Reeve & Co., Ashford, Kent.
BAKER, J.G. 1897b. Diagnoses africanae. X. *Bulletin of Miscellaneous Information Kew* 1897: 243–300.
BAKER, J.G. 1901. In H. Schinz, Beiträge zur Kenntnis der Afrikanischen Flora. Iridaceae. *Bulletin de l'Herbier Boissier*, sér. 2, 1: 862–868.
BAKER, J.G. 1904a. Beiträge zur Kenntnis der Afrikanischen Flora. XVI: Iridaceae. *Bulletin de l'Herbier Boissier,* Sér. 2, 4: 1003–1007.
BAKER, J.G. 1904b. Iridaceae. In H. Schinz, Beiträge zur Kenntnis der Afrikanischen Flora (XVII). *Vierteljahrsschrift der Naturforschenden Gesellschaft Zürich* 49: 171–196.
BARKER, W.F., LEWIS, J.G., LEVYNS, M.R. & MOSS, C.E. 1948. Plantae Novae Africanae. *Journal of South African Botany* 14: 29–40.
BENTHAM, G. & HOOKER, J.D. 1883. *Genera plantarum*, vol. 3(1). Reeve, London.
BIEBERSTEIN, F.A.M. von. 1808. *Flora Taurico-Caucasica exhibens stirpes phaenogamas, in Chersoneso Taurica et regionibus caucasicis sponte crescents*, vol. 1. Charkouiae.
BOISSIER, P.E. 1854. *Diagnoses plantarum orientalium novarum*, ser. 1, 2(13).
BOLUS, F. 1915. In Novitates Africanae. *Annals of the Bolus Herbarium* 1: 186–197.
BOLUS, F. 1917. In Novitates Africanae. *Annals of the Bolus Herbarium* 2: 95–111.
BOLUS, F. 1928. In Novitates Africanae. *Journal of Botany, British and foreign* 66: 9–16.
BOLUS, L. 1915. Novitates Africanae. *Annals of the Bolus Herbarium* 1: 126–133.
BOLUS, L. 1917. Novitates Africanae. *Annals of the Bolus Herbarium* 2: 95–111.
BOLUS, L. 1920. Novitates Africanae. *Annals of the Bolus Herbarium* 3: 1–14.
BOLUS, L. 1921. Novitates Africanae. *Annals of the Bolus Herbarium* 3 70–85.
BOLUS, L. 1922. Novitates Africanae. *Annals of the Bolus Herbarium* 3: 123–146.
BOLUS, L. 1924. Novitates Africanae. *Annals of the Bolus Herbarium* 3: 159–184.
BOLUS, L. 1925. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 1–30.
BOLUS, L. 1927a. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 69–119.
BOLUS, L. 1927b. Plants – new and noteworthy. *South African Gardening and Country Life* 17: 293, 294.
BOLUS, L. 1928. Plants – new and noteworthy. *South African Gardening and Country Life* 18: 214.
BOLUS, L. 1929a Novitates africanae. *Journal of Botany, British and foreign* 67:132–139.
BOLUS, L. 1929b Plants – new and noteworthy. *South African Gardening and Country Life* 19: 215.
BOLUS, L. 1931a. Novitates Africanae. *Journal of Botany, British and foreign* 69: 10–15.
BOLUS, L. 1931b. Novitates Africanae: New Iridaceae. *Journal of Botany, British and foreign* 69: 258–262.
BOLUS, L. 1931c. Plants – new or noteworthy. *South African Gardening and Country Life* 21: 367, 368.
BOLUS, L. 1933a Plants – new or noteworthy. *South African Gardening and Country Life* 23: 46–47.
BOLUS, L. 1933b Novitates africanae. *Journal of Botany, British and foreign* 71: 122–125.
BOLUS, L. 1934. Plants – new or noteworthy. *South African Gardening and Country Life* 24: 101.
BOLUS, L. & LEWIS, J.G. 1932. Plants – new or noteworthy. *South African Gardening and Country Life 22*: 204–205.
BROWN, N.E. 1909. Diagnoses africanae. XXVII. *Bulletin of Miscellaneous Information Kew* 1909: 53–49.
BROWN, N.E. 1921. New plants from tropical and South Africa collected by archdeacon F.A. Rogers. *Bulletin of Miscellaneous Information Kew* 1921: 290–300.
BROWN, N.E. 1928. The South African Iridaceae of Thunberg's Herbarium. *Journal of the Linnean Society, Botany* 48: 15–55.
BROWN, N.E. 1929a. The Iridaceae of Burman's Florae capensis Prodromus I. *Bulletin of Miscellaneous Information Kew* 1929: 129–139.
BROWN, N.E. 1929b. The Iridaceae of Burman's Florae capensis Prodromus II. *Bulletin of Miscellaneous Information Kew* 1929: 243, 244.
BROWN, N.E. 1932a. Contributions to a knowledge of the Transvaal Iridaceae. Part II. *Transactions of the Royal Society of South Africa* 20: 261–280.
BROWN, N.E. 1932b. Plants new or noteworthy: new Iridaceae. *Gardeners' Chronicle*, ser. 3, 92: 466–468.
BULLOCK, A.A. 1930. *Oenostachys,* a new genus of Iridaceae from East Africa. *Bulletin of Miscellaneous Information Kew* 1930: 465.
BULLOCK, A.A. 1960. *Gladiolus trichonemifolius* forma *symmetranthus. Curtis's Botanical Magazine* 173: t. 357.
BURMAN, N.L. 1768. *Prodromus plantae capensium.* Cornelius Haak, Leiden.
CHEVALIER, E. 1938. Deux nouvelles Iridacées. *Bulletin du Museum National d'Histoire Naturelle*, Sér. 2, 9: 401–404.
CUNO, J.C. 1750. *Ode über seinen garten*. Amsterdam.
CURTIS, W. 1790. *Gladiolus cardinalis.* Superb Gladiolus or Corn-flag. *The Botanical Magazine* 4: t. 135.
CURTIS, W. 1799. *Antholyza merianella.* Dwarf *Antholyza. Curtis's Botanical Magazine* 13: t. 441.
DE VOS, M.P. 1976. Die Suid-Afrikaanse spesies van *Homoglossum. Journal of South African Botany* 42: 301–359.
DELAROCHE, D. 1766. *Descriptiones plantarum aliquot novarum*. Leiden.
DIELS, L. 1909. Formationen und florenelemente im nordwestlichen Kapland. *Botanische Jahrbücher für Systematik* 44: 91–124.

DRAPIEZ, P.A.J. 1853. *Dictionnaire classique des sciences naturelles.* Meline, Cans & Co., Brussels.
DUMORTIER, B.C.J. 1822. *Commentationes botanicae*. Ch. Casterman-Dien, Tournay.
DURAND, T. & SCHINZ, H. 1894 [‘1895’]. *Conspectus florae africae*, vol. 5. Jardin botanique de l’Etat, Bruxelles etc.
ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon.* Reiseverein, Esslingen.
FOSTER, R.C. 1936. Notes on nomenclature in Iridaceae. *Contributions from the Gray Herbarium of Harvard University* 114: 37–50.
GAERTNER, J. 1788. *De fructibus et seminibus plantarum*, vol. 1. Academiae Carolinae, Stuttgart.
GOLDBLATT, P. 1970. The Iridaceae of Daniel de la Roche. *Journal of South African Botany* 36: 291–318.
GOLDBLATT, P. 1971. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460.
GOLDBLATT, P. 1979. New species of Cape Iridaceae. *Journal of South African Botany* 45: 81–89.
GOLDBLATT, P. 1984. New taxa and notes on southern African *Gladiolus* (Iridaceae). *Journal of South African Botany* 50: 449–459.
GOLDBLATT, P. 1989. The Genus *Watsonia*. *Annals of Kirstenbosch Botanic Gardens* 17.
GOLDBLATT, P. 1993. Iridaceae. In G.V. Pope, *Flora zambesiaca* 12(4): 1–106.
GOLDBLATT, P. 1996. *Gladiolus in tropical Africa.* Timber Press, Portland, Oregon.
GOLDBLATT, P. & DE VOS, M.P. 1990 [‘1989’]. The reduction of *Oenostachys*, *Homoglossum* and *Anomalesia*, putative sunbird pollinated genera, in *Gladiolus* L. (Iridaceae-Ixioideae). *Bulletin du Museum National d’Histoire Naturelle, Sér.* 4, B, *Adansonia* 11: 417–428.
GOLDBLATT, P. & MANNING, J.C. 1996. Two new edaphic endemic species and taxonomic changes in *Gladiolus* (Iridaceae) of southern Africa, with notes on Iridaceae restricted to unusual substrates. *Novon* 6: 172–180.
GOLDBLATT, P. & MANNING, J.C. 1998. Gladiolus *in southern Africa.* Fernwood Press, Cape Town.
GOLDBLATT, P. & MANNING, J. C. 1999. New species of *Sparaxis* and *Ixia* (Iridaceae: Ixioideae) from Western Cape, South Africa, and taxonomic notes on *Ixia* and *Gladiolus*. *Bothalia* 29: 59–63.
GOLDBLATT, P. & MANNING, J.C. 2009. Three new species of *Gladiolus* (Iridaceae) from South Africa, a major range extension for *G. rubellus* and taxonomic notes for the genus in southern and tropical Africa. *Bothalia* 39: 37–45.
GOLDBLATT, P. & MANNING, J.C. 2011a. Back from the brink: *Gladiolus halophila* (Iridaceae: Crocoideae), a remarkable new species from southern Namibia escapes imminent extinction. *South African Journal of Botany* 77: 790–794.
GOLDBLATT, P. & MANNING, J.C. 2011b. *Gladiolus diluvialis* (Crocoideae), a replacement name for the illegitimate homonym *G. halophilus*. *Bothalia* 41: 324.
GOLDBLATT, P. & VLOK, J.H.J. 1989. New species of *Gladiolus* (Iridaceae) from the southern Cape and the status of *G. lewisiae*. *South African Journal of Botany* 55: 259–264.
HARMS, H. 1903. In H. Baum, *Kunene-Sambesi-Expedition*. Kolonial-Wirtschaftlichten Komitees, Berlin.
HERBERT, W. 1825. *Gladiolus alatus* β. Winged cornflag, Algoa Bay variety. *Curtis’s Botanical Magazine* 53: t. 2608.
HERBERT, W. 1838. *Gladiolus mortonius.* Mr. Morton’s *Gladiolus. Curtis’s Botanical Magazine* 65: t. 3680 & sub. t. 3693.
HERBERT, W. 1842. *Gladiolus floribundus. Edwards’s botanical register* 28 (Misc.): 86.
HERBERT, W. 1843. *Gladiolus splendens. Edwards’s botanical register* 29 (Misc.): 46.
HERBERT, W. 1844. *Gladiolus festivus. Edwards’s botanical register* 30 (Misc.): 89.
HILLIARD, O.M. & BURTT, B.D. 1979. Notes on some plants of southern Africa, chiefly from Natal (VIII). *Notes from the Royal Botanical Garden, Edinburgh* 37: 284–325.
HILLIARD, O.M. & BURTT, B.D. 1986. Notes on some plants of southern Africa, chiefly from Natal (X). *Notes from the Royal Botanical Garden, Edinburgh* 43: 299–319.
HITCHCOCK, A.S. & GREEN, M.L. 1929. Standard species of Linnaean genera of Phanerogamae. *In* Nomenclature proposals by British botanists. *International Botanical Congress, Cambridge (England). 1930*: 111–199. HMSO, London.
HOCHSTETTER, C.F. 1844. Nova genera plantarum Africae proponit et describit. Continuo. *Flora* 27: 18–32.
HOOKER, W.J. 1830. *Gladiolus psittacinus.* Splendid Cornflag. *Curtis’s Botanical Magazine* 57: t. 3032.
HOOKER, W.J. 1831. *Anthericum plumosum.* Bearded-flowered Anthericum. *Curtis’s Botanical Magazine* 58: sub t. 3084.
HOOKER, J.D. 1864. *Gladiolus sericeo-villosus.* Shaggy-stemmed Cornflag. *Curtis’s Botanical Magazine* 90: t. 5427.
HOOKER, J.D. 1866. *Gladiolus papilio.* Butterfly-flowered Gladiolus. *Curtis’s Botanical Magazine* 92: t. 5565.
HOOKER, J.D. 1869. *Gladiolus cruentus.* Blood-red gladiolus. *Curtis’s Botanical Magazine* 95: t. 5810.
HOOKER, J.D. 1870a. *Gladiolus saundersii.* Mr Wilson Saunders’ gladiolus. *Curtis’s Botanical Magazine* 96: t. 5873.
HOOKER, J.D. 1870b. *Geissorhiza grandis.* Large-flowered tile-root. *Curtis’s Botanical Magazine*. 96: t. 5877.
HOOKER, J.D. 1871. *Gladiolus dracocephalus. Curtis’s Botanical Magazine* 97: t. 5884.
HOOKER, J.D. 1872. *Gladiolus purpureo-auratus. Curtis’s Botanical Magazine* 98: t. 5944.
HORNEMANN, J.W. 1815. *Gladiolus vittatus. Hortus regius botanicus hafniensis* 2: 950.
HORNEMANN, J.W. 1819. *Gladiolus luridus. Supplementum Horti botanici hafniensis* 113.
HOUTTUYN, M. 1780. *Natuurlijke historie*, vol. 12. Amsterdam.
HOUTTUYN, M. 1782. *Handleiding to de plant- en kruidkunde*, vol. 12. Amsterdam.
INGRAM, C. 1930. New plants. *Gardeners’ Chronicle*, ser. 3, 88: 301–302.
INGRAM, C. 1931a *Gladiolus eximius*. *Gardeners’ Chronicle*, ser. 3, 89: 40.
INGRAM, C. 1931b *Gladiolus cygneus*. *Gardeners’ Chronicle*, ser. 3, 89: 347.
INGRAM, C. 1931c. New *Gladiolus*. *Gardeners’ Chronicle*, ser. 3, 89: 9.
INGRAM, C. 1932. *Gladiolus burchellii. Gardeners’ Chronicle*, ser. 3, 92: 482.
INGRAM, C. 1933. *Gladiolus anorthanthus*. *Gardeners’ Chronicle*, ser. 3, 94: 273.
JACKSON, B.D. 1895. *Index Kewensis.* Clarendon Press, Oxford.
JACQUIN, N.J. 1771. *Observationum botanicarum*, vol. 4. J.P. Kraus, Vienna.
JACQUIN, N.J. 1788–1795 [‘1786–1793’]. *Icones plantarum rariorum*, vol. 2. C.F. Wappler, Vienna.
JACQUIN, N.J. 1791 [‘1790’]. *Collectanea*, vol. 4. C.F. Wappler, Vienna.
KER GAWLER, J.B. 1802a. *Gladiolus versicolor var. tenuior.* Small Changeable Corn-flag. *Curtis’s Botanical Magazine* 16: t. 556.

KER GAWLER, J.B. 1802b. *Galdiolus quadrangularis*. Square-leaved corn-flag. *Curtis's Botanical Magazine* 16: t. 567.
KER GAWLER, J.B. 1802c. *Galdiolus watsonius* (var. β). Dwarf Watson's corn-flag. *Curtis's Botanical Magazine* 16: t. 569.
KER GAWLER, J.B. 1802d. *Gladiolus hirsutus* (var. β). Rose-coloured hairy corn-flag. *Curtis's Botanical Magazine* 16: t. 574.
KER GAWLER, J.B. 1802e. *Gladiolus namaquensis*. Thick-leaved cornflag. *Curtis's Botanical Magazine* 16: t. 592.
KER GAWLER, J.B. 1803a. *Gladiolus blandus* var. *purpureo-albescens*. Pale-purple corn-flag. *Curtis's Botanical Magazine* 18: t. 645.
KER GAWLER, J.B. 1803b *Gladiolus milleri*. Miller's corn-flag. *Curtis's Botanical Magazine* 17: t. 632.
KER GAWLER, J.B. 1803d. *Gladiolus viperatus*. Perfumed corn-flag. *Curtis's Botanical Magazine* 18: t. 688.
KER GAWLER, J.B. 1804. *Gladiolus hirsutus* (β). Variegated shaggy cornflag. *Curtis's Botanical Magazine* 19: t. 727.
KER GAWLER, J.B. 1805. *Gladiolus hirsutus* (γ). Two-flowered shaggy cornflag. *Curtis's Botanical Magazine* 22: t. 823.
KER GAWLER, J.B. 1807. *Gladiolus versicolor*. Large-flowered cornflag. *Curtis's Botanical Magazine* 26: t. 1042.
KER GAWLER, J.B. 1812. *Gladiolus trichonemifolius*. Trichonema-leaved cornflag. *Curtis's Botanical Magazine* 36: t. 1483.
KER GAWLER, J.B. 1813. *Gladiolus hastaus*. Spade corn-flag. *Curtis's Botanical Magazine* 38: t. 1564.
KER GAWLER, J.B. 1814. *Gladiolus blandus* (var. δ). Painted corn-flag. *Curtis's Botanical Magazine* 40: t. 1665.
KER GAWLER, J.B. 1817. *Gladiolus edulis. Edwards's Botanical Register* 2: t. 169.
KER GAWLER, J.B. 1821. Notes. *Edwards's Botanical Register* 7(Misc.): 2.
KER GAWLER, J.B. 1827. *Iridearum genera*. De Mat, Brussels.
KIES, P. 1952. *Gladiolus vinoso-maculatus,* Transvaal. *Flowering Plants of Africa* 29: t. 1123.
KLATT, F.W. 1864. Revisio Iridearum. *Linnaea* 32: 689–784.
KLATT, F.W. 1867a. Species novas Iridearum. *Linnaea* 35: 299–301.
KLATT, F.W. 1867b. Diagnoses Iridearum novarum. *Linnaea* 35: 377–384.
KLATT, F.W. 1882. Ergänzungen und Berichtingungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
KLATT, F.W. 1885. Determination and description of Cape Iridaceae. *Transactions of the South African Philosophical Society* 3: 196–205.
KUNZE, G. 1845. *Hortus Universitatis literarum Lipsiensis*, seminum anno 1844 perceptorum offert delectum.
KUNTZE, O. 1898. *Revisio generum plantarum*, vol. 3(2). Arthur Felix, Leipzig.
LAMARCK, J.B.A.P.M. 1783. *Encyclopédie méthodique Botanique*, vol. 1. Paris.
LAMARCK, J.B.A.P.M. 1788. *Encyclopédie méthodique Botanique*, vol. 2. Paris.
LAMARCK, J.B.A.P.M. 1791. *Tableau encyclopédie et méthodique Botanique*, vol. 1. Paris.
LAMARCK, J.B.A.P.M. 1812. *Encyclopédie méthodique Botanique*, vol. 2, Suppl.: 795. Paris.
LEHMANN, J.G.C. 1835. *Delectum semina in horto botanico hamburgensi*. Hamburg.
LEWIS, J.G. 1933. Plants – new or noteworthy. *South African Gardening and Country Life* 23: 140.
LEWIS, J.G. 1935. Plants – new or noteworthy. *South African Gardening and Country Life* 25: 57.
LEWIS, J.G. 1941. New genera and species and miscellaneous notes. *Journal of South African Botany* 7: 19–59.
LEWIS, J.G. 1946. *Gladiolus nerineoides*. *Flowering plants of Africa* 25: t. 994.
LEWIS, J.G. 1947. *Gladiolus stokoei*. *Flowering plants of Africa* 26: t. 1004.
LEWIS, J.G. 1948. Some Changes in Nomenclature III. *Journal of South African Botany* 14: 85–89.
LEWIS, J.G. 1953a. *Gladiolus subcaeruleus*. *Flowering Plants of Africa* 29: t. 1158.
LEWIS, J.G. 1953b. *Gladiolus pillansii* var. *roseus*. *Flowering Plants of Africa* 29: t. 1159.
LEWIS, J.G. 1954. Iridaceae—-new species and miscellaneous notes. *Annals of the South African Museum* 40: 115–135.
LEWIS, J.G. 1966. Thunberg's South African species of *Gladiolus*—four name changes. *Botaniska Notiser* 119(2): 286–296.
LEWIS, J.G., OBERMEYER, A.A. & BARNARD, T.T. 1972. A revision of the South African species of *Gladiolus*. *Journal of South African Botany*, Suppl. 10.
LINK, J.H.F. 1820. Der Botanische Garten bei Berlin und die Willdenowsche Kräutersammlung. *Jahrbücher der Gewächskunde* 1(3): 13–80.
LINNAEUS, C. 1738 ['1737']. *Hortus Cliffortianus*. Amsterdam.
LINNAEUS, C. 1753. *Species plantarum*. Salvius, Stockholm.
LINNAEUS, C. 1759. *Systema naturae*, edn. 10. Salvius, Stockholm.
LINNAEUS, C. 1760. *Plantae rariores africanae*. Salvius, Stockholm.
LINNAEUS, C. 1762. *Species plantarum*, edn. 2, vol.1. Salvius, Stockholm.
LINNAEUS, C. 1767. *Mantissa plantarum*, vol. 1. Salvius, Stockholm.
LINNAEUS, C. 1774. *Systema vegetabilium*, edn. 13. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.
LOUDON, J.W. 1841. *The Ladies' Flower-Garden of Ornamental Bulbous Plants,* William Smith, London.
MANNING, J.C. & GOLDBLATT, P. 1997. The *Moegistorhynchus longirostris* (Diptera: Nemestrinidae) pollination guild: long-tubed flowers and a specialized long-proboscid fly pollination system in southern Africa. *Plant Systematics and Evolution* 206: 51–69.
MANNING, J.C. & GOLDBLATT, P. 2012. *Plants of the Greater Cape Floristic Region 1: The Core Cape Flora*. *Strelitzia* 29. South African National Biodiversity Institute, Pretoria.
MANNING, J.C., GOLDBLATT, P., WINTER, P.D.J. 1999. Two new species of *Gladiolus* (Iridaceae: Ixioideae) from southern Africa and notes on long-proboscid fly pollination in the genus. *Bothalia* 29: 217–223.
MEYER, E. 1844 [1843]. Zwei Pflanzengeographische Documente von J.F. Drège. *Flora* 26 (Beigabe): 1–230.
MILLER, P. 1755–1758. *Figures of the most beautiful, useful, and uncommon plants described in the Gardener's dictionary*. P. Miller, London.
MILLER, P. 1768. *The Gardener's dictionary*, edn. 8. P. Miller, London.
MOORE, T. 1868. New plants. *The Gardeners' Chronicle* 1868: 1138.
NORDENSTAM, S.R. 1972. Types of Ecklon's *'Topographisches Verzeichniss'* in the Swedish Museum of Natural History in Stockholm. *Journal of South African Botany* 38: 277–298.
OATES, K. 1889. *Matebeleland and the Victoria Falls*, edn. 2. London.
OBERMEYER, A.A. 1961. *Kentrosiphon saccatus* subsp. *steingroeveri*. *Flowering Plants of Africa* 34: t. 1354.
OBERMEYER, A.A. 1970. *Gladiolus lewisiae*. *Flowering Plants of Africa* 40: t. 1596.

OBERMEYER, A.A. 1979. A new species of *Gladiolus* from the Transvaal. *Bothalia* 12: 636.
OBERMEYER, A.A. 1981. A new subspecies of *Gladiolus microcarpus*. *Bothalia* 13: 451.
OBERMEYER, A.A. 1982. A new species of *Gladiolus*. *Bothalia* 14: 78.
OLIVER, D. 1887. Enumeration of the plants collected by Mr. H.H. Johnston on the Kilimanjaro Expedition, 1884. *Transaction of the Linnean Society, London*, ser. 2, *Botany* 2: 327–357.
PAX, F. 1888. Iridaceae. In H.G.A. Engler & K.A.E. Prantl, *Die Natürlichen Pflanzenfamilien* 2, 5: 137–157. Leipzig.
PAX, F. 1892. Iridaceae africanae. *Botanische Jahrbücher für Systematik* 15: 150–157.
PERSOON, C.H. 1805. *Synopsis plantarum*, vol. 1. Cramer, Paris.
PHILLIPS, E.P. 1917. *Gladiolus dieterlenii*. *Annals of the South African Museum* 16: 282.
PHILLIPS, E.P. 1941. Note on N.E. Brown's sub-division of the genus *Antholyza* Linn. *Bothalia* 4: 44.
REDOUTÉ, P.J. 1805. *Les Liliacées* 3: t. 124. Didot Jeune, Paris.
REDOUTÉ, P.J. 1812. *Les Liliacées* 7: t. 399. Didot Jeune, Paris.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium secundum*, vol. 1. J.G. Cotta, Stuttgart.
SALISBURY, R.A. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SALISBURY, R.A. 1806. *Paradisus Londinensis*. W. Hooker, London.
SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.
SALISBURY, R.A. 1866. *The Genera of Plants*. Van Voorst, London.
SCHRANK, F. DE P. 1822. Commentarius in Irideas capenses. *Denkschriften der Königlich-Baierischen Botanischen Gesellschaft in Regensburg* 2: 165–224.
SCHINZ, H. 1900. Beiträge zur Kenntnis der Afrikanischen Flora. (Neue Folge). XII. *Mémoires de l'Herbier Boissier* 20: 1–36.
SCHLECHTER, R. 1896. Decades plantarum novarum austro-africanarum. *Journal of Botany, British and foreign* 34: 500–504.
SCHLECHTER, R. 1899 ['1900']. Plantae Schlechterianae novae vel minus cognitae describuntur 2. *Botanische Jahrbücher für Systematik* 27: 86–220.
SCHLECHTER, R. 1907 ['1908']. Beiträge zur kenntnis der Flora von Natal. *Botanische Jahrbücher für Systematik* 40: 89–96.
SIMS, J. 1825. *Gladiolus debilis*. Weak corn-flag. *Curtis's Botanical Magazine* 52: t. 2585.
SPRENGEL, C.P.J. 1820. Species plantarum minus cognitae. *Neue Entdeckungen im Umfang der Pflanzenkunde* 1: 221–305.
STAPF, O. 1885. Flora von Lycien, Carien und Mesopatamien. *Denkschriften der Kaiserlichen Akademie der Wissenschaften/Mathematische-Naturwissenschaftlige Classe* 50(2): 73–120.
STEUDEL, E.G. 1840. *Nomenclator botanicus*, edn. 2, vol. 1. J.G. Cotta, Stuttgart & Tübingen.
STOKES, J.S. 1830. *Gladiolus telifer*. *Botanical Commentaries* 1: 217.
SÜSSENGUTH, K. & MERXMÜLLER, H. 1951. A contribution to the flora of the Marandellas District, Southern Rhodesia. *Proceedings and Transactions of the Rhodesia Scientific Association* 43: 75–160.
SWEET, R. 1826. *Hortus brittanicus*. James Ridgway, London.
SWEET, R. 1830a. *Hortus brittanicus*, edn. 2. James Ridgway, London.
SWEET, R. 1830b. *British flower garden* 4: t. 84.
SWEET, R. 1832. *British flower garden*. 5: t. 140.
TAUSCH, I.F. 1836. *Gladiolus marmoralus*. *Flora* 19: 421.
THUNBERG, C.P. 1784. *Dissertatio de Gladiolo*. Edman, Uppsala.
THUNBERG, C.P. 1800. *Prodromus plantarum capensium*. Edman, Uppsala.
THUNBERG, C.P. 1811. *Flora capensis*, fasc. 2. Edman, Uppsala.
VALENTE, L.M., SAVOLAINEN, V., MANNING, J., GOLDBLATT, P. & VARGAS, P. 2011. Explaining disparities in species richness between Mediterranean floristic regions: a case study in *Gladiolus* (Iridaceae). *Global Ecology and Biogeography* 20: 881–892.
VAN GEEL, P.C. 1829. *Gladiolus dalenii*. *Sertum Botanicum* 2(1): 18.
VERDOORN, F. 1962. *Gladiolus pole-evansii,* Transvaal. *Flowering Plants of Africa* 35: t. 1373.
WRIGHT, C.H. 1906. *Gladiolus carmineus*. *Curtis's Botanical Magazine* 132: t. 8068.
WRIGHT, C.H, 1913. *Gladiolus masoniorum*. *Bulletin of Miscellaneous Information Kew* 1913: 305.
ZUCCAGNI, A. 1806. Centuria I. *Observationum botanicarum*. Turic, Zürich.

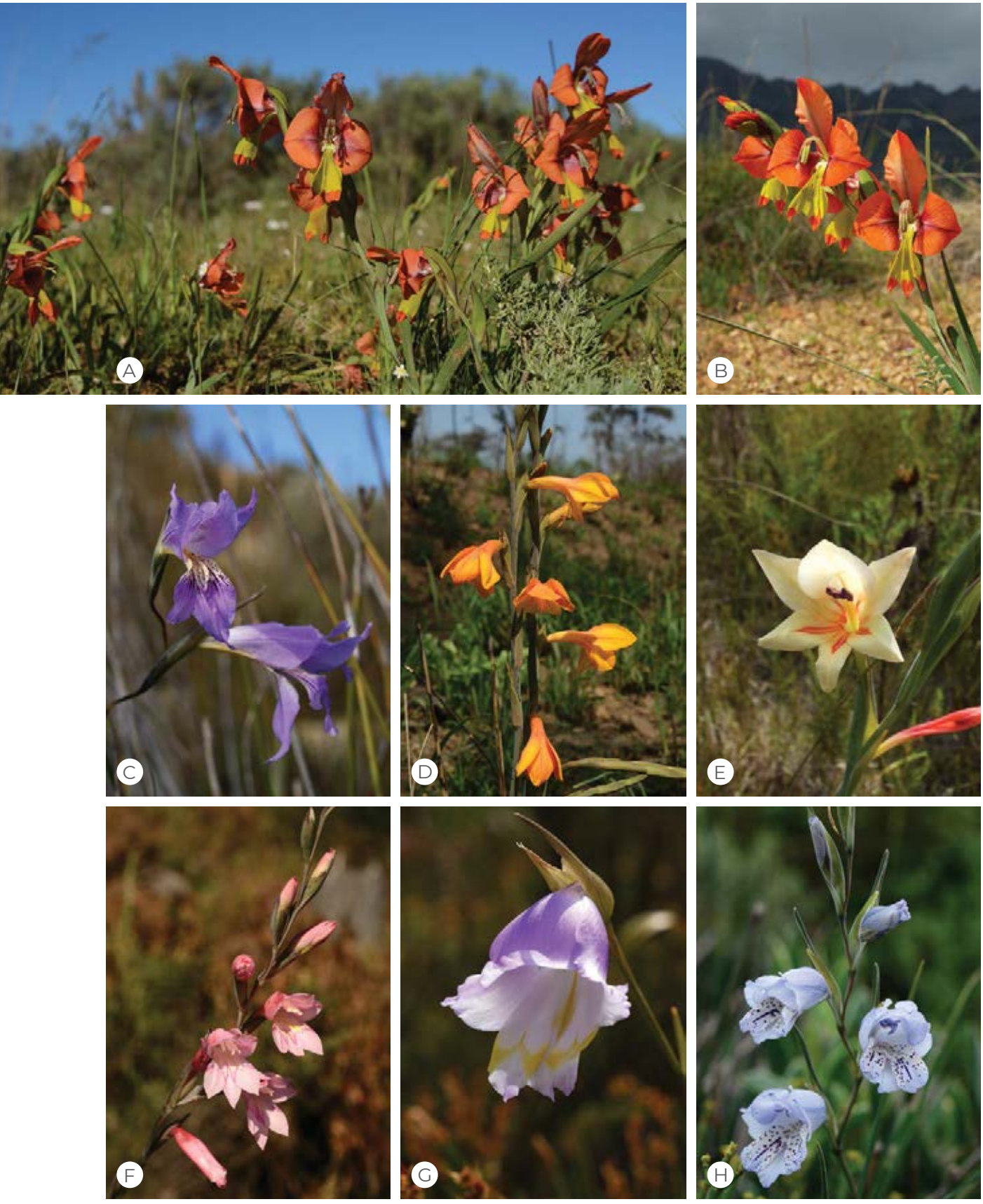


Plate 20: A & B, ***Gladiolus alatus***, Hermon, WC; C, ***G. atroviolaceus***, McGregor, WC; D, ***G. aurantiacus***, Pietermaritzburg, KZN; E, ***G. bilineatus***, Swellendam, WC (photograph: R. Saunders); F, ***G. brevifolius***, Table Mt, WC; G, ***G. bullatus***, Hermanus, WC; H, ***G. caeruleus***, Paternoster, WC.

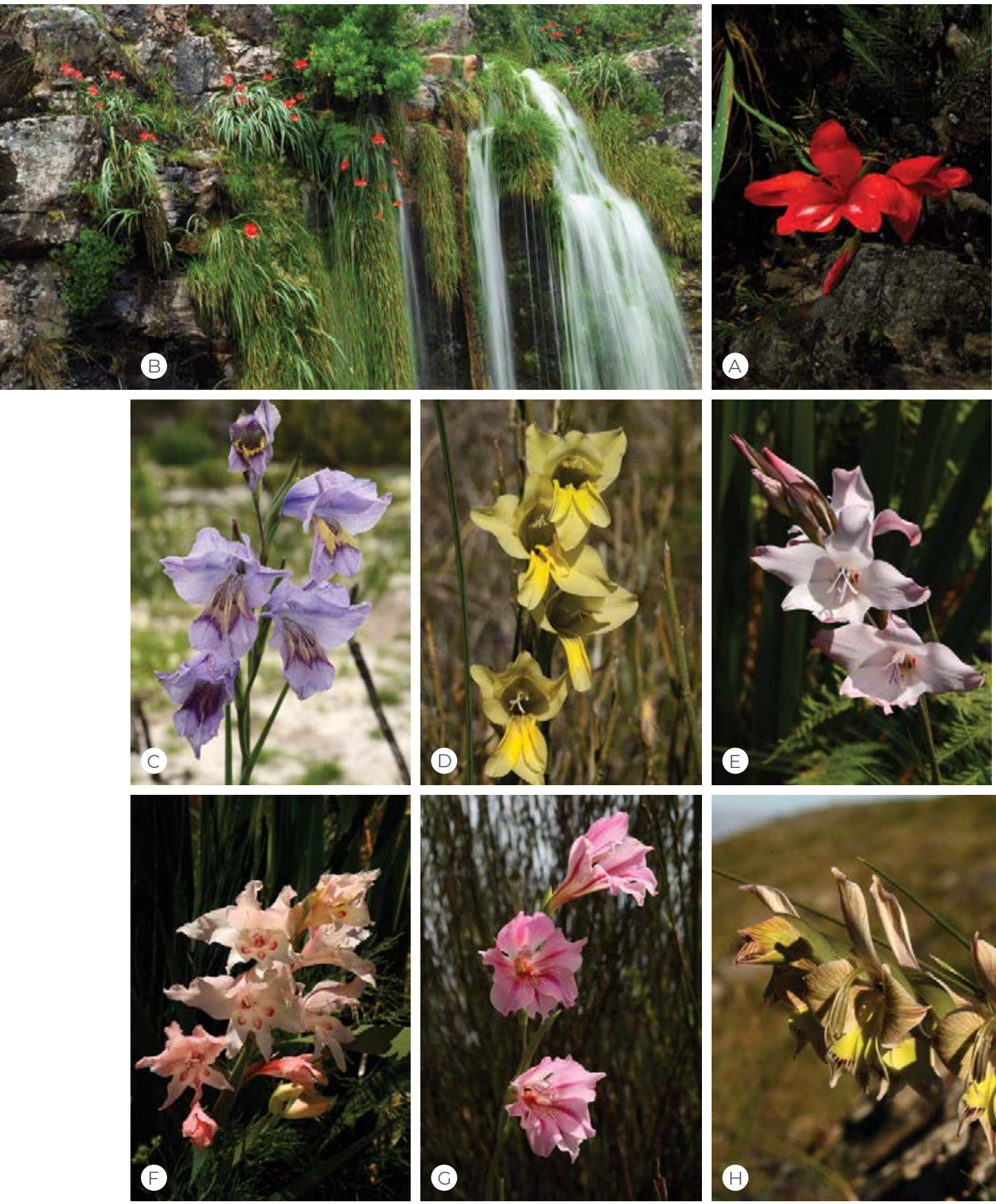


Plate 21: A & B, ***Gladiolus cardinalis***, Wellington, WC; C, ***G. carinatus***, Bokbaai, WC; D, ***G. carinatus***, Botha, WC; E, ***G. carneus***, Betty's Bay, WC; F, ***G. carneus***, Du Toit's Kloof, WC; G, ***G. caryophyllaceus***, Clanwilliam, WC; H, ***G. ceresianus***, Koo WC.

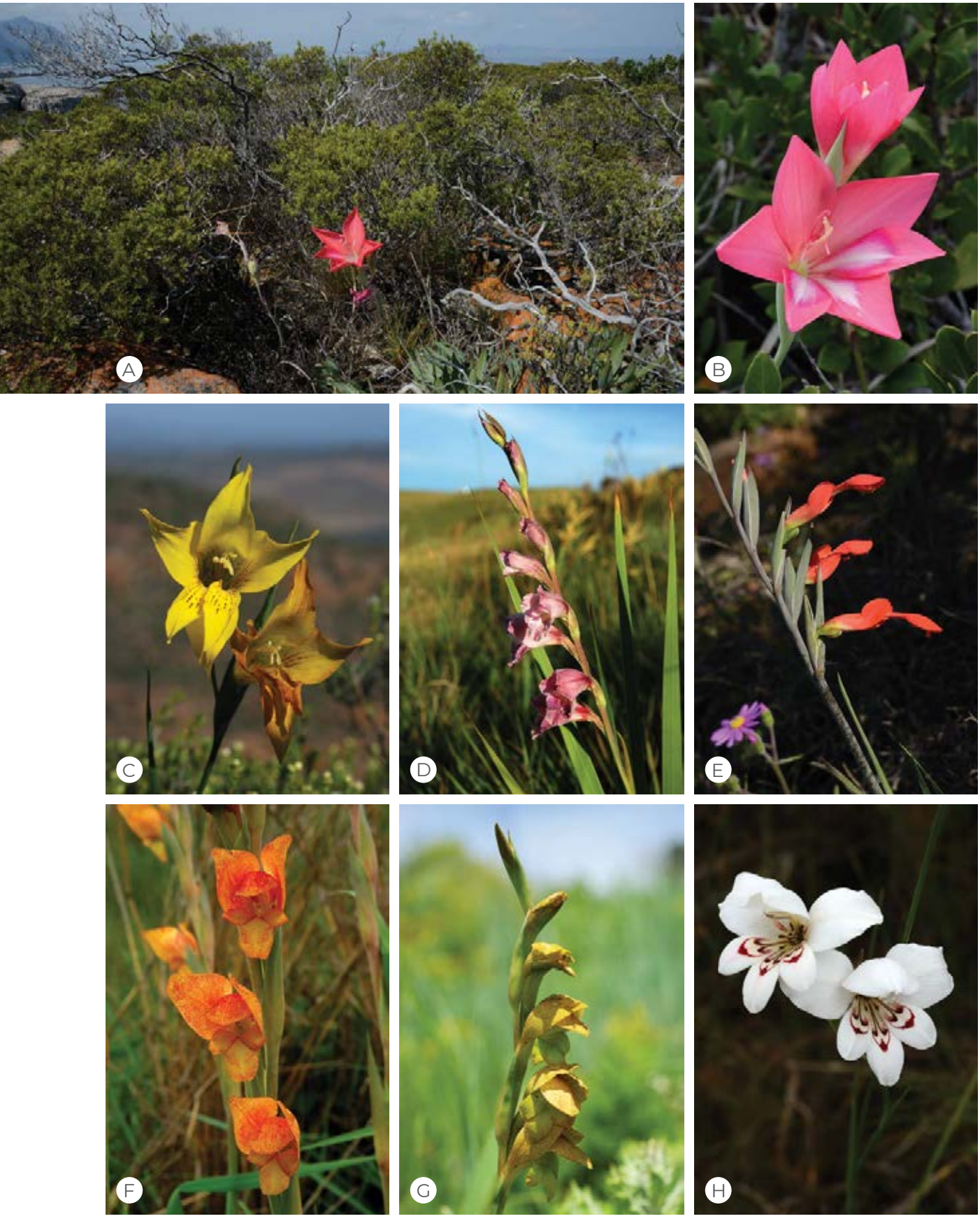


Plate 22: A & B, ***Gladiolus carmineus***, Hermanus, WC; C, ***G. comptonii***, Graafwater, WC; D, ***G. crassifolius***, Witsieshoek, FS; E, ***G. cunonius***, Scarborough, WC; F, ***G. dalenii***, Barkly East, EC; G, ***G. dalenii***, Howick, KZN; H, ***G. debilis***, Cape Peninsula WC.

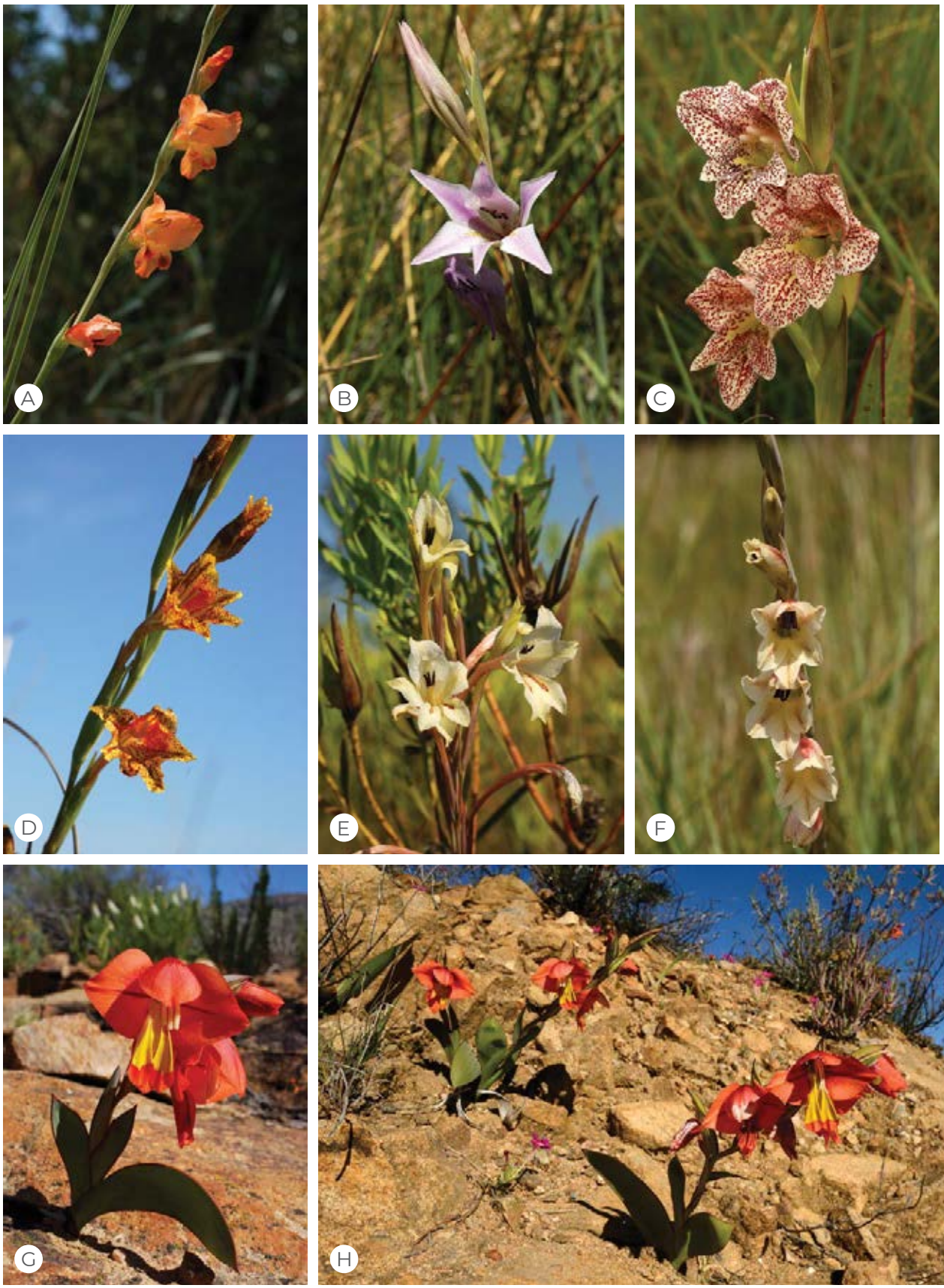


Plate 23: A, ***Gladiolus densiflorus***, Lydenburg, MP; B, ***G. diluvualis***, Fish River Canyon, NAM; C, ***G. ecklonii***, Witsieshoek, FS; D, ***G. emiliae***, Swellendam, WC; E, ***G. engysiphon***, Swellendam, WC; F, ***G. exiguus***, Lydenburg, MP; G, ***G. equitans***, Kamiesberg, NC; H, ***G. equitans***, Garies, NC.

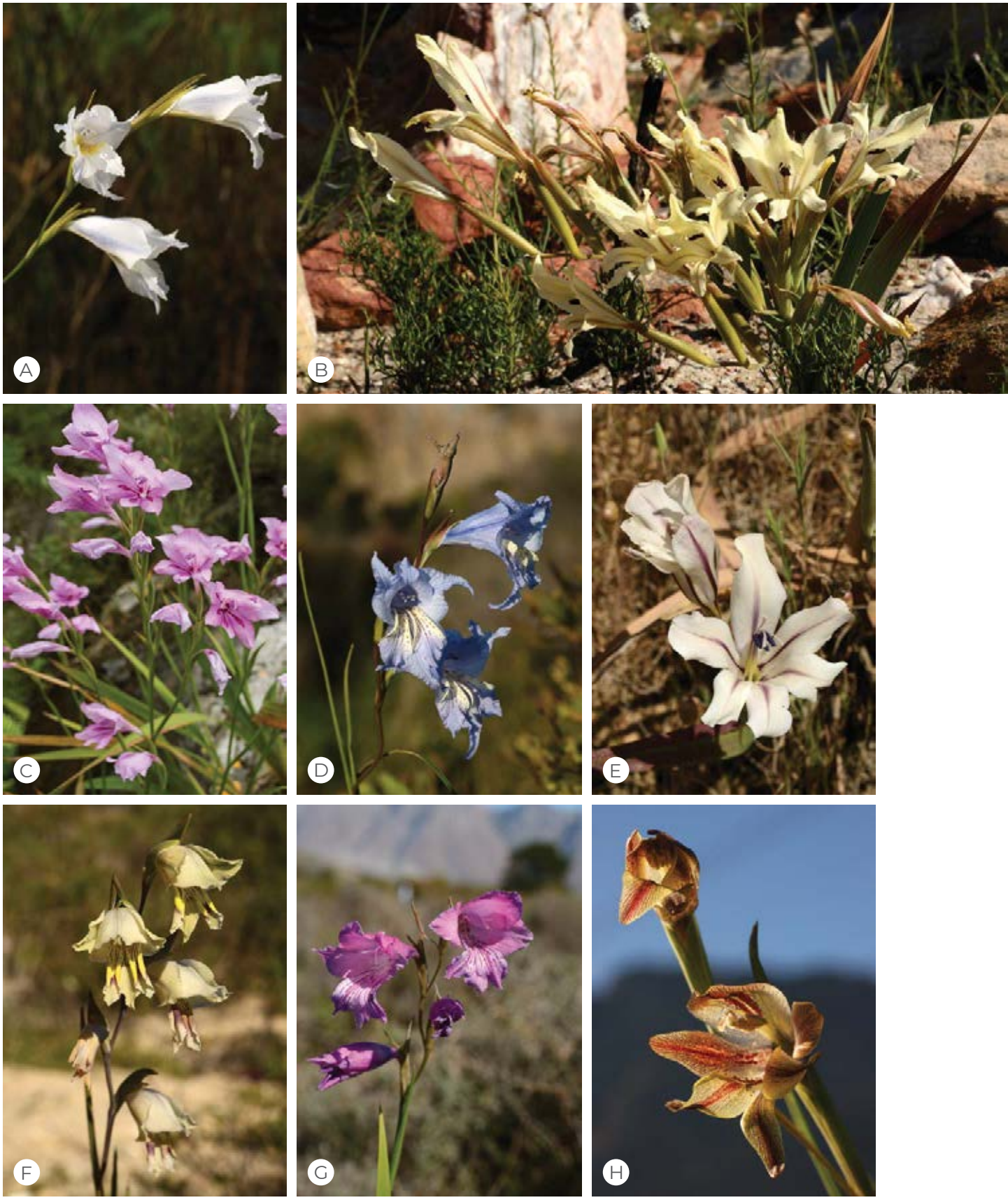


Plate 24: A, ***Gladiolus exilis***, Goudini, WC; B, ***G. floribundus***, Worcester, WC; C, ***G. geardii***, Baviaanskloof, EC (photograph: J. Wait); D, ***G. gracilis***, Cape Town, WC; E, ***G. grandiflorus***, Villiersdorp, WC; F, ***G. griseus***, Dwarskersbos, WC; G, ***G. hirsutus***, Botha, WC; H, ***G. hyalinus***, Hermon, WC.

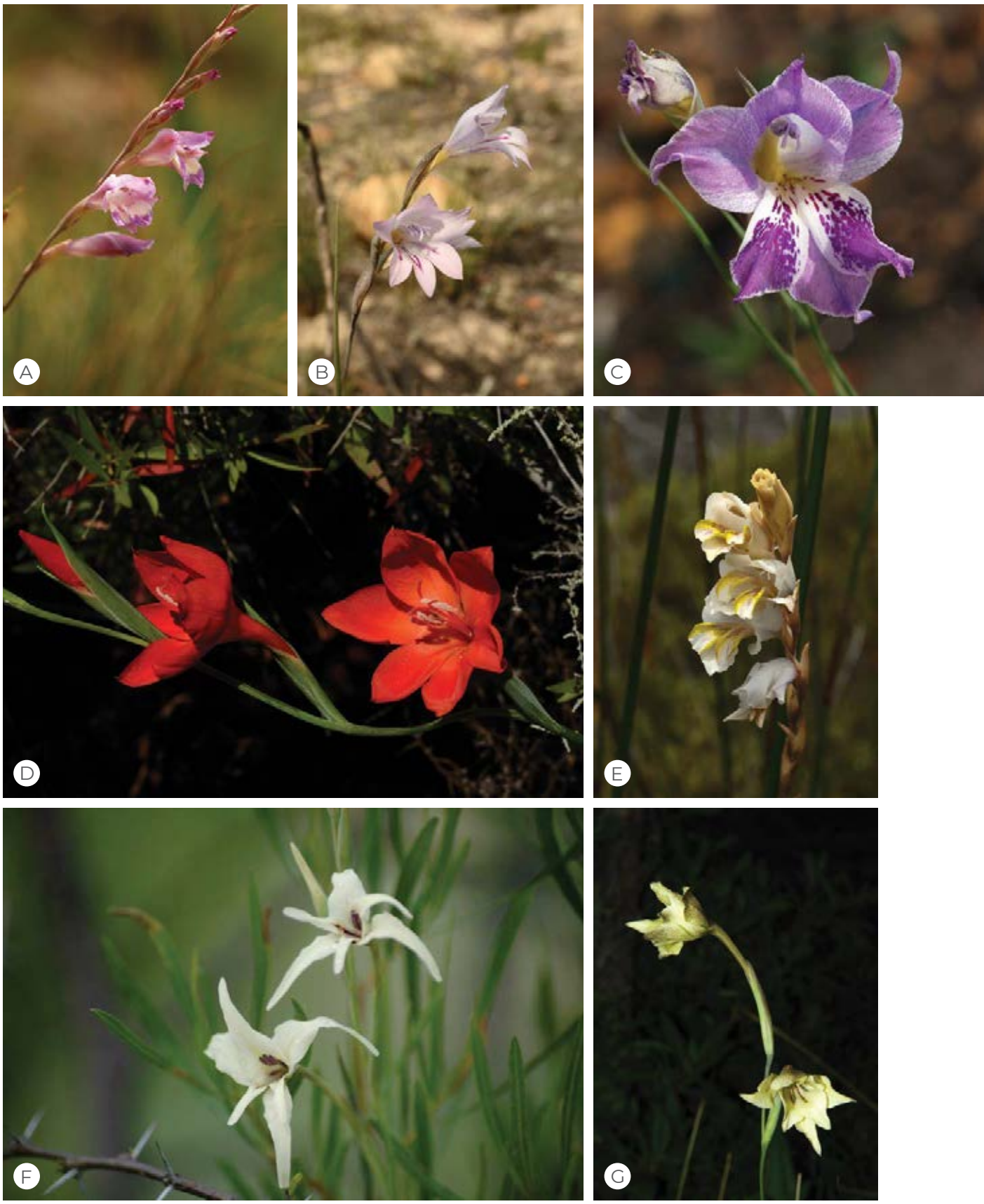


Plate 25: A, ***Gladiolus inandensis***, Maclear, EC; B, ***G. inflatus***, Ceres, WC; C, ***G. inflexus***, Rawsonville, WC; D, ***G. insolens***, Piketberg, WC, E, ***G. jonquilliodorus***, Bokbaai, WC; F, ***G. leptosiphon***, Oudshoorn, WC; G, ***G. longicollis*** subsp. ***longicollis***, Rhodes, EC.

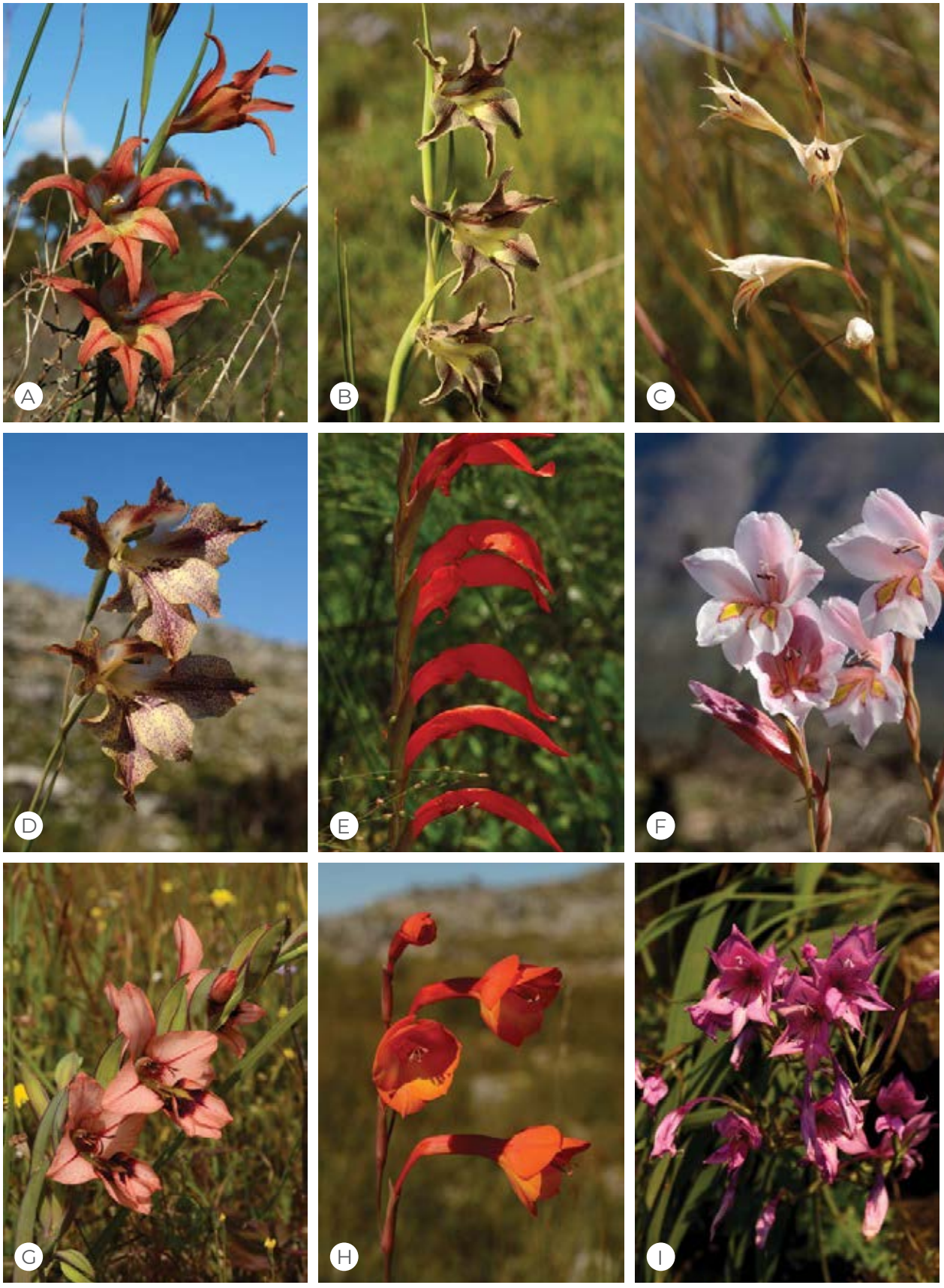


Plate 26: A, ***Gladiolus lilaceus***, Napier, WC; B, ***G. liliaceus***, Caledon, WC; C, ***G. macneilii***, Strydom Pass, MP; D, ***G. maculatus***, Cape Peninsula, WC; E, ***G. magnificus***, Angola (photograph: M. Picker); F, ***G. martleyi***, Hermon WC; G, ***G. meliusculus***, Darling, WC; H, ***G. merianellus***, Simonstown, WC; I, ***G. microcarpus***, Witsieshoek, FS.

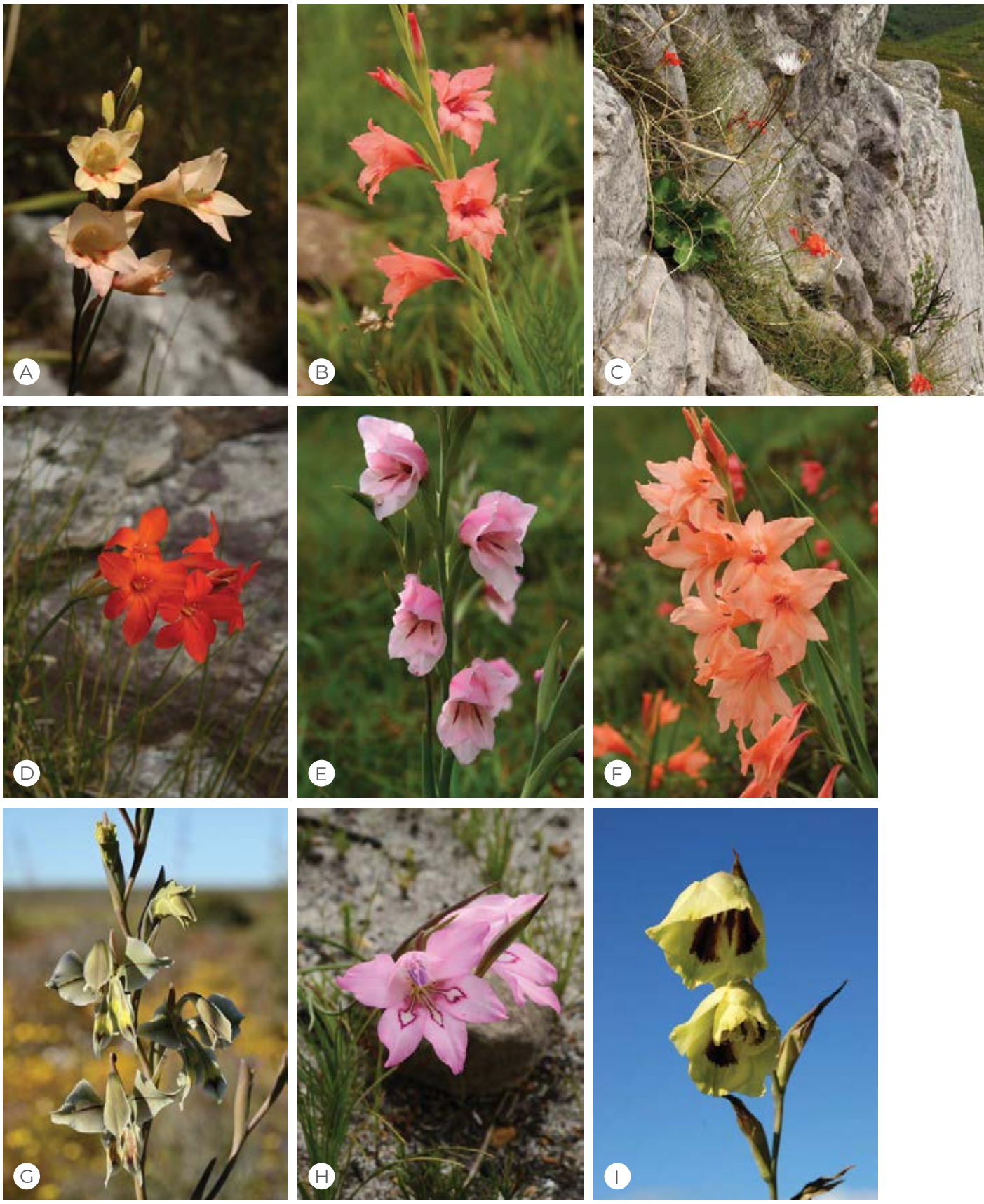


Plate 27: A, ***Gladiolus monticola***, Table Mt, WC; B, ***G. mortonius***, Cathcart, EC; C & D, ***G. nerineoides***, Helderberg, WC; E, ***G. ochroleucas***, Morgan's Bay, EC; F, ***G. oppositiflorus***, Rhodes, EC; G, ***G. orchidiflorus***, Nieuwoudtville, NC; H, ***G. ornatus***, Cape Peninsula, WC; I, ***G. papilio***, Harrismith, FS.

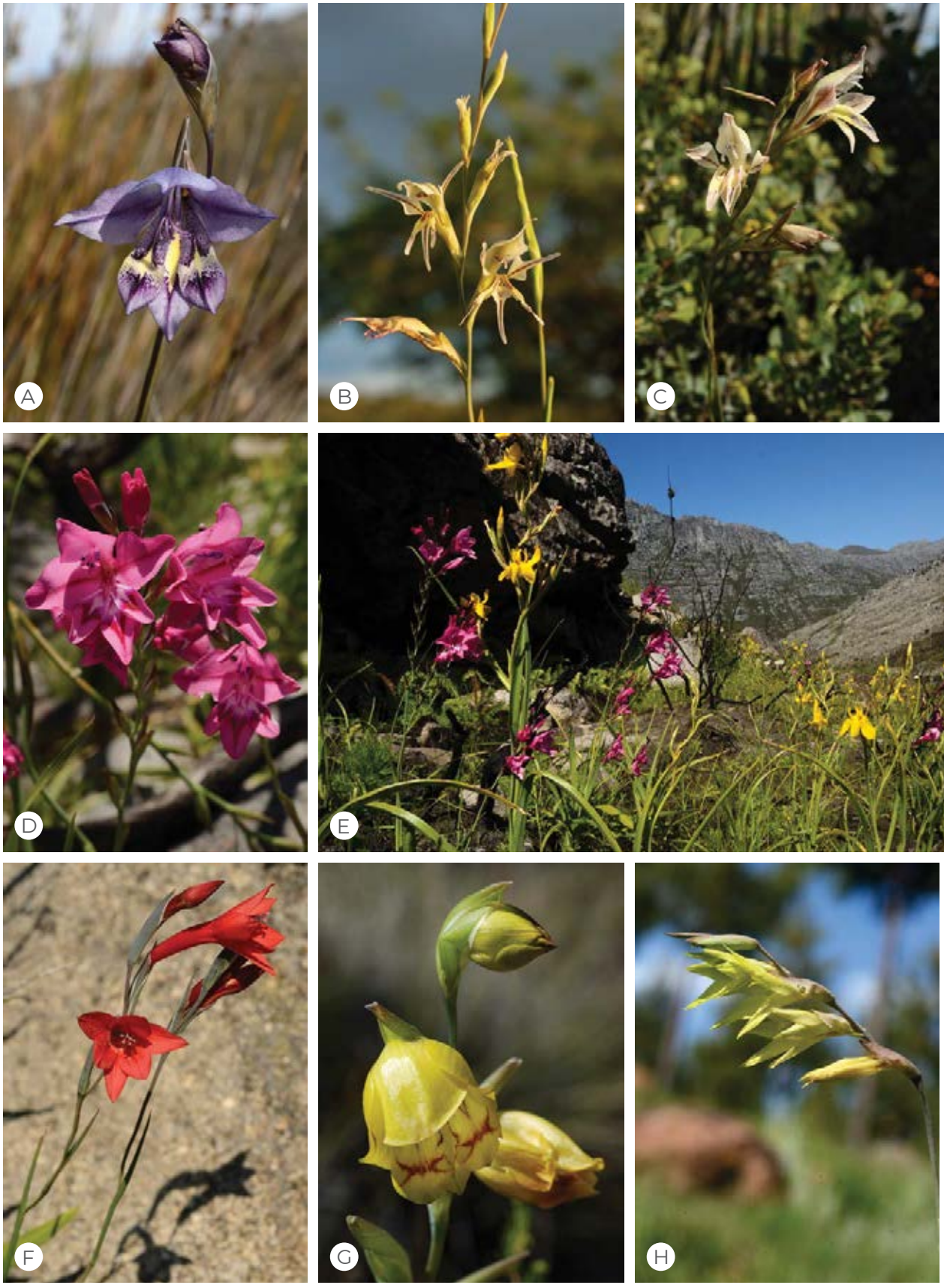


Plate 28: A, ***Gladiolus patersoniae***, McGregor, WC; B, ***G. permeabilis*** subsp. ***edulis***, Windhoek, NAM; C, ***G. permeabilis*** subsp. ***permeabilis***, Bredasdorp, WC; D & E, ***G. phoenix***, Wellington, WC; F, ***G. priorii***, Cape Town, WC; G, ***G. pritzelii***, Middelpos, NC; H, ***G. pubiger***, Amatola Mtns, EC.

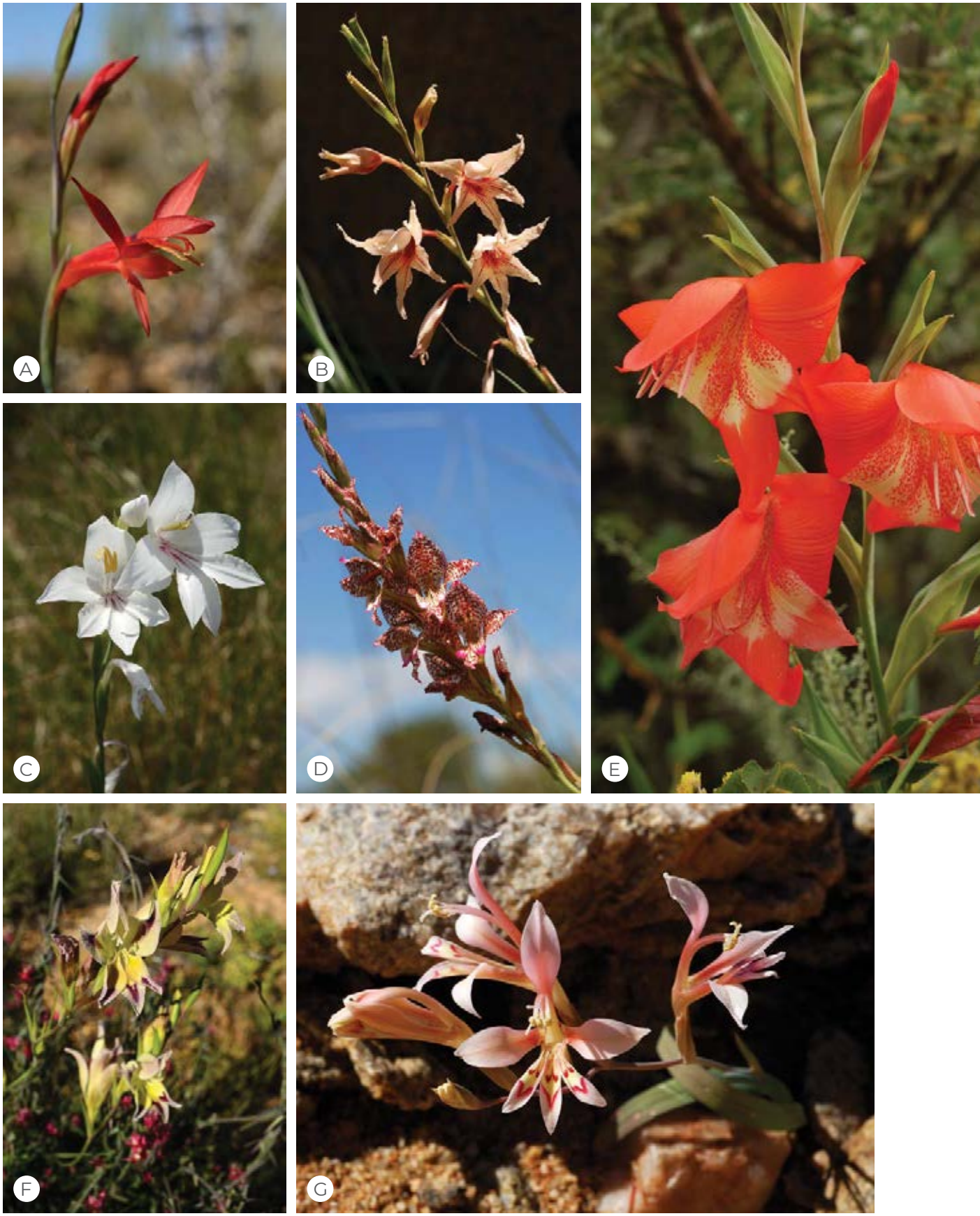


Plate 29: A, ***G. quadrangulis***, Ceres, WC; B, ***G. reginae***, Lydenburg, MP; C, ***G. robertsoniae***, Villiers, FS; D, ***G. rufomarginatus***, Lydenburg, MP; E, ***G. saundersii***, Lesotho; F, ***G. scullyi***, Nuwerus, NC; G, ***G. salteri***, Springbok, NC.

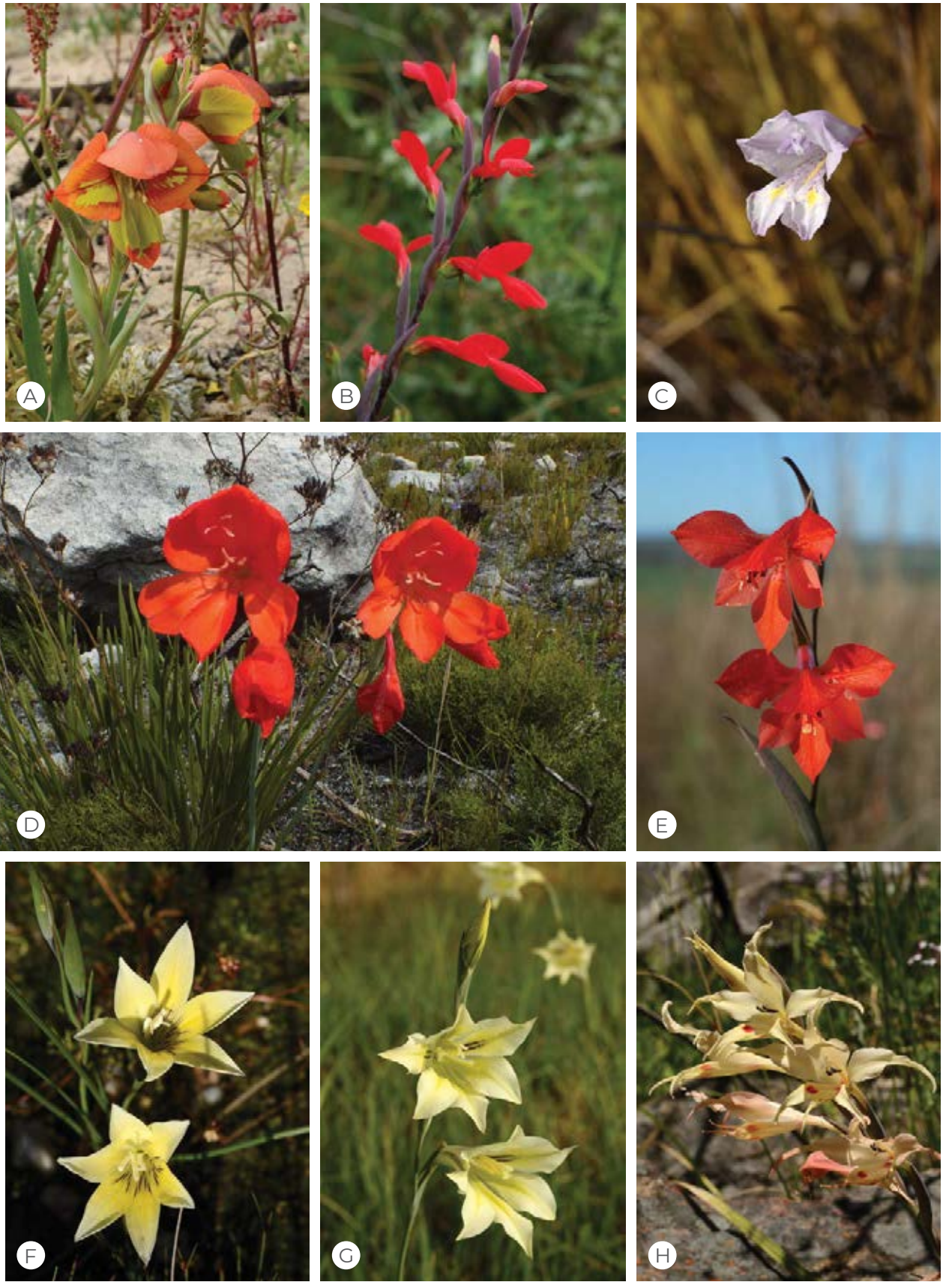


Plate 30: A, ***Gladiolus speciosus***, Atlantis, WC; B, ***G. splendens***, Sutherland, NC; C, ***G. subcaeruleus***, Napier, WC; D, ***G. stokoei***, Riviersonderend (photograph: R. Saunders); E, ***G. teretifolius***, Heidelberg, WC; F, ***G. trichonemifolius***, Klapmuts, WC; G, ***G. tristis***, Napier, WC; H, ***G. undulatus***, Wellington, WC.

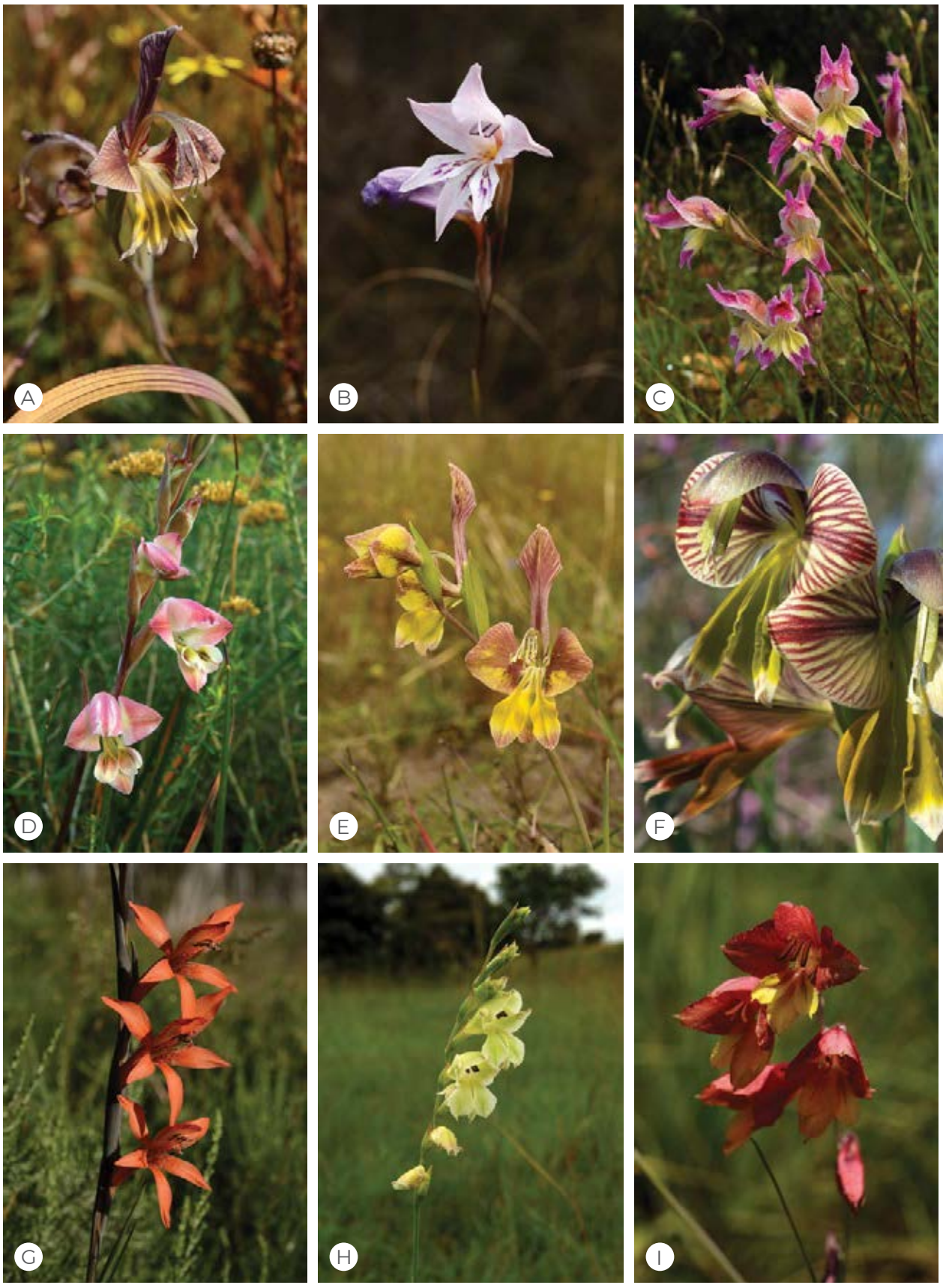


Plate 31: A, ***Gladiolus uysiae***, Nieuwoudtville, NC; B, ***G. vaginatus***, Napier, WC; C, ***G. venustus***, Clanwilliam, WC; D, ***G. vernus*** Graskop, MP; E, ***G. virescens***, Rawsonville, WC; F, ***G. watermeyeri***, Nieuwoudtville, NC; G, ***G. watsonius***, Tulbagh, WC; H, ***G. wilsonii***, Morgan's Bay, EC; I, ***G. woodii***, Sabie, MP.

Subtribe 2. **Melasphaerulinae**

Melasphaerulinae *Goldblatt & J.C.Manning*, new subtribe. Type: *Melasphaerula* Ker Gawl.

Corm bell-shaped with flat base, tunics firm-papery to woody, splitting radially from centre of base plate; stem well developed. *Leaf* margins with subepidermal sclerenchyma. *Inflorescence* a panicle of spikelets. *Flowers* zygomorphic; style branches undivided. *Capsules* depressed-cordate; seed epidermal cell outlines prominent; ovular vasculature intact; $x = 10$.

Genera 1, only *Melasphaerula*, 1 species: Greater Cape Floristic Region of southern Africa.

15. **Melasphaerula**

Melasphaerula *Ker Gawl.* in Curtis's Botanical Magazine 17: plate 615 (1803). Type: *M. graminea* (L. f.) Ker Gawl.

Phalangium Burm.f.: 3 (1768), illegitimate homonym, not *Phalangium* Miller (1754). Type: *P. ramosa* Burm.f. = *Melasphaerula graminea* (L.f.) Ker Gawl.

Diasia DC.: 151 (1803). Type: *D. graminifolia* DC. = *Melasphaerula graminea* (L.f.) Ker Gawl.

Aglaea Steud.: 21 (1821). Type: *A. graminea* (L.f.) Steud. = *Melasphaerula graminea* (L.f.) Ker Gawl.

From the Greek, *melas* = black, *sphaerulos* = small sphere, alluding to the cormlets in the basal leaf axils and sometimes also around the corm base.

Deciduous geophyte. *Corm* bell-shaped with flat base, axial in origin; tunics woody to firm-papery, concentric, splitting radially from centre of flat base into sharp, geniculate teeth, thus without a separate baseplate. *Cataphylls* 2, membranous becoming dry and papery. *Stem* aerial, erect or sprawling, terete and wiry, developing clusters of cormlets in axils of basal leaves, divaricately many-branched, branches laxly spreading. *Leaves* several, sword-shaped, mostly basal in a fan, plane with visible main vein, relatively soft-textured; marginal epidermis unspecialised. *Spikes* lax, few-flowered; bracts soft-textured with translucent margins, short, inner mostly membranous and strongly 2-veined, shorter than to ± as long as outer, notched apically. *Flowers* nodding, zygomorphic, long-lived, bilabiate, cream-coloured to yellow, all or at least lower 3 tepals with dark median streak, lightly scented, with nectar from septal nectaries; perianth tube obsolete; tepals with uppermost shorter and broader, lanceolate tapering to attenuate apices. *Stamens* unilateral and strongly arcuate; filaments inserted at mouth of perianth tube; anthers short. *Ovary* strongly obcordate and strongly 3-angled, locules with 2 or 3 pairs of ovules; style filiform, 3-branched distally, branches longitudinally folded. *Capsules* depressed-obcordate, deeply 3-lobed or winged, lobes apically auriculate, leathery, minutely papillate, dehiscing only along dorsal surface, few-seeded. *Seeds* subglobose, flattened at chalazal end, smooth, matte, testa cells domed. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number* $x = 10$.

Species 1: coastal and near-inland southern Africa, mainly the winter-rainfall zone, in sheltered and moist, shady places.

The wiry, divaricately branched stems, the small, usually dull flowers with obsolete perianth tube and attenuate tepals, and the depressed-cordate, deeply lobed capsules are unmistakable. Although the bell-shaped corms with woody tunics of *Melasphaerula* bear a superficial resemblance to those of some species of *Geissorhiza* and *Hesperantha*, they decay in quite a different way, splitting radially into sharply bent teeth directly from the basal point rather than from the rim, thus without forming a separate baseplate as is found in other genera in the family with bell-shaped corms and woody tunics.

Melasphaerula is placed as sister to *Gladiolus* by molecular data, but the two show little resemblance to one another and are only distantly related to the remaining Crocoideae (Goldblatt & Manning 2008)

1. **Melasphaerula graminea** *(L.f.) Ker Gawl.* in Curtis's Botanical Magazine 17: t. 615 (1803). *Gladiolus gramineus* L.f.: 95 (1782). *Diasia graminifolia* DC.: 151 (1803), illegitimate superfluous name for *G. gramineus* L.f. (1782). *M. intermedia* Sweet: 399 (1826), illegitimate superfluous name for *M. graminea* (L.f.) Ker Gawl. (1803). *D. intermedia* (Sweet) Heynh.: 261 (1840). *Aglaea graminea* (L.f.) Steud.: 19 (1821). Type: South Africa, without precise locality, *Sparrman s.n. Herb. Linn. No. 59.23* [LINN, holo.—other type elements cited explicitly excluded in L.f.: 468 (Emendanda) (1782)].

   Phalangium ramosum Burm.f.: 3 (1768). *Melasphaerula ramosa* (Burm.f.) N.E.Br.: 138 (1929),



Melasphaerula graminea: A, flowering plant; B, flower; C, half-flower; D, capsules; E, seed.

illegitimate homonym, not *M. ramosa* (L.) Klatt (1894) [= *Ixia scillaris* L.]. Type: South Africa, without precise locality or collector, *Herb. Burman G0096635* [G, lecto., effectively designated by Brown: 138 (1929)].

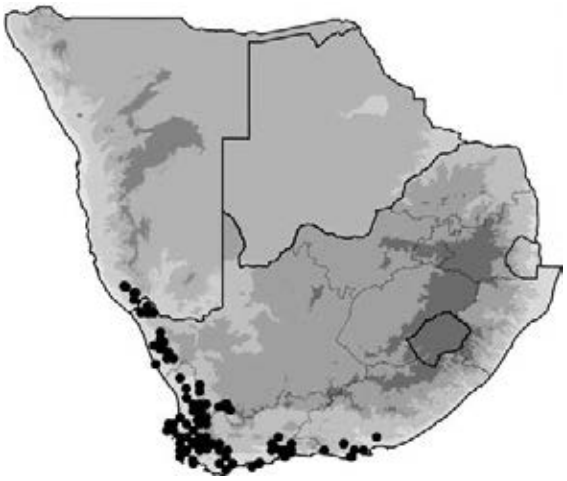
Diasia iridifolia DC.: 151 (1803), as a new name for *Gladiolus gramineus* sensu Andrews: t. 62 [excluding synonyms]. Type: South Africa, without precise locality or collector, illustration in Andrews: t. 62 (1799).

[?*Phalangium obsoletum* Burm.f.: 3 (1768), invalid name without description —identity uncertain. based on: South Africa, without precise locality or collector, illustration in Plukenet, Phytographia 3: t. 187, f. 3 (1692).]

[*Melasphaerula iridifolia* Sweet: 399 (1826), invalid name without description.]

[*Melasphaerula parviflora* G.Lodd.: t. 1444 (1829), invalid name without description. *Diasia parviflora* G.Lodd. ex Steud.: 501 (1840), invalid name without descriotion.]

Plants 200–750(–1 000) mm high. *Corm* 8–15 mm diam.; tunics woody to firm-papery. *Stem* wiry, erect below but at length arching or sprawling, divaricately many-branched, branches horizontal or drooping, stem bracts awl-like. *Leaves* 5 or 6, mostly basal, narrowly lanceolate to lanceolate, (50–)100–200 × (3–)5–15 mm, cauline leaves 1 or 2, progressively smaller. *Spike* scalloped or flexuose, 1- to 8-flowered; bracts 2–5 mm long, ovate, gaping. *Flowers* nodding, cream-coloured to yellow, all or at least lower 3 tepals with maroon or purple median streak, weakly scented with sweet or musty odour; tube obsolete, < 1 mm long; tepals suberect, uppermost shortest, erect and hooded over the anthers, others lightly twisted, attenuate, uppermost ovate to lanceolate, 7–9 × 3–5 mm, others narrowly lanceolate, 9–15 × 1–2 mm. *Filaments* ± 2 mm long; anthers 1.0–1.5 mm long, yellow. *Style* dividing beyond anthers, branches 1.5–2.0 mm long. *Capsules* ± 4 × 8 mm, deeply 3-lobed. *Seeds* ± 2 mm diam. *Flowering time*: July to September.



Distribution of ***Melasphaerula graminea***.

Distribution and ecology: distributed widely through the winter- and aseasonal rainfall regions of southern Africa, from southern Namibia through Namaqualand and along the West Coast and the Roggeveld to Agulhas and eastward along the south coast and through the Little Karoo to near Humansdorp in South Africa; in sheltered and shaded, moist situations among rocks or at the foot of cliffs in a variety of soil types.

The small, dull flowers are pollinated by March flies (Bibionidae) (Goldblatt et al. 2005).

Diagnosis: readily recognised by its bell-shaped corm with the woody corm tunics splitting from the basal point; wiry, divaricately branched stem with spreading, scalloped spikes of small, cream-coloured to pale yellow flowers with lanceolate-attenuate tepals and an obsolete perianth tube; and distinctive depressed-cordate, deeply 3-lobed or -winged capsules with finely papillate surface.

The species was known until recently as *Melasphaerula ramosa* (Burm.f.) N.E.Br. but this is an illegitimate homonym for *M. ramosa* (L.) Klatt, which is a synonym of *Ixia scillaris* L.

REFERENCES

ANDREWS, H.C. 1799. *The Botanist's Repository* 1: t. 62.

BROWN, N.E. 1929. The Iridaceae of Burmann's *Florae capensis prodromus*. *Bulletin of Miscellaneous Information, Kew* 1929: 129–139.

BURMAN, N.L. 1768. *Prodromus plantae capensium*. Leiden.

CANDOLLE, A.P. de. 1803. Notes sur deux genres nouveaux de la famille des Iridees. *Bulletin des sciences, par la Société Philomatique de Paris* 3: 151.

GOLDBLATT, P. & MANNING, J.C. 2008. *The Iris Family: Natural History and Classification*. Timber Press, Oregon.

GOLDBLATT, P., MANNING, J.C. & BERNHARDT, P. 2005. The floral biology of *Melasphaerula* (Iridaceae: Crocoideae): is this monotypic genus pollinated by march flies (Bibionidae)? *Annals of the Missouri Botanic Garden* 92: 268–274.

HEYNHOLD, G. 1840. *Nomenclator botanicus*, vol. 1. Arnold, Dresden & Leipzig.

KER GAWLER, J.B. 1803. *Melasphaerula graminea*. Grass-leaved Melasphaerula. *Curtis's Botanical Magazine* 17: t. 615.

KLATT, F.W. 1894 ['1895']. Irideae. In T. Durand & H. Schinz, *Conspectus florae africae* 5: 143–230. Jardin botanique de l'Etat, Bruxelles etc.

LINNAEUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.

MILLER, P. 1754. *The Gardener's dictionary*, *abridged*, edn. 4. P. Miller, London.
LODDIGES, G. 1829. *The botanical cabinet* 15: t. 1444. C. Loddiges & Sons, London.
PLUKENET, L. 1692. *Phytographia*, part 3: t. 187, f. 3. London.
STEUDEL, E.G. 1821. *Nomenclator botanicus*, part 1. J.G. Cotta, Stuttgart & Tübingen.
STEUDEL, E.G. 1840. *Nomenclator botanicus*, edn. 2, vol. 1. J.G. Cotta, Stuttgart & Tübingen.
SWEET, R. 1826. *Hortus brittanicus*. James Ridgway, London.





Plate 32: A & B, ***Melasphaerula graminea***, Clanwilliam, WC.

Subtribe 3. **Freesiinae**

Freesiinae *Goldblatt* in Journal of South African Botany 37: 441 (1971). Type: *Freesia* Klatt

Corm tunics fibrous and reticulate; flowering stem well developed. *Leaf* margins with columnar epidermal cells and without subepidermal sclerenchyma. *Inflorescence* a spike or flowers solitary on branches. *Flowers* zygomorphic; style branches apically notched to deeply divided; seed epidermal cell outlines prominent or smooth (*Freesia*); ovular vasculature excluded (*Crocosmia, Devia*) or intact (*Freesia, Xenoscapa*); x = 11 (10).

Genera 4, mainly southern Africa; 20 species: *Xenoscapa* 3; *Freesia* 16; *Crocosmia* 7; *Devia* 1.

16. **Xenoscapa**

Xenoscapa *(Goldblatt) Goldblatt & J.C.Manning* in Systematic Botany 20: 172 (1995). *Anomatheca* sect. *Xenoscapa* Goldblatt: 88 (1972). Type: *X. fistulosa* (Spreng. ex Klatt) Goldblatt & J.C.Manning

Revisionary account: Manning & Goldblatt (2011): 283–288.

From the Greek, *xenos*, strange and *scapa*, flowering stem, because of the inflorescence, unusual for subfamily Crocoideae, bears solitary flowers on the main and lateral branches instead of spikes of multiple flowers.

Small deciduous geophytes. *Corm* globose, axial in origin, tunics of finely netted fibres. *Cataphylls* 2 or 3, pale and membranous. *Stem* inclined to prostrate at base then stiffly erect, usually with 1–4 short branches each subtended by short cauline bract. *Leaves* 2 or 3, basal, prostrate, soft-textured, blade unifacial, oblong or falcate, plane with definite main vein; margin without vascular bundle, epidermal cells columnar and thickened. *Inflorescence* of solitary, sessile flowers terminal on axes; bracts leathery, green, inner slightly shorter or more often slightly longer than outer, strongly 2-veined, often notched apically. *Flowers* zygomorphic, long-lived, salver-shaped, either white and sweetly scented or pink with contrasting markings on lower tepals and unscented, with nectar from septal nectaries; perianth tube cylindric and elongate; tepals subequal, spreading or dorsal erect and slightly larger, spoon-shaped. *Stamens* unilateral and arcuate; filaments inserted shortly below top of perianth tube, shortly exserted. *Ovary* globose; style filiform, 3-branched distally, branches short and deeply divided, longitudinally folded, recurved. *Capsules* cartilaginous, ellipsoid to cylindric. *Seeds* strongly angled, with prominent chalazal crest, slightly wrinkled, matte, surface wrinkled, cells domed. *Pollen grains* monosulcate-operculate, operculum 1-banded, exine perforate-scabrate. *Basic chromosome number* x = 11.

Species 3: southern Namibia and western South Africa.

Xenoscapa fistulosa has a complex taxonomic history. It was described first in the genus *Ovieda* (a nomenclatural synonym of *Lapeirousia*) on account of the divided style branches and subsequently transferred in turn to *Lapeirousia*, *Anomatheca* and *Freesia* before being finally recognised as a separate genus, largely on account of its unusual inflorescence. Molecular DNA sequence data place the species as most closely related to *Freesia*.

Key to species

1a Flowers white or creamy white (rarely very pale pink), without contrasting nectar guides but perianth tube often flushed purple, fragrant; perianth tube 1.0–1.5 mm diam. at mouth; tepals 4–7 × 1–3 mm; anthers 1.0–2.5 mm long; capsules (8–)12–18 mm long . . . . . 3. *X. fistulosa*

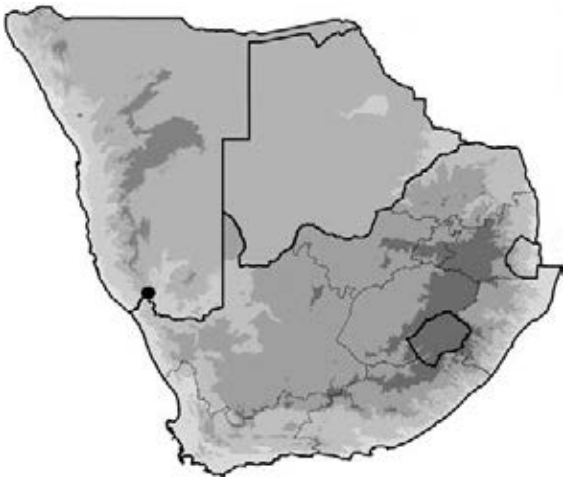
1b Flowers lilac to dark pink or purple with contrasting nectar guides on lower tepals, unscented; perianth tube 1.5–2.0 mm diam. at mouth; tepals 6–14 × 2.0–5.5 mm; anthers 2–4 mm long; capsules 10–13 mm long:

2a Flowers dark pink; perianth tube 22–28 mm long; tepals 6–7 × 2–3 mm; anthers ± 2 mm long; plants from the Kamiesberg in central Namaqualand . . . . . 2. *X. uliginosa*

2b Flowers pale lilac; perianth tube 33–35 mm long; tepals 12–14 × 4.0–5.5 mm; anthers 3.5–4.0 mm long; plants from the Hunsberge in southern Namibia. . . . . 1. *X. grandiflora*



XENOSCAPA. X. fistulosa: A, flowering stem and capsule; B, dehisced capsule; C, seed. ***X. uliginosa***: D, flowering plant; E, detail of style branches; F, dehisced capsule.



Distribution of ***Xenoscapa grandiflora***.

1. **Xenoscapa grandiflora** *Goldblatt & J.C.Manning* in Bothalia 41: 284 (2011). Type: Namibia, Hunsberge, Hohenzollern Peak, 1 July 2007 [fl. in cult. 13 July 2010], *E. van Jaarsveld sub J.C. Manning 3303* (NBG, holo.).

Plants 40–100 mm high, including flowers. *Corm* subglobose, 6–8 mm diam., tunics of coarse, netted fibres. *Leaves* 3, prostrate, oblong, lower two 45–60 × 15–20 mm, upper leaf ± half as large. *Stem* up to 45 mm long. *Spikes* 1-flowered; bracts green, 8–9 mm long, inner slightly longer and often shortly forked apically. *Flowers* zygomorphic with angle widest between upper and lower lateral tepals, pale lilac but darker on tube, lower 3 tepals each with pale creamy yellow patch at base outlined in purple, unscented; perianth tube cylindric, 33–35 mm long, wider and curved just below apex, 2 mm diam. at mouth; tepals subequal but inner slightly wider than outer, 12–14 × 4.0–5.5, dorsal erect, others spreading horizontally at right angles to tube. *Stamens* unilateral; filaments 3–5 mm long, exserted 2–4 mm from tube; anthers 3.5–4.0 mm long, dark purple; pollen grey-blue. *Style* dividing opposite anther bases, branches 4 mm long, deeply forked. *Capsule* oblong-cylindric, 10–13 × 3–4 mm. *Seeds* ± 1 mm diam. *Flowering time*: June to July.

Distribution and ecology: known only from the type collection from the summit of Hohenzollern Peak at the southern end of the Hunsberge in southern Namibia; wedged in crevices in the shelter of rock outcrops. Self-fertile and autogamous.

Diagnosis: distinguished from *Xenoscapa uliginosa* from the Kamiesberg by its larger, pale lilac flowers, with perianth tube 33–35 mm long and tepals 12–14 mm long. Additional collections are needed.

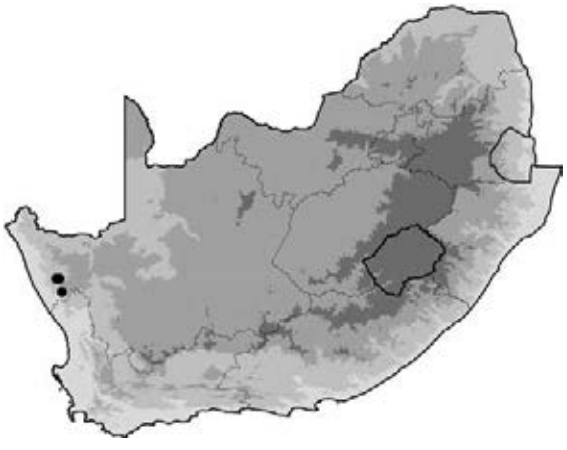
2. **Xenoscapa uliginosa** *Goldblatt & J.C.Manning* in Systematic Botany 20: 173 (1995). Type: South Africa, [Northern Cape], Namaqualand, Farm Modderfontein, lower east-facing slopes of Sneeukop, ± 1 400 m, 18 Sept. 1981, *Goldblatt [& Manning] 9244* (NBG, holo.; K, MO, PRE, iso.).

Plants 30–50 mm high, including flowers. *Corm* 5–8 mm diam.; tunics of fine, netted fibres. *Leaves* 3, prostrate, oblong, lower two 20–40 × 5–18 mm, upper leaf ± half as large. *Stem* up to 40 mm long. *Spikes* 1-flowered; bracts green, 6–7 mm long, inner slightly longer and often shortly forked apically. *Flowers* zygomorphic, dark pink or purple and darker on tube, lower 3 tepals each with pale creamy yellow patch at base outlined in purple, unscented; perianth tube cylindric, (20–)22–28 mm long, wider and curved just below apex, 1.5–2.0 mm diam. at mouth; tepals subequal but inner slightly wider than outer, 6–7 × 2–3 mm, dorsal erect or suberect and exposing anthers. *Stamens* unilateral; filaments 3–5 mm long, exserted ± 2 mm from tube; anthers ± 2 mm long, dark purple; pollen grey-blue. *Style* dividing opposite anther bases, branches 2 mm long, deeply forked. *Capsule* oblong, ± 10 × 3–4 mm. *Seeds* ± 1 mm diam. *Flowering time*: mid-September–October(early November).

Distribution and ecology: restricted to the Kamiesberg in central Namaqualand in Northern Cape, South Africa, on Sneeuberg and Rooiberg; along the margins of seasonal seeps and in rock flushes.

Hybrids with *Xenoscapa fistulosa* have been recorded on Sneeukop where the two species grow near one another (Manning & Goldblatt 2011). The flowers are adapted for pollination by long-proboscid flies (Manning & Goldblatt 1996).

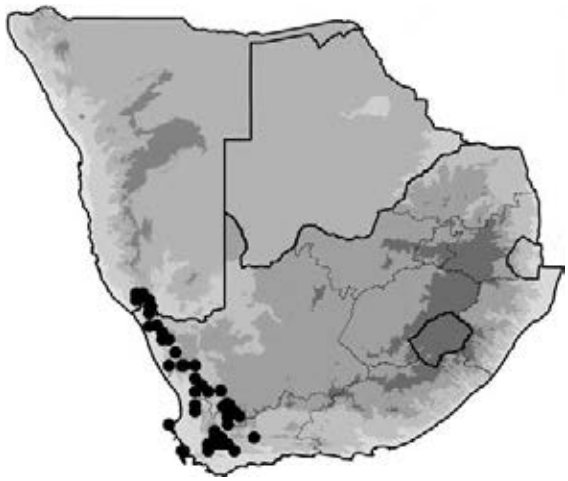
Diagnosis: resembling *Xenoscapa grandiflora* in its unscented, moderately sized, pink flowers with contrasting darker nectar guides on the lower tepals, but distinguished by the dark pink perianth with shorter tube 20–28 mm long and tepals 6–7 mm long.



Distribution of ***Xenoscapa uliginosa***.

3. **Xenoscapa fistulosa** *(Spreng. ex Klatt) Goldblatt & J.C.Manning* in Systematic Botany 20: 172 (1995). *Ovieda fistulosa* Spreng. ex Klatt: 781 (1864). *Lapeirousia fistulosa* (Spreng. ex Klatt) Baker: 155 (1877). *Anomatheca fistulosa* (Spreng. ex Klatt) Goldblatt: 88 (1972). Type: South Africa, [Western Cape], Olifants River, Clanwilliam, without date, *Ecklon & Zeyher Irid. 254* (B, holo.; MO, PRE, iso.).

Plants (50–)70–200 mm high, including flowers. *Corm* 5–8 mm diam.; tunics of fine to medium-textured, netted fibres. *Stem* up to 180 mm long. *Leaves* 3, prostrate, oblong, lower two 20–50(–70) × 5–18(–20) mm, upper leaf ± half as large. *Spikes* 1-flowered, sometimes a second inflorescence developing in axil of upper leaf; bracts green, 5–7 mm long, inner slightly longer and often shortly forked apically. *Flowers* zygomorphic, white or creamy white, rarely pale pink, flushed purplish on tube, unmarked, with sweet-spicy fragrance; perianth tube cylindric, 18–25(–33) mm long, wider and curved just below apex, 1.0–1.5 mm diam. at mouth; tepals subequal, 4–7 × 1–3 mm, dorsal ± erect but others spreading ± horizontally at right angles to tube. *Stamens* unilateral; filaments 3–5 mm long, exserted ± 2 mm from tube; anthers 1.0–2.5 mm long, dark purple; pollen grey-blue. *Style* dividing between base and middle of anthers, branches 2 mm long, deeply forked. *Capsule* oblong to cylindric, (8–)12–20 × 2.5–4.0 mm. *Seeds* ± 1 mm diam. *Flowering time*: August to October.



Distribution of ***Xenoscapa fistulosa***.

Distribution and ecology: widespread along the near interior of the southern African Atlantic Coast and the western Karoo, from Aurusberg and the southern edge of the



Plate 33: ***Xenoscapa fistulosa***, Clanwilliam, WC.

Huib-Hoch Plateau in southern Namibia through the higher-lying parts of the Richtersveld and Namaqualand of Northern Cape, South Africa to Montagu and the northern foothills of the Klein Swartberg, with isolated populations along the Western Coast from Vredenburg to the lower slopes of Lions Head on the Cape Peninsula in Western Cape; typically on shale or gneiss/granite substrates, from near sea-level to almost 1 300 m elevation, in cool, seasonally moist or wet and largely shaded situations in the lee of rocks or boulders.

Diagnosis: distinguished by the relatively small, fragrant, mostly white (rarely pale pink in the Richtersveld and southern Namibia) flowers without markings on the lower tepals and a slender perianth tube up to 1.5 mm diam. at the mouth. In most populations the main stem is relatively long, up to 180 mm, exceeding that of other species. *Xenoscapa fistulosa* is self-fertile and autogamous but hybridises with *X. uliginosa* in the Kamiesberg. The small, fragrant flowers appear to be otherwise adapted for pollination by settling moths.

REFERENCES

BAKER, J.G. 1877 ['1878']. Systema iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

GOLDBLATT, P. 1971. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460.

GOLDBLATT, P. 1972. Revision of *Lapeirousia* and *Anomatheca* in the winter rainfall area of southern Africa. *Contributions from the Bolus Herbarium* 4: 1–111.

GOLDBLATT, P. & MANNING, J.C. 1995. Phylogeny of the African genera *Anomatheca* and *Freesia* (Iridaceae: Ixioideae), and a new genus *Xenoscapa*. *Systematic Botany* 20: 161–178.

KLATT, F.W. 1864. Revisio iridearum. *Linnaea* 32: 689–784.

MANNING, J.C. & GOLDBLATT, P. 1996. The *Prosoeca peringueyi* (Diptera: Nemestrinidae) pollination guild in southern Africa: long-tongued flies and their tubular flowers. *Annals of the Missouri Botanical Garden* 83: 67–86.

MANNING, J.C., GOLDBLATT, P. 2011. A review of the genus *Xenoscapa* (Iridaceae: Crocoideae), including *X. grandiflora*, a new species from southern Namibia. *Bothalia* 41: 283–288.

17. **Freesia**

Freesia *Eckl. ex Klatt* in Linnaea 34: 672 (1866), name conserved against *Lomenia* Pourr. [= *Watsonia*] (Goldblatt 1980) and against *Anomatheca* Ker Gawl. (Goldblatt & Manning 1993). Lectotype: *F. refracta* (Jacq.) Klatt, designated by Goldblatt: 56 (1982).

Anomatheca Ker Gawl.: 227 (1804). Type species: *A. juncea* Ker Gawl. = *Freesia verrucosa* (B.Vogel) Goldblatt

Nymanina Kuntze: 701 (1891), illegitimate superfluous name for *Freesia* Klatt. Type species: as for *Freesia*.

Revisionary accounts: Brown: 1–31 (1935); Goldblatt: 39–81 (1982); Goldblatt: 430–484 (1990); Manning & Goldblatt: 1–114 (2010).

Named after Dr Friedrich Heinrich Theodor Freese, a physician at Kiel, Germany, and friend of C.F. Ecklon, nineteenth century plant collector.

Small to medium-sized deciduous geophytes. *Corm* subglobose to narrowly conical, axial in origin; tunics of pale, fine to coarse, netted fibres. *Cataphylls* up to 3, papery. *Leaves* 4 to 13, lower 3 to 11 ± basal and suberect to prostrate, unifacial, linear-lanceolate to lanceolate, falcate or oblong, acute to obtuse, main vein lightly to moderately thickened, usually plane, rarely undulate or crisped (*F. viridis* subsp. *crispifolia*), uppermost 1 or 2 leaves cauline, usually without blade; margin without vascular bundle, epidermis cells columnar with thickened walls. *Stem* erect or shortly decumbent, usually terete but flattened and winged in *F. viridis*, often branched, smooth or sparsely to densely papillate. *Inflorescence* a spike, usually branched, rachis ± deflexed and inclined or horizontal, secund and ± scalloped; bracts either firm-textured and green with narrow, hyaline margin, or pale and papery or membranous and then usually tipped dark brown, acute, apiculate or tricuspidate, inner smaller and strongly 2-veined, forked apically. *Flowers* weakly to strongly zygomorphic, long-lived, either ± salver-shaped or funnel-shaped and bilabiate, mostly white or cream-coloured to pale yellow, often flushed purple on reverse but also pink, red or green to brown, lower tepals often with yellow to orange lateral nectar guides, often fragrant, nectar from septal nectaries; perianth tube either subcylindric and expanding slightly and evenly from base or near apex, or funnel-shaped and narrowly tubular below but ± abruptly expanded near middle into a broadly cylindric or flared distal part; tepals subequal or upper larger and sometimes hooded, oblong to lanceolate, inner tepals often oblong or ovate-cordate. *Stamens* unilateral, usually inserted at base of broader distal part of tube or near mouth of tube, usually included but sometimes exserted. *Ovary* ellipsoid; style filiform, 3-branched distally, branches deeply divided, longitudinally folded, recurved. *Capsules* cartilaginous, subglobose to oblong, 3-lobed, rough and papillate to verrucose in upper ½ or throughout. *Seeds* subglobose, sometimes with raphe and chalaza inflated, smooth or wrinkled, testa dry and glossy reddish brown, rarely bright orange to red when fresh. *Pollen grains* monosulcate-operculate, operculum 1- (*F. viridis* only) or 2-banded, exine perforate-scabrate. *Basic chromosome number x* = 11.

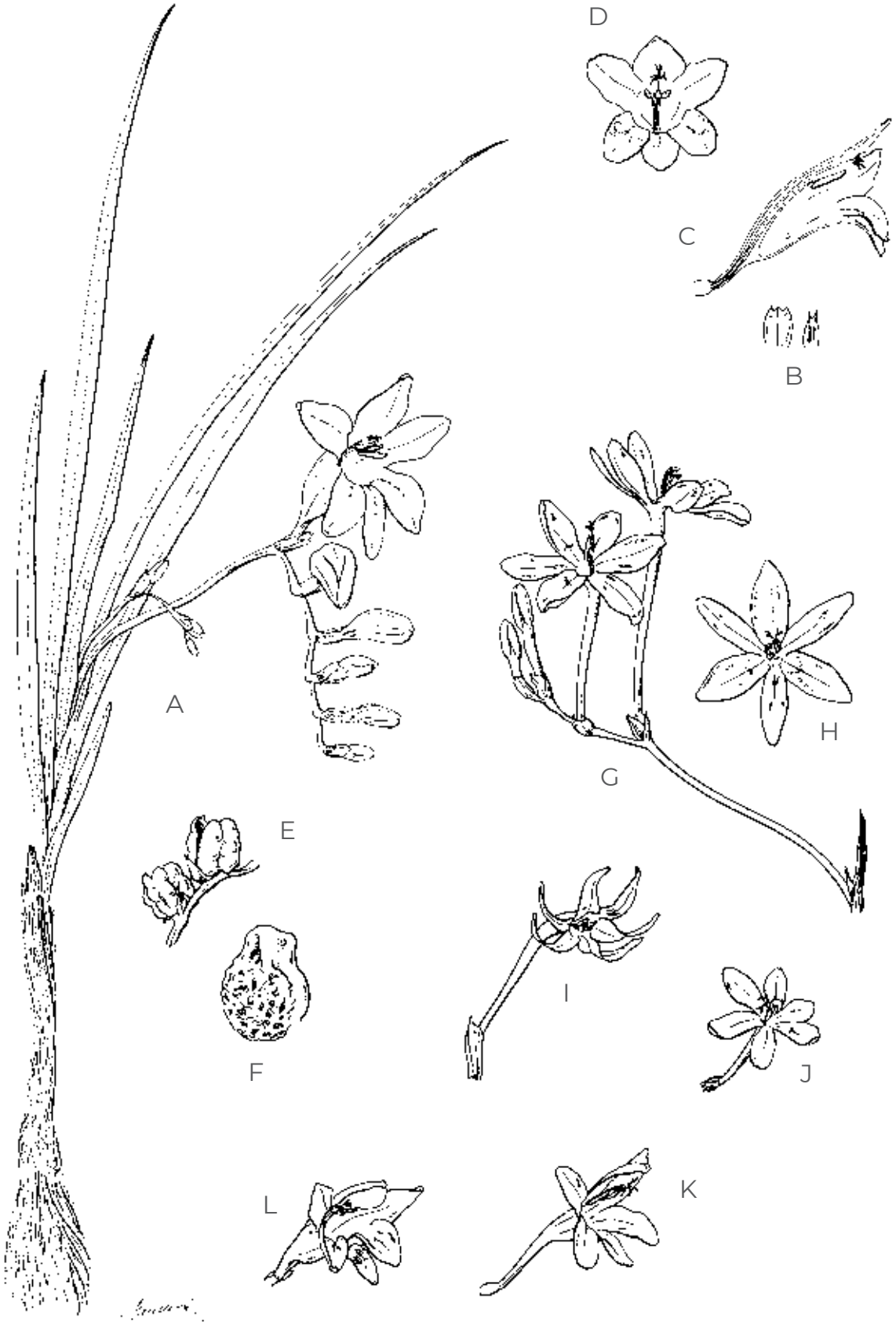
Species 16: mainly winter-rainfall southern Africa but extending into eastern subtropical and tropical Africa.

Freesia was initially restricted to the often highly fragrant species with funnel-shaped flowers but now includes several florally dissimilar species with salver-shaped flowers previously segregated as the genus *Anomatheca*. The genus is distinguished by the often narrowly conical corms with finely netted tunics, mostly soft-textured leaves with the marginal epidermal cells columnar and thickened, an inclined or horizontal and ± scalloped spike of flowers with deeply divided style branches, ± distinctive ± papillate or verrucose capsules, and subglobose seeds with a smooth, glossy testa.

The genus is popular in the cut-flower trade, with numerous named cultivars. These have all been derived from repeated crossing of colour forms of just the two species *Freesia corymbosa* and *F. leichtlinii* (subsp. *alba* and subsp. *leichtlinii*).

Key to species

1a Flowers ± salver- or trumpet-shaped with floral tube slender and cylindric throughout or widening gradually from base, 1–3 mm diam. at mouth; tepals subequal and ± spreading or recurved, without extensive yellow markings; stamens inserted in upper 5 mm of floral tube:
2a Stem 2-angled or -winged; floral tube sharply bent in upper part and mouth facing down; flowers green or brownish; anthers included. . . . . 9. *F. viridis*
2b Stem terete; floral tube straight or slightly curved, mouth facing sideways or upwards; flowers white, mauve, pink or red; anthers exserted:
3a Leaves < 100 mm long, much shorter than inflorescence, oblong, obtuse-apiculate; bracts 4.0–5.5 mm long; perianth tube 15–20 mm long; flowers pink . . . . . 5. *F. verrucosa*
3b Leaves usually > 100 mm long, often as long as or longer than inflorescence, linear-lanceolate to lanceolate, acute-apiculate; bracts (4–)5–20 mm long; perianth tube 20–40 mm long; flowers red, pink, pale blue or white:



FREESIA. F. fucata: A, flowering plant, B. outer bract (left) and inner bract (right); C, half-flower; D, flower front view; E, dehisced capsules; F, seed. ***F. laxa***: G, flowering branch; H, flower front view. ***F. viridis*** subsp. ***crispifolia***: I, flower. ***F. verrucosa***: J, flower. ***F. sparmannii***: K, flower. ***F. refracta***: L, flower.

4a Perianth > twice as long as tepals; upper tepal 9–15 mm long; filaments 3–4 mm long, scarcely exserted . . . 1. *F. laxa*
4b Perianth tube ± as long as tepals or slightly longer; upper tepal 22–32 mm long; filaments 15–25 mm long, exserted 10–20 mm . . . . . 2. *F. grandiflora*
1b Flowers funnel-shaped, floral tube with narrowly tubular lower portion ± abruptly expanded into broadly cylindric distal portion, 5–15 mm diam. at mouth; stamens inserted near middle or in lower half of tube, at junction between lower and upper portions; lower tepals usually with extensive yellow markings:
5a Floral bracts thin-textured, membranous or papery, pale green or translucent and dry, usually with dark tips; stems smooth; seeds subglobose, without inflated raphe:
6a Bracts 7–13 mm long; flowers normally 50–65 mm long; filaments 18–32 mm long:
7a Leaves 100–200 mm long, acute; flowers white to cream-coloured, boldly marked with purple lines in throat; tepals ovate to elliptic; filaments 18–25 mm long . . . . . 3. *F. andersoniae*
7b Leaves 25–100 mm long, obtuse or subacute; flowers pale yellow, plain or with pale purple lines in throat; tepals suborbicular; filaments 27–33 mm long . . . . . 4. *F. speciosa*
6b Bracts 4–8 mm long; flowers normally 25–40 mm long; filaments 10–14 mm long:
8a Bracts uniformly pale; leaves usually ± as long as stem . . . . . 7. *F. refracta*
8b Bracts brown-tipped; leaves usually ± half as long as stem:
9a Leaves obtuse or subacute, (5–)7–18(–25) mm wide; bracts lightly tipped with dark brown; flowers white or cream-coloured, sometimes flushed pale lilac or mauve . . . . . 8. *F. occidentalis*
9b Leaves acute to acuminate, 2–7(–10) mm wide; bracts with pronounced dark brown tips; flowers usually pale yellow sometimes flushed dull purple, or pale to deep pink. . . . . 6. *F. corymbosa*
5b Floral bracts firm-textured or leathery, green with narrow membranous margins; stems puberulous or papillate, at least toward base; seeds obliquely globose, with inflated raphe:
10a Floral tube narrowly funnel-shaped, lower portion 12–15 mm long and ± as long as or slightly longer than upper portion; lower tepals 4–5 mm wide; flowers unscented . . . . . 10. *F. sparrmanii*
10b Floral tube funnel-shaped, lower portion ± half as long as upper portion; lower tepals 5–12 mm wide; flowers always fragrant:
11a Plants usually with deeply buried corms, bearing cormlets in one or more lower leaf axil; plants coastal in sandy soils . . . . . 15. *F. leichtlinii*
11b Plants with shallow corms, bearing cormlets at base of parent corm, never in leaf axils; plants inland in loamy or clay soils:
12a Corm tunics of soft, thin-textured fibres (< 0.1 mm diam.); flowers mostly with yellow or orange markings on lower median tepal only; flowering June to July . . . . . 14. *F. praecox*
12b Corm tunics of wiry, coarse-textured fibres (at least some > 0.2 mm diam.); flowers mostly with yellow or orange markings on all three lower tepals:
13a Flowers creamy yellow or bright yellow; number of leaves (5–)7 to 13; flowering (June) July to August . . . . . 16. *F. fergusoniae*
13b Flowers white; number of leaves 4 to 7(–9); flowering April to July:
14a Leaves erect, glaucous, acuminate, 4–5 mm wide . . . . . 11. *F. fucata*
14b Leaves erect or prostrate, green or glaucous, subacute to acute, 6–15(–20) mm wide:
15a Leaves medium-textured, with prominent main vein but no evident submarginal vein . . . 13. *F. caryophyllacea*
15b Leaves firm-textured and leathery, with inconspicuous main vein and prominent submarginal vein . . . . . 12. *F. marginata*

Subg. 1. **Freesia**

Anomatheca Ker Gawl. in König & Sims, Annals of Botany: 227 (1804). *Lapeirousia* subg. *Anomatheca* (Ker Gawl.) Baker: 173 (1892). *Freesia* subg. *Anomatheca* (Ker Gawl.) J.C.Manning & Goldblatt: 172 (2005). Type: *A. verrucosa* (B.Vogel) Goldblatt = *F. verrucosa* (B.Vogel) Goldblatt & J.C.Manning.

Plants small to medium-sized. *Stem* terete, smooth. *Leaves* erect to prostrate, lanceolate to oblong, plane, acute or obtuse. *Spike* suberect or inclined; bracts soft-textured, either soft-herbaceous and green throughout or drying from apex, or entirely membranous and translucent, often brown-tipped. *Flowers* either funnel-shaped and white or pale to deep pink or yellow with dark yellow or orange markings on lower tepals, or ± salver-shaped with straight tube and blue or pink to red with red markings on lower tepals. *Stamens* included or shortly to well exserted. *Seeds* subglobose or with inflated raphe, smooth or rugulose, reddish brown but sometimes orange to red when fresh.

Species 8: southern and tropical Africa.

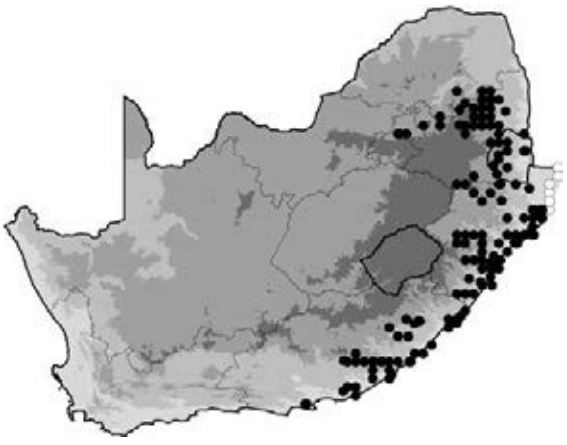
1. **Freesia laxa** *(Thunb.) Goldblatt & J.C.Manning* in Systematic Botany 20: 171 (1995). *Gladiolus laxus* Thunb.: 50 (1823). *Lapeirousia laxa* (Thunb.) N.E.Br.: 24 (1928). *Meristostigma laxum* (Thunb.) A.Dietr.: 597 (1832). *Anomatheca laxa* (Thunb.) Goldblatt: 442 (1971). Type: South Africa, [Eastern Cape], without precise locality but probably Uitenhage District in December 1773, *Thunberg s.n.* (UPS-THUNB 1039, holo.).

Plants (150–)200–300(–500) mm high. *Corm* globose-conical, 10–15 mm diam., with cormlets at base; tunics

of fine-textured fibres. *Stem* erect, usually simple. *Leaves* 6 to 9, suberect, usually shortly overtopping spike, narrowly lanceolate, (40–)100–400 × 4–10(–15) mm, acute to acuminate, soft-textured with midrib moderately thickened. *Spike* slightly or moderately deflexed, (1)2 to 6(–14)-flowered; bracts ovate, (4–)5–8(–14) mm long, acute, soft-textured, green with reddish brown tips, inner slightly shorter. *Flowers* 25–40 mm long, red to pink, lilac or pale blue, rarely white, base of lower 3 tepals each with dark red, purple or violet blotch, unscented; perianth tube cylindric, expanded slightly near apex, (20–)25–35(–40) mm long, ± curved in upper 4 mm; tepals subequal but inner 3 broader, uppermost ± reflexed, others spreading, elliptic to obovate, 9–15 × 4–8 mm. *Filaments* erect, mostly 3–5 mm long, inserted 2 mm below mouth of tube, exserted 1–3 mm; anthers ± 4 mm long. *Style* dividing between base and apex of anthers. *Capsules* oblong-ovoid, 10–12(–15) × 8–10 mm, ± papillate. *Seeds* subglobose with highly inflated raphe, 2.5–3.0 mm diam., smooth and glossy, bright red when fresh but soon darkening to reddish brown. *Flowering time*: variable in any locality, from June to April, most often from October to December.

Distribution and ecology: widely distributed along the eastern seaboard of southern Africa from east of Port Elizabeth in South Africa through the Eastern Cape and KwaZulu-Natal Midlands to Mpumalanga and Eswatini; also southern Mozambique, Zambia, eastern Democratic Republic of the Congo, Tanzania, western Kenya, eastern Uganda and the Imatong Mountains in South Sudan; in small colonies in coarse sandy soil in coastal scrub and inland on the edges of bush and forest, often in rocky situations. Naturalised locally on waste ground in Australia around Sydney and the northern coast of New South Wales, in southern China, Mauritius, Réunion, Madeira, and USA in Florida and possibly other southern states; self-fertile and often autogamous.

Diagnosis: evidently closely allied to *Freesia grandiflora* and sharing subglobose-conical corms, suberect spikes of brilliant scarlet flowers (pale bluish in subsp. *azurea*), and seeds that are bright orange or red when fresh. Both species are restricted to forest or savanna in regions of summer rainfall. The flowers in *F. laxa* are generally smaller, with a relatively longer perianth tube more than twice as long as the tepals (9–15 mm long), and very short filaments, 3–4 mm long and scarcely exserted from the tube. The species reproduces vegetatively by sessile cormlets.



Distribution of ***Freesia laxa*** subsp. ***laxa***, ●; subsp. ***azurea***, ○.

Key to subspecies

1a Flowers pink to red (rarely white) with dark red markings on lower tepals; upper tepal 10–15 × 5–8 mm; style dividing at or above middle of anthers . . . . . 1a. subsp. *laxa*

1b Flowers lilac, pale bluish or white with violet or indigo markings on lower tepals; upper tepal 9–11(–12) × 4(–5) mm; style dividing below middle of anthers . . . . . 1b. subsp. *azurea*

1a. subsp. **laxa**

Anomatheca cruenta Lindl.: t. 1369 (1830). *Lapeirousia cruenta* (Lindl.) Baker: 173 (1892). *Freesia cruenta* (Lindl.) Klatt: 187 (1894). Type: South Africa, [Eastern Cape], without precise locality, *Lindley s.n.* (GCE, holo.).

Lapeirousia grandiflora Jacq.: 120 (1836), illegitimate superfluous name for *Anomatheca cruenta* Lindl. Type: illustration in Annales de flora et de Pomone 4: 122 (1836).

Lapeirousia graebneriana Harms: 366 (1901). Type: Tanzania, Iringa District, Uhehe, Ufuagi, 14 Mar. 1899, *Goetze 748* (B, holo.; BR, iso.).

Flowers pink to red (rare white sports are known), usually paler on reverse, lower 3 tepals each with dark red blotch at base; perianth tube 20–35(–40) mm long; tepals 10–12(–15) × 4–8 mm. *Filaments* exserted 1.5–2.0 mm. *Style* dividing between middle and apex of anthers. *Flowering time*: August to January but peak flowering south of the equator is between November and January, and May to July north of the equator.

Distribution and ecology: widely distributed along the eastern coast and near interior of South Africa, from near Port Elizabeth through Eastern Cape and KwaZulu-Natal to Eswatini and Ohrigstad in Mpumalanga and Pretoria in Gauteng, and discontinuously through eastern tropical Africa to western Kenya, southern Tanzania, Zambia, eastern Uganda and southern Sudan but not recorded in Zimbabwe, northern Mozambique or southern Malawi; favouring rocky habitats on the edge of bush clumps and afrotemperate forest but also in coastal forest and bush near sea level in northern KwaZulu-Natal.

1b. subsp. **azurea** *Goldblatt & Hutchings* in Novon 3: 146 (1993). Type: Mozambique, Inhaca Island, 20 July 1980, *De Koning & Navunga 8312* (LMU, holo.; BR, K, MO, SRGH, iso.).

Flowers lilac, pale bluish or white, lower 3 tepals each with dark blue to violet blotch at base; perianth tube 25–35 mm long; tepals 9–11(–13) × 4(–5) mm. *Filaments*

exserted 1–3 mm. *Style* dividing between base and middle of anthers. *Flowering time*: June to September.

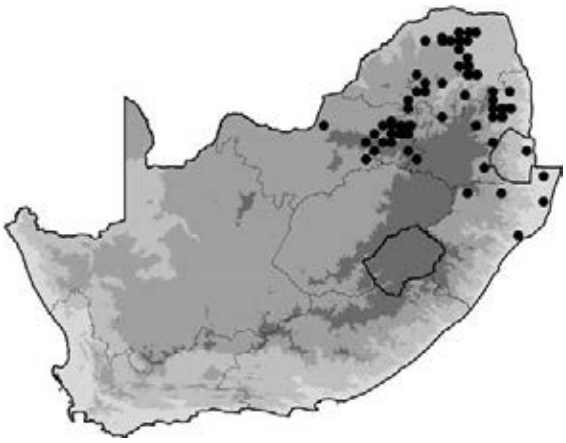
Distribution and ecology: restricted to coastal habitats between Richards Bay in northern KwaZulu-Natal and Massinga in central Mozambique; in coarse, sandy soils, either in exposed sites such as grassy dunes or in light shade.

2. **Freesia grandiflora** *(Baker) Klatt* in Th.Durand & H.Schinz, Conspectus florae africae 5: 187 (1894). *Anomatheca grandiflora* Baker: 337 (1876). *Lapeirousia grandiflora* (Baker) Baker: t. 6924 (1887), illegitimate homonym, not *L. grandiflora* Jacq. (1836) [= *F. laxa* (Thunb.) Goldblatt & J.C.Manning]. Type: Mozambique, mouth of Luabo [Luaua] River, 30 May 1858, *Kirk s.n.* [K, lecto., designated by Goldblatt: 53 (1993)].

Plants (120–)200–600 mm high. *Corm* globose-conical, 10–15 mm diam., producing thick, scaly rhizomes 20–40 mm long, tunics of fine fibres or ± papery. *Stem* erect, usually simple, rarely developing cormlets in axils of lower leaves. *Leaves* 6 to 9, suberect, usually reaching to base of spike or shortly above, lanceolate, (40–)100–300 × (6–)8–20 mm, acute, soft-textured with moderately thickened main vein. *Spike* suberect or weakly deflexed, becoming erect or suberect in fruit, 2- to 6-flowered; bracts ovate, soft and herbaceous, green with dark reddish brown tips, 10–20 mm long, acute, inner ⅔ as long. *Flowers* 30–50 mm long, usually red, rarely pinkish red or pink, base of lower 3 tepals with darker red blotch, unscented; perianth tube cylindric below, expanded and funnel-shaped near apex, 20–30(–35) mm long, straight or slightly curved above; tepals subequal with inner 3 slightly larger and uppermost largest, suberect below and spreading above, oblanceolate, upper tepals 22–32 × 7–10 mm, lower 21–26 mm long. *Filaments* erect and unilateral, (6–)15–25 mm long, inserted 3–4 mm below mouth of tube, exserted 12–20 mm; anthers 5.5–8.0 mm long. *Style* dividing between middle and apex of anthers. *Capsules* oblong, 8–10 × 7–8 mm, ± papillate. *Seeds* subglobose, 2.0–3.5 mm diam., with or without inflated chalaza and very short raphe, smooth or lightly wrinkled, deep orange or red when fresh but soon darkening. *Flowering time*: mainly January to April.

Distribution and ecology: scattered through the eastern, southern and tropical Africa, from north of Durban in KwaZulu-Natal through the northern provinces of South Africa as far west as Rustenburg and Zeerust, and through Eswatini and Mozambique to Zambia and southern Tanzania; typically in humus-rich soils in scrub, deciduous woodland or more rarely forest, sometimes along streams, also occasionally on anthills.

The production of rhizomes is unusual among southern African Crocoideae but is also found in *Crocosmia aurea*, another woodland or forest species. The flowers are evidently adapted for butterfly pollination and the seeds for bird dispersal.



Distribution of ***Freesia grandiflora*** subsp. ***grandiflora***.

Diagnosis: allied to *Freesia laxa* but distinguished from it by the larger flowers with the dorsal tepal 22–32 mm long, relatively shorter tube at most only slightly longer than the dorsal tepal, and filaments typically 15–20 mm long and well exserted from the tube. The characteristic rhizomes are not developed in *F. laxa*, which produces sessile cormlets.

subsp. **grandiflora**

Tritonia graminifolia Baker: 195 (1892). *Lapeirousia graminifolia* (Baker) L.Bolus: 135 (1929b). Type: South Africa, [Mpumalanga], near Lydenburg, November 1874, *Bolus 2651* (K, holo.).

Freesia rubella Baker: 868 (1901). Type: Mozambique, Delagoa Bay [Maputo], 1890, *Junod 166* (Z, holo.).

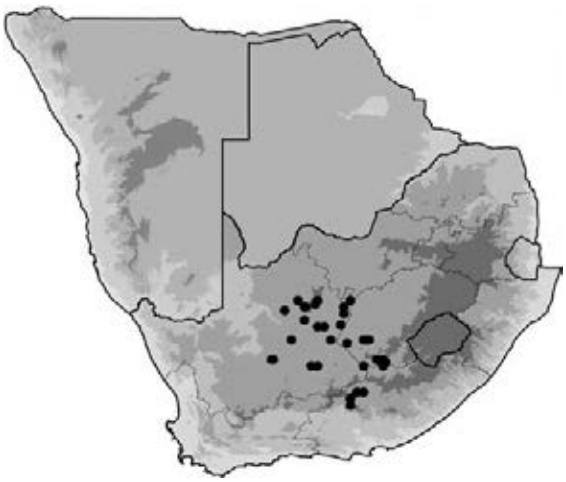
Flowers usually bright red, rarely salmon-pink. *Filaments* 15–25 mm long, exserted 12–20 mm beyond tube. *Style* usually dividing between middle and apex of anthers, rarely below anthers.

Distribution and ecology: as for the species.

A second subspecies, subsp. *occulta* J.C.Manning & Goldblatt, with unusually short filaments, ± 6 mm long, occurs locally near Mocuba in Zambézia Province in north-central Mozambique.

3. **Freesia andersoniae** *L.Bolus* in South African Gardening and Country Life 17: 337 (1927). Type: South Africa, [Northern Cape], Herbert District, September 1925, *Anderson 760* [BOL, lecto., designated by Goldblatt: 86 (1982)].

Plants 100–250(–300) mm high. *Corm* conical, 15–25 mm diam., tunics light brown, of medium–coarse-textured fibres. *Stem* erect, smooth but minutely verrucose on angles below each flower, usually simple. *Leaves* 10 to 14, inclined to suberect, ± as long as stem, narrowly lanceolate, 100–200 × 4–10 mm, acute to subattenuate,



Distribution of ***Freesia andersoniae***.

drying at flowering time. *Spike* deflexed, 2- to 5-flowered; bracts ovate, dry and membranous or papery, translucent with brown veins and rust-coloured speckling on apices, 7–10(–13) mm long, acute, inner up to 2 mm longer. *Flowers* 50–60 mm long, white to creamy white, base of lowermost tepal and inner edges of lower lateral tepals flushed orange, all three lower tepals with dark brownish midline and with dark chevrons in sinuses, strongly lily-scented; perianth tube funnel-shaped, 35–45 mm long with basal tubular portion 15–20 mm long, widening ± abruptly into cylindric-flared upper portion; tepals with dorsal largest, suberect, obovate, 12–16 × 10–12 mm, upper laterals broadly elliptic, lower tepals recurved, elliptic, 10–15 × 17–9 mm. *Filaments* arcuate, 18–25 mm long, inserted at base of widened upper portion, included; anthers 7–9 mm long. *Style* dividing between base and middle of anthers. *Capsules* shortly oblong or oblong-ovoid, (7–)10–12 × 8–10 mm, warty or papillate. *Seeds* subglobose or with chalaza slightly swollen, 2.5–3.0 mm diam., smooth, glossy dark or reddish brown. *Flowering time*: August to early October.

Distribution and ecology: scattered across the central plateau of South Africa in the drainage basins of the Orange and Vaal rivers, from the Kuruman Hills on the southern fringes of the Kalahari in the north to near Carnarvon in the west and to Aliwal North and the Sneeuberg near Middelburg in the east; typically along the lower, southern slopes of dolerite outcrops.

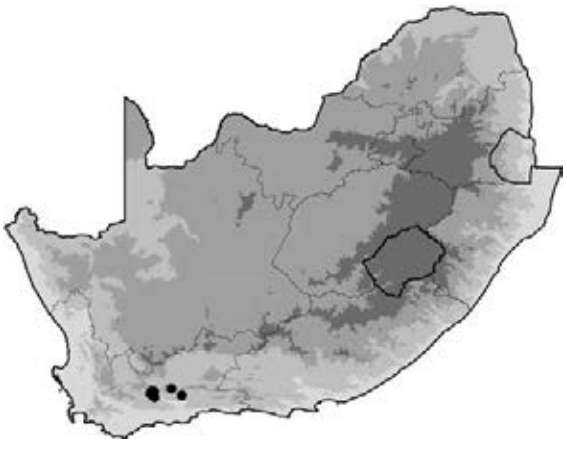
Diagnosis: *Freesia andersoniae* has an erect, almost smooth stem and thin-textured, membranous or papery bracts, and large, fragrant white flowers, 50–60 mm long, marked with characteristic purple chevrons in the tepal sinuses.

4. **Freesia speciosa** *L.Bolus* in South African Gardening and Country Life 19: 385 (1929a). Type: South Africa, [Western Cape], between Bonnievale and Barrydale (cultivated at the Karoo Garden, Whitehill), 22 Aug. 1929, *Archer s.n. BOL19027* (BOL, holo.).

Freesia sparrmanii [as *sparrmannii*] var. *flava* N.E.Br.: t. 11 (1921). *F. flava* (N.E.Br.) N.E.Br.: 27 (1935). Type: South Africa, [Western Cape], Ladismith District, 30 Oct. 1918 (fl. in cult. Pretoria 19 Sept. 1919), *Shand s.n. PRE 15786* (PRE, holo.).

Plants (80–)120–200(–300) mm high. *Corm* conic, 15–30 mm diam., tunics light brown, of medium–coarse-textured fibres. *Stem* erect, smooth but minutely verrucose on angles below each flower, usually simple. *Leaves* 5 or 6, inclined to suberect, usually ± half as long as stem, oblong, 25–100 × 14–20 mm, obtuse to subobtuse, apiculate, firm-textured or softer. *Spike* deflexed, 3- to 6-flowered; bracts ovate, membranous, green below when young but dry in upper ⅔, later translucent with brown veins and rust-coloured speckling on apices, 8–10 mm long, acute but lower bracts tricuspidate, inner up to 1 mm longer. *Flowers* 50–70 mm long, pale creamy yellow, base of lowermost tepal and inner edges of lower lateral tepals flushed orange, all three lower tepals with brown midline, strongly lily-scented, with sour or bitter note during day; perianth tube funnel-shaped, 35–50 mm long with basal tubular portion 15–20 mm long, widening ± abruptly into cylindric-flared upper portion; tepals with dorsal largest, suberect, broadly ovate to suborbicular, 15–18 × 14–15 mm, upper laterals elliptic, lower tepals recurved, lower laterals broadly elliptical to suborbicular, 14–15 × 11–12 mm, lower median oblong, 14–15 × 7–8 mm. *Filaments* arcuate, 27–33 mm long, included; anthers 6–7 mm long. *Style* dividing at or slightly beyond anther apices. *Capsules* short-oblong or oblong-ovoid, 9–13 × 8–10 mm, warty or papillate. *Seeds* globose, 2.5–3.0 mm diam., smooth or finely wrinkled, glossy dark or reddish brown. *Flowering time*: mid-August to September.

Distribution and biology: endemic to the western Little Karoo in Western Cape, South Africa, from Anysberg to Calitzdorp; on cooler, south-trending stony slopes in



Distribution of ***Freesia speciosa***.

open shrubland, typically in loam or alluvium, or with the corms wedged in cracks on south-facing sandstone cliffs in humus.

Diagnosis: a distinctive species with obtuse, often somewhat succulent leaves and large, pale creamy yellow flowers, 50–70 mm long, with broadly elliptical or suborbicular lower lateral tepals, 11–12 mm wide, and elongate filaments 27–33 mm long.

5. **Freesia verrucosa** *(B.Vogel) Goldblatt & J.C.Manning* in Systematic Botany 20: 171 (1995). *Ixia verrucosa* B.Vogel in Trew: t. 24, f. 2 (1784). *Anomatheca verrucosa* (B.Vogel) Goldblatt: 442 (1971). Type: without precise locality, figure in Trew, Plantae Rariores 3: 8, t. 24, f. 2 (1784).

Gladiolus junceus L.f.: 94 (1782), illegitimate homonym, not *G. junceus* Burm.f. (1768) [= *Geissorhiza aspera* Goldblatt]. *Lapeirousia juncea* Ker Gawl.: t. 606 (1802). *Anomatheca juncea* (Ker Gawl.) Ker Gawl.: 227 (1804). *Peyrousia juncea* (Ker Gawl.) Poir.: 364 (1826). *Meristostigma junceum* (Ker Gawl.) Steud.: 130 (1841). *Freesia juncea* (Ker Gawl.) Klatt: 187 (1894). Type: [South Africa], without precise locality, *Thunberg s.n. LINN59.25* [as *Gladiolus falcatus*] (LINN, holo.).

Ixia emarginata Lam.: 342 (1789). Type: South Africa, without precise locality, Herb. Lamarck (P, holo.).

Gladiolus amabilis Salisb.: 41 (1796). Type: unknown.

Gladiolus pulchellus Salisb.: 39 (1796). Type: unknown.

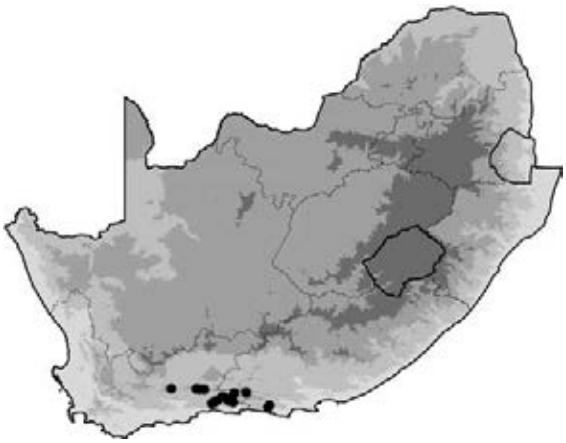
Gladiolus polystachyus Andrews: t. 66 (1799). *G. paniculatus* Pers.: 45 (1805), illegitimate superfluous name for *G. polystachyus* Andrews. Type: illustration in Andrews: t. 66 (1799).

Ixia elliptica Thunb.: 4 (1803). Type: [South Africa], without precise locality, *Thunberg s.n.* (UPS-THUNB 897, holo.).

Gladiolus excisus Jacq.: 46 (1804). Type: illustration in Jacq.: t. 491 (1804).

Ixia gawleri Schrad.: 67 (1810), illegitimate superfluous name for *Gladiolus amabilis* Salisb. [= *F. verrucosa* (B.Vogel) Goldblatt & J.C.Manning]. Type: illustration in Ker Gawl.: t. 606 (1802).

Plants 80–200 mm high. *Corm* conic, 10–15 mm diam., tunics of fine–medium-textured fibres. *Stem* suberect, smooth, usually branched. *Leaves* 7 to 10, suberect, usually ± ⅓ as long as stem, oblong, (15–)20–80 × 3–9 mm, obtuse-apiculate, margins sometimes slightly undulate, soft-textured with moderately thickened main vein. *Spike* slightly deflexed to horizontal, (4–)8- to 10(–15)-flowered; bracts obovate, soft-textured, herbaceous, 4.0–5.5 mm long, green below but soon becoming pale, flushed pinkish distally with reddish veins, inner slightly shorter. *Flowers* 25–30 mm long, bright pink, lower 3 or only median tepal with whitish or pale yellowish blotch at base outlined with dark pink, unscented or lightly scented; perianth tube subcylindric, 15–20 mm long, straight or slightly curved in upper 5 mm; tepals subequal or upper 3 slightly larger, spreading, elliptic to oblanceolate, 8–11 × 3–4 mm. *Filaments* arcuate, 6–7 mm long, inserted 4–5 mm within tube, shortly exserted; anthers ± 3 mm long. *Style* dividing opposite middle of anthers. *Capsules* short-oblong to subglobose, 6–7 × 6 mm, papillate. *Seeds* subglobose, 1.5–2.0 mm diam., smooth, glossy reddish brown. *Flowering time*: late August to October.



Distribution of ***Freesia verrucosa***.

Distribution and ecology: restricted to the Little Karoo and Long Kloof between Ladismith in Western Cape and Willowmore in Eastern Cape; in stony clay soils in open renosterveld shrubland and washes.

Diagnosis: recognised by the spreading or prostrate fan of short, obtuse leaves, and the declinate or horizontal spike of pink, ± salver-shaped flowers with slender tube 15–20 mm long and short bracts 4.0–5.5 mm long.

6. **Freesia corymbosa** *(Burm.f.) N.E.Br.* in Bulletin of Miscellaneous Information, Kew 1929: 132 (1929). *Gladiolus corymbosus* Burm.f.: 2 (1768). Type: South Africa, without precise locality (cultivated in Europe), *Burman s.n.* (G-Herb. Burman, holo.).

Freesia odorata Eckl. ex Klatt: 672 (1866), illegitimate superfluous name for *F. sparrmanii*. *F. refracta* var. *odorata* Baker: 167 (1892). Type: South Africa, [Eastern Cape], heights between the Bushmans and Kariega Rivers, *Ecklon & Zeyher Irid. 108* (GH, holo.; K, LD, MO, P, PRE, iso.).

Freesia aurea Hend. ex Gumbl.: 392 (1896). *F. corymbosa* var. *aurea* (Hend. ex Gumbl.) N.E.Br.: 16 (1935). Type: [South Africa], without locality or date, *Gumbleton s.n.* (K, holo.).

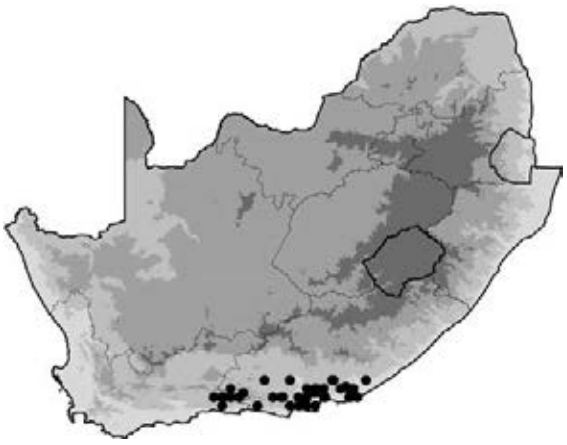
Freesia armstrongii W.Watson: 195 (1898). Type: South Africa, [Eastern Cape], Humansdorp Distr. (cultivated at Royal Botanic Gardens, Kew), *Armstrong s.n.* (K, holo.).

Freesia metelerkampiae L.Bolus: 337 (1927). Type: South Africa, without precise locality (cultivated in Cape Town), July–August 1927, *Metelerkamp s.n.* (BOL, holo.).

Freesia brevis N.E.Br.: 263 (1933), illegitimate superfluous name for *F. metelerkampiae* L.Bolus. Type: illustration in South African Gardening and Country Life 17: 336 (1927) (a figure of the type of *F. metelerkampiae* when alive).

[*Tritonia odorata* G.Lodd.: t. 1820 (1832), invalid name without description. *Waitzia odorata* G.Lodd. ex Heynh.: 854 (1841), invalid name without description.]

Plants (120–)150–400(–600) mm high. *Corm* conic or globose, 12–30 mm diam., tunics light brown, of medium-textured to coarse fibres, sometimes forming collar. *Stem* suberect, smooth, usually branched. *Leaves* 7 to 10, erect, usually ± half as long as stem, narrowly lanceolate, (40–)60–200 × 2–7(–10) mm, acute, rarely oblong-lanceolate and obtuse. *Spike* horizontal or deflexed, (3–)6- to 10-flowered; bracts oblong to oblanceolate, membranous becoming dry, 4–8 mm long, translucent or flushed pale pinkish, with brown veins and dark brown tips, obtuse or rarely apiculate, inner slightly shorter to slightly longer, with dark brown tips. *Flowers* 25–35(–40) mm long, usually pale to deep yellow, pale to deep pink, or rarely white, with base of tube, lowermost tepal and inner margins of lower lateral tepals bright yellow to orange, lower tepals with brownish midline running into tube, unscented or weakly scented; perianth tube funnel-shaped, 20–25(–35) mm long with basal tubular portion 5–10(–20) mm long and strongly curved at tip, widening abruptly into flared upper portion; tepals with dorsal largest, suberect, broadly ovate-cordate, 8–12 × 7–10 mm, upper laterals ovate, lower tepals recurved, lower laterals broadly ovate-cordate with margins strongly upcurved, 7–11 × 8–10 mm, lower median ovate, 7–10 × 4–8 mm. *Filaments* arcuate, 13–15 mm long, included; anthers 5–6 mm long. *Style* dividing at or slightly beyond anther apices. *Capsules* subglobose or oblong, 6–8 × 6–8 mm, papillate. *Seeds* globose with flattened chalaza, slightly wrinkled, glossy reddish brown, 2.0–3.5 mm diam. *Flowering time*: (May) late August to October.



Distribution of ***Freesia corymbosa***.

Distribution and ecology: fairly widespread in southern South Africa, from near Uniondale in Western Cape through the Long Kloof and adjacent valleys to Grahamstown, King William's Town and Butterworth in Eastern Cape; in loamy or sandy soils in rocky conglomerate, sandstone or shale, in open scrub or grassy fynbos.

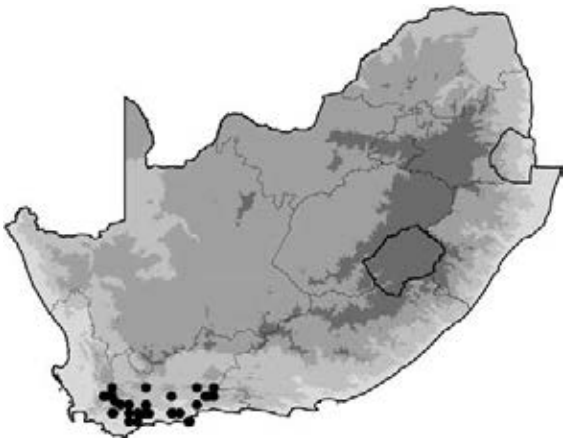
The flowers are typically pale yellow with a darker throat and lower tepals but are deep yellow around Port Elizabeth, and rose- or deep pink-flowered populations occur in the Long Kloof, near Haarlem, Joubertina and Zuurbron, and near Hankey. The lower part of the perianth tube is exceptionally long, 15–20 mm long, in plants from the southern foothills of the Zuurberg, near Enon.

Diagnosis: resembling both *Freesia refracta* and *F. occidentalis* in its bracts and flowers but distinguished by the usually obtuse bracts prominently tipped with dark brown for up to 0.5 mm, and often more brightly coloured flowers, mostly pale to deep yellow but also pink, or rarely white.

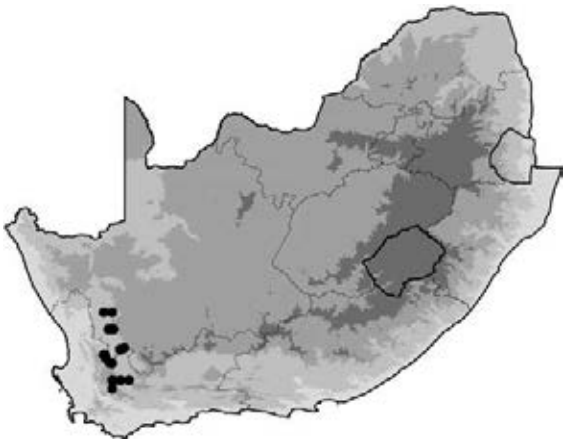
7. **Freesia refracta** *(Jacq.) Klatt* in Linnaea 34: 673 (1866). *Gladiolus refractus* Jacq.: t. 241 (1795). *Tritonia refracta* (Jacq.) Ker Gawl.: 228 (1804). *G. resupinatus* Pers.: 45 (1805), illegitimate superfluous name for *G. refractus* Jacq. *Waitzia refracta* (Jacq.) Heynh.: 855 (1841). *Montbretia refracta* (Jacq.) Endl. ex Heynh.: 418 (1847). *Nymanina refracta* (Jacq.) Kuntze: 701 (1891). Type: illustration in Jacq.: t. 241 (1795).

Freesia hurlingii L.Bolus: 112 (1933a). Type: South Africa, [Western Cape], Bonnievale, 23 August 1931, *Hurling & Neil s.n.* (BOL, lecto., designated by Goldblatt: 74 (1982); BOL, isolecto.).

Plants (80–)150–400(–600) mm high. *Corm* conic or ± globose, 12–30 mm diam., tunics light brown, of fine–medium-textured fibres, forming short neck. *Stem* suberect, smooth, usually branched. *Leaves* 7 to 10, usually erect, half as long to ± as long as stem, narrowly lanceolate-attenuate, (60–)100–300 × 2–7(–10) mm, acute, sometimes glaucous, rarely with prominent marginal vein. *Spike* horizontal or deflexed, (4)5- to 10(–12)-flowered; bracts oblong to oblanceolate, membranous becoming dry, translucent or flushed pale pinkish with brown veins, 4–8 mm long, obtuse to apiculate, inner slightly shorter to slightly longer. *Flowers* 25–35 mm long, pale greenish yellow or dull white, ± purplish on reverse and base of tube, lowermost tepal and inner margins of the lower lateral tepals bright orange, all



Distribution of ***Freesia refracta***.



Distribution of ***Freesia occidentalis***.

3 lower tepals with dark brownish midline, either unscented or strongly scented of rose and violet with spicy undertones; perianth tube funnel-shaped, 16–25 mm long with basal tubular portion 5–8(–9) mm long, widening abruptly into flared upper portion; tepals with dorsal largest, suberect, broadly ovate-cordate, 8–12 × 7–10 mm, upper laterals ovate, lower tepals recurved, laterals broadly ovate-cordate, margins strongly upcurved, 7–11× 8–10 mm, lower median ovate, 7–10 × 4–8 mm. *Filaments* arcuate, 10–14 mm long, included; anthers 5–6 mm long. *Style* dividing at or slightly beyond anther apices. *Capsules* subglobose or oblong, 6–10 × 6–8 mm, papillate. *Seeds* globose with flattened chalaza, 2.0–2.5 mm diam., lightly wrinkled, glossy reddish brown. *Flowering time*: mid-July to early September.

Distribution and ecology: relatively common in the southwestern Western Cape, South Africa, from Genadendal along the coast to Gouritz River Mouth and from the Hex River Valley and Breede River Valley through the Little Karoo to De Rust; in drier, stony soils in shrubland and coastal thicket.

Diagnosis: distinguished from *Freesia corymbosa* and *F. occidentalis*, which it resembles in its bracts and flowers, by its mostly dull yellowish or greenish perianth, uniformly pale bracts without brown tips, and leaves mostly as long as the stem.

8. **Freesia occidentalis** *L.Bolus* in South African Gardening and Country Life 23: 266 (1933c). Type: South Africa, [Western Cape], Nieuwefontein, precise locality not given, September 1932, *Compton 4723* (BOL, lecto., designated by Goldblatt: 77 (1982); K, isolecto.).

Freesia framesii L.Bolus: 245 (1934). Type: South Africa, [Northern Cape], Calvinia District (cultivated in Cape Town), September 1934, *Ross Frames ex Skaife BOL21366* (BOL, holo.).

Plants 80–300(–600) mm high. *Corm* conic, 15–20 mm diam., tunics light brown, of medium-textured to coarse fibres, forming collar. *Stem* suberect, smooth, usually branched. *Leaves* 7 to 10, erect or inclined, ± half as long to as long as stem, oblong to lanceolate, 40–120(–300) × (5–)7–18(–25) mm, obtuse to subacute, apiculate. *Spike* horizontal or deflexed, (3–)6- to 9-flowered; bracts oblanceolate to oblong, membranous becoming dry, translucent or flushed pale pink with brown veins and tips, 5–8 mm long, apiculate, inner slightly shorter to slightly longer, with brown tips. *Flowers* 30–35 mm long, white to yellow, sometimes flushed mauve or pink, base of tube sometimes bright orange, lowermost tepal and inner margins of lower lateral tepals bright yellow, all three lower tepals with dark brownish midline, strongly rosy violet-scented with peppery overtones; perianth tube funnel-shaped, 20–25 mm long with basal tubular portion 6–11 mm long and strongly curved at tip, widening abruptly into flared upper portion; tepals unequal, dorsal largest, suberect, broadly ovate-cordate, 8–12 × 7–10 mm, upper laterals ovate, lower tepals recurved, lower laterals broadly ovate-cordate with margins strongly upcurved, 7–11 × 8–10 mm, lower median ovate, 7–10 × 4–8 mm. *Filaments* arcuate, 13–15 mm long, included; anthers 5–6 mm long. *Style* dividing at or slightly beyond anther apices. *Capsules* subglobose or oblong, 6–10 × 6–8 mm, papillate. *Seeds* globose with flattened chalaza, 2.0–2.5 mm diam., lightly wrinkled, glossy reddish or purplish brown. *Flowering time*: August to September.

Distribution and ecology: restricted to the western edge of the Tanqua Karoo and nearby, from southwest of Calvinia in Northern Cape, South Africa, to Karoopoort and along the foot of the Bonteberg to Pieter Meintjies siding in Western Cape; in arid fynbos, transitional fynbos–renosterveld or succulent karoo, in loamy soils, in rocky alluvium, or shale outcrops, on south-trending slopes or drainage lines.

Diagnosis: distinguished from the similar *Freesia refracta* and *F. corymbosa* by its obtuse or subacute leaves, typically shorter than the flowering spike, flowers with rather blunt tepals, and brown-tipped bracts.

Subg. 2. **Viridibractea**

Subg. **Viridibractea** *(Goldblatt) J.C.Manning & Goldblatt* in Strelitzia 27: 50 (2010). *Freesia* sect. *Viridibractea* Goldblatt: 56 (1982). Type: *F. alba* (G.L.Mey.) Gumbl. = *F. leichtlinii* subsp. *alba* (G.L.Mey.) J.C.Manning & Goldblatt

Plants small to medium-sized. *Stem* either winged in section and smooth, or terete and puberulous, at least below. *Leaves* erect to prostrate, blades lanceolate to oblong, plane or undulate-crispulate, acute or obtuse. *Spike* inclined or horizontal; bracts firm-textured, herbaceous and green with narrow, translucent margin. *Flowers* either funnel-shaped and white or pale to deep yellow with dark yellow or orange markings on lower tepals, or ± tubular with tepals ± recurved and yellowish green or brownish. *Stamens* included or shortly exserted. *Seeds* subglobose or with inflated raphe, smooth or rugulose, reddish brown.

Species 8: South Africa.

Sect. 1. **Alatae** *J.C.Manning & Goldblatt* in Novon 15: 172 (2005). Type: *Freesia viridis* (Aiton) Goldblatt & J.C.Manning

Stem compressed and laterally winged. *Leaves* erect or suberect, falcate, acute to attenuate, plane or undulate-crispulate. *Flowers* green to brownish or maroon, scented or evidently unscented at night, tubular, tube sharply curved apically, tepals ± equally recurved, lanceolate. *Filaments* inserted near top of tube, included. Seeds subglobose, without inflated raphe. Pollen operculum 1-banded.

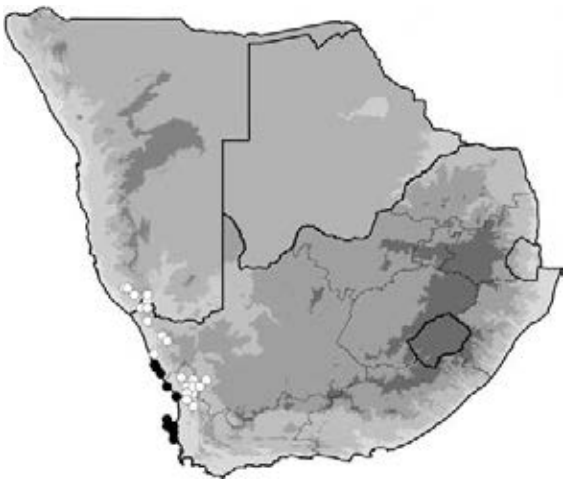
Species 1: West Coast and near interior Western and Northern Cape, South Africa.

9. **Freesia viridis** *(Aiton) Goldblatt & J.C.Manning* in Systematic Botany 20: 172 (1995). *Gladiolus viridis* Aiton: 481 (1789). *Tritonia viridis* (Aiton) Ker Gawl.: 231 (1804). *Waitzia viridis* (Aiton) Kreysig: 52 (1829). *Montbretia viridis* (Aiton) Voigt: 610 (1845). *Lapeirousia viridis* (Aiton) L.Bolus: 276 (1932). *Anomatheca viridis* (Aiton) Goldblatt: 443 (1971). Type: South Africa, [Western Cape], Swartland, without exact locality or date, *Masson s.n.* (BM, holo.).

Plants 100–300(–500) mm high. *Corm* conic, 10–30(–40) mm diam., tunics of fine-textured to coarse fibres, sometimes extending as collar. *Stem* erect, flattened and 2-winged, usually simple. *Leaves* 4 to 8, suberect or sometimes prostrate, half as long as to slightly longer than stem, narrowly lanceolate to oblong or falcate, (30–)50–150(–200) × 4–15(–25) mm, acute to attenuate, rarely obtuse-acuminate, margins plane or undulate to crisped, soft-textured or leathery with moderately thickened midrib. *Spike* deflexed, (3)4- to 10-flowered; bracts ovate, herbaceous and firm-textured, green, often flushed pinkish at tips, 5–10(–25) mm long, obtuse, inner slightly shorter. *Flowers* 20–40 mm long, yellowish green to olive-green or ± strongly flushed with brown or maroon, unscented or rose-scented at night; perianth tube subcylindric, expanding gradually from base to apex, 15–25 mm long, curved sharply downward in upper 5–7 mm with oblique mouth; tepals subequal with upper 3 slightly larger, recurved from base, lanceolate and obtuse to linear-lanceolate and attenuate, 6–15 × 1–2 mm. *Filaments* arcuate, 5–7 mm long, at bend in tube, included or very shortly exserted; anthers shortly protruding from tube, ± 3 mm long. *Style* dividing at base of anthers. *Capsules* oblong or subglobose, 3-lobed, 10–15 × 8–10 mm, rough or papillate when fresh. *Seeds* globose, 2.0–3.0 mm diam., wrinkled, glossy reddish brown. *Flowering time*: mid-May to mid-August (October).

Distribution and biology: widely scattered along the West Coast and near-interior winter rainfall region, from southern Namibia and the Richtersveld and Namaqualand of Northern Cape, South Africa, through the Olifants River Valley to Mamre north of Cape Town in Western Cape; mostly in coastal thicket and succulent Karroo shrubland, rarely in arid fynbos. The species is self-fertile and facultatively autogamous.

Diagnosis: a highly distinctive species with several vegetative and floral specialisations, notably the flattened and winged stems, the small, greenish or brown flowers



Distribution of ***Freesia viridis*** subsp. ***viridis***, ●; subsp. ***crispifolia***, ○.

with strongly curved perianth tube and included stamens, and the one-banded pollen operculum.

Key to subspecies

1a Leaves narrowly lanceolate to lanceolate, mostly 4–10 mm wide, plane; tepals (6–)10–18 mm long . . . . . 9a. subsp. *viridis*
1b Leaves lanceolate to falcate, up to 25 mm wide, margins ± crispulate or undulate; tepals 6–10 mm long. . . . . 9b. subsp. *crispifolia*

9a. subsp. **viridis**

Leaves narrowly lanceolate to lanceolate, (2–)4–10(–15) mm wide, plane. *Flowers* yellowish green, or green flushed with dark purple; tepals oblong-lanceolate to narrowly lanceolate and attenuate, (6–)10–18 mm long.

Distribution and ecology: essentially coastal, from Yzerfontein to south of the Olifants River Mouth in Western Cape but occurring in isolated populations in Namaqualand at Brand-se-Baai, Groen River Mouth and near Hondeklip Bay in Northern Cape; in pockets of loam or rock cracks in coastal thicket.

9b. subsp. **crispifolia** *(Goldblatt) J.C.Manning & Goldblatt* in Strelitzia 27: 55 (2010). *Anomatheca viridis* subsp. *crispifolia* Goldblatt: 87 (1972). Type: South Africa, [Western Cape], Clanwilliam, July 1894, *Leipoldt 161* (BOL, holo.; NBG, PRE, iso.).

Leaves oblong-lanceolate to falcate, 5–10(–25) mm wide, margins weakly undulate to crisped. *Flowers* dull green or brownish to maroon; tepals oblong-lanceolate to lanceolate, 6–10 mm long.

Distribution and ecology: distributed along the near interior of the West Coast from Clanwilliam in Western Cape, through the Knersvlakte and central Namaqualand in Northern Cape as far north as the Auros Mountains in southern Namibia; on a wide variety of substrates from near the coast to just over 100 km inland, often in crevices in rock outcrops.

Populations from the Richtersveld and southern Namibia in the extreme north of the range are characterised by short, ± inclined leaves with weakly undulate margins.

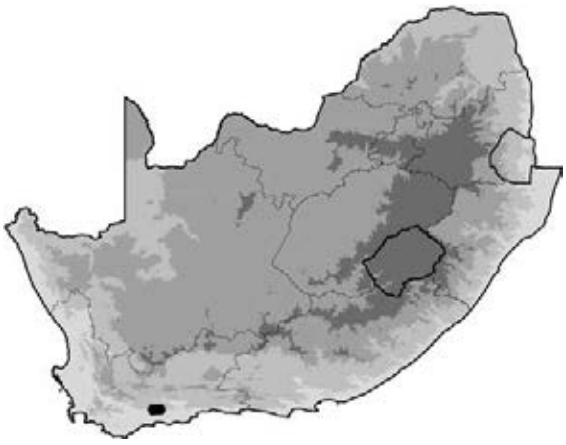
Sect. 2. **Viridibractea** *Goldblatt* in Journal of South African Botany 48: 56 (1982). Type: *Freesia alba* (G.L.Mey.) Gumbl. = *F. leichtlinii* subsp. *alba* (G.L.Mey.) J.C.Manning & Goldblatt

Stem terete, sparsely to densely papillate. *Leaves* erect, inclined or prostrate, acute or obtuse. *Flowers* funnel-shaped with upper tepal largest and erect, white or pale to deep yellow with dark yellow or orange markings on lower tepals. *Filaments* inserted at base of widened upper portion, included. *Seeds* obliquely subglobose, with inflated raphe.

Species 7: southwestern and south-coastal Western and Eastern Cape.

10. **Freesia sparrmanii** *(Thunb.) N.E.Br.* in Flowering Plants of South Africa 1: t. 11 (1921). *Gladiolus sparrmanii* [as *sparrmannii*] Thunb.: 191 (1814). *Ixia sparrmanii* (Thunb.) Roem. & Schult.: 285 (1822). *Meristostigma sparrmanii* (Thunb.) Steud.: 130 (1841). Type: South Africa, [Western Cape], exact locality unknown but probably at or near Grootvadersbosch, September–October 1775, *Sparrman s.n.* (S, lecto., designated by Goldblatt: 63 (1982); S, isolecto.).

Plants (100–)150–250 mm high. *Corm* conical, 10–25 mm diam., tunics pale, of fine-textured fibres. *Stem* erect or flexed outward above uppermost sheath and then suberect, minutely papillate in lower half, usually branched. *Leaves* 5 to 9, erect, ± as long as the stem, linear to narrowly lanceolate, tapering above, 70–200 × (2–)3–8(–9) mm, acute. *Spike* deflexed, (3–)5- to 8(–11)-flowered; bracts obovate, herbaceous and firm-textured, green with hyaline margins, flushed purple apically, (3–)4–6(–7) mm long, inner slightly shorter. *Flowers* (30–)35–40 mm long, white, flushed dull purple on reverse of tepals, base of lower median tepal with oblong yellow-orange mark in midline, unscented; perianth tube narrowly funnel-shaped, 20–27 mm long with basal narrow part 12–15 mm long, expanded into wider, flared upper portion; tepals unequal, dorsal largest and suberect, ovate, 10–11 × ± 7 mm, upper laterals slightly narrower, lower tepals recurved, narrowly ovate, 7–8(–10) × 4–5 mm. *Filaments* arcuate, 10–14 mm long, included; anthers 4.0–4.5 mm long. *Style* dividing ± 2 mm beyond anther apices. *Capsules* oblong or subglobose,



Distribution of ***Freesia sparrmanii*** .

10–12 × 8–10 mm, papillate. *Seeds* obliquely subglobose with inflated chalaza and raphe, 2.0–2.5 mm diam., smooth, glossy reddish brown. *Flowering time*: late September to late October.

Distribution and ecology: a local endemic along the southern foothills of the Langeberg between Suurbraak and Grootvadersbosch in Western Cape, South Africa; forest margins and clearings on the forest floor.

Diagnosis: distinguished from other gullet-flowered species by its slender, white flowers with narrow tepals up to 5 mm wide and narrowly funnel-shaped tube with the slender, lower portion 12–15 mm long and ± as long as or slightly longer than the upper part.

11. **Freesia fucata** *J.C.Manning & Goldblatt* in Bothalia 31: 189 (2001). Type: South Africa, Western Cape, Villiersdorp District, 5.5 km along Doornrivier Road, Farm Die Hoek, 10 July 2000, *Manning 2271* (NBG, holo.).

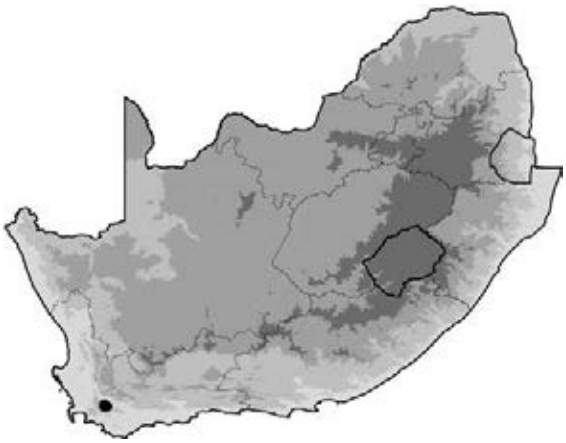
Plants 150–300 mm high. *Corm* conic, 15–20 mm diam., tunics pale, of medium-textured fibres, accumulating with age and forming collar. *Stem* flexed outward above uppermost sheath and then suberect, minutely papillate, usually 1- or 2-branched. *Leaves* 5 or 6, inclined to suberect, usually ± as long as stem, linear-lanceolate, 80–250 × 4–5 mm, tapering above, acute. *Spike* lightly deflexed, 4- to 9-flowered; bracts obovate, herbaceous and firm-textured, green with hyaline margins, 6–10(–13) mm long, tricuspidate, inner slightly shorter. *Flowers* (30–)35–47 mm long, white flushed dull purple on reverse of tepals, base of lower tepals marked yellow-orange with dark midline, strongly violet-scented; perianth tube funnel-shaped, 20–30 mm long with tubular lower portion 6–7 mm long, widening ± abruptly into flared upper portion; tepals unequal, dorsal largest, suberect, ovate, 11–18 × 8–11 mm, upper laterals oblong, lower tepals recurved, lower laterals narrowly ovate, 10–14 × 6–8 mm, lower median oblong, 10–16 × 5–6 mm. *Filaments* arcuate, 13–15 mm long, included; anthers 7–8 mm long. *Style* dividing at or slightly beyond anther apices. *Capsules* oblong, (6–)9–12 × (6–)7–10 mm, papillate. *Seeds* obliquely subglobose with inflated chalaza and raphe, 2.5–3.0 mm diam., wrinkled, glossy reddish brown. *Flowering time*: July.

Distribution and biology: a local endemic of the Hoeksrivier Valley north of Villiersdorp in Western Cape, South Africa; in clay soils in open renosterbos shrubland or stony washes.

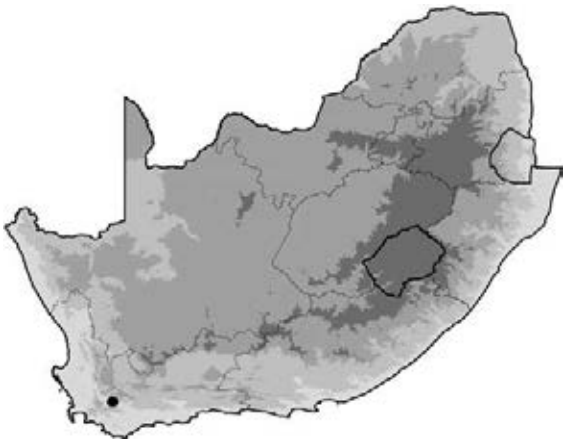
Diagnosis: distinguished from other early-flowering species of sect. *Viridibractea* by its narrow, glaucous, almost grass-like leaves, 4–5 mm wide, and 3-toothed bracts.

12. **Freesia marginata** *J.C.Manning & Goldblatt* in Novon 15: 168 (2005). Type: South Africa, Western Cape, between Worcester and Robertson, 25 May 2002, *Manning 2734* (NBG, holo.).

Plants 40–100 mm high, usually ± prostrate. *Corm* conic, 15–20 mm diam., tunics of pale, medium-textured fibres, accumulating with age and forming long collar. *Stem* flexed outward above uppermost leaf sheath and then prostrate or horizontal, densely puberulous, usually simple. *Leaves* (4)5 or 6(7), prostrate or rarely erect, slightly shorter than to half as long as stem, oblong to lanceolate, 20–50(60) × 6–15 mm, acute, leathery and ± glaucous, with prominent submarginal vein. *Spike* declinate, 4- to 10-flowered; bracts obovate, herbaceous and firm-textured, green with hyaline margins, 5–7 mm long, tricuspidate or upper bracts obtuse with prominent central cusp tipped rusty brown, inner slightly longer. *Flowers* (30–)33–37 mm long, white usually lightly flushed purple on reverse of tepals, base of lower tepals marked yellow-orange and usually with dark midline, strongly violet-scented; perianth tube funnel-shaped, 18–25 mm long, with tubular basal portion 6–10 mm long, widening ± abruptly into flared upper portion; tepals unequal, dorsal largest, erect, obovate, 12–15 × 7–8 mm, upper laterals oblong-lanceolate, lower tepals recurved, oblong-lanceolate, 11–13 × 4.0–5.5 mm. *Filaments* arcuate, 15–17 mm long, included;



Distribution of ***Freesia fucata***.



Distribution of ***Freesia marginata***.

anthers 5.0–5.5 mm long. *Style* dividing below or opposite anther apices. *Capsules* oblong or subglobose, (5–)6–10 × 5–10 mm, minutely papillate when fresh. *Seeds* obliquely subglobose with slightly to moderately inflated chalaza and raphe, 2.0–3.0 mm diam., slightly wrinkled, glossy reddish or purplish brown. *Flowering time*: late May to early June.

Distribution and ecology: a highly local endemic of the Breede River Valley in Western Cape, South Africa, between Worcester and Robertson; in gravelly or stony washes in decaying sandstone in open succulent karoo shrubland.

Diagnosis: resembling *Freesia caryophyllacea* in its prostrate, ± obtuse leaves and early flowering but distinguished by the ± glaucous leaves with inconspicuous main vein but prominent submarginal vein, clearly visible in both fresh and dried leaves as a translucent line ± 0.5 mm in from the leaf margin.

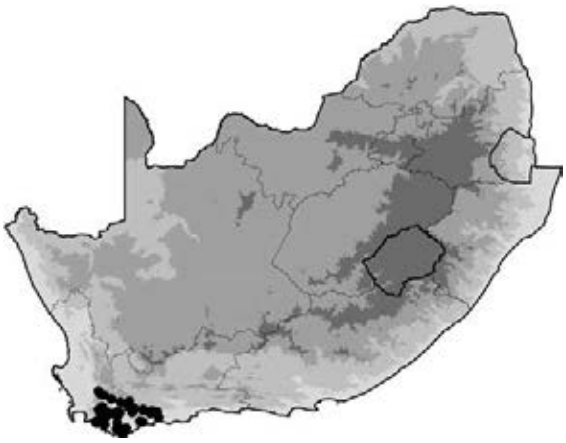
13. **Freesia caryophyllacea** *(Burm.f.) N.E.Br.* in Bulletin of Miscellaneous Information, Kew 1929: 134 (1929). *Ixia caryophyllacea* Burm.f.: 1 (1768). *Antholyza caryophyllacea* (Burm.f.) Roem & Schult.: 448 (1817). *Anisanthus caryophyllaceus* (Burm.f.) Klatt: 344 (1882). Type: South Africa, without locality (cult.), *Burman s.n.* (G, holo.).

Gladiolus xanthospilus DC. in Redouté 3: t. 124 (1805). *Freesia xanthospila* (DC.) Klatt: 673 (1866). *Tritonia xanthospila* (DC.) Ker Gawl. ex Spreng.: 154 (1824). *Waitzia xanthospila* (DC.) Heynh.: 855 (1841). *Montbretia xanthospila* (DC.) Heynh.: 418 (1847). Type: South Africa, without precise locality, cultivated in France, illustration in Redouté: t. 124 (1805).

Freesia parva N.E.Br.: 9 (1935). Type: South Africa, [Western Cape], near Elim, 24 Apr. 1896, *R. Schlechter 7727* (K, lecto., designated by Goldblatt: 65 (1982); BOL, isolecto.).

Freesia elimensis L.Bolus: 168 (1933b). Type: South Africa, [Western Cape], 8 miles [13 km] from Bredasdorp on Elim road, 22 April 1933, *W.F. Barker & L. Bolus NBG697/33* (BOL, holo.; BOL, iso.).

Plants 30–100 mm high, usually ± prostrate. *Corm* conic, 10–15 mm diam., tunics of pale, medium-textured fibres, sometimes accumulating with age and forming long collar. *Stem* flexed outward above uppermost leaf sheath and then prostrate or horizontal, rarely suberect, densely puberulous, usually simple. *Leaves* 5 to 7(–9), prostrate or rarely erect, usually slightly shorter than stem, oblong to lanceolate, (20–)30–100(–120) × 6–15(–20) mm, subacute or obtuse, thin-textured or leathery. *Spike* declinate, 3- to 10-flowered; bracts obovate, herbaceous and firm-textured, green with hyaline margins, 5–8 mm long, inner slightly shorter. *Flowers* 30–40(–60) mm long, white flushed purple on reverse of tepals, base of lower tepals marked yellow-orange and usually



Distribution of ***Freesia caryophyllacea***.

with dark midline, unscented or violet-scented; perianth tube funnel-shaped, 20–30 mm long with basal tubular portion 5–8(–12) mm long, widening ± abruptly into flared upper portion; tepals with dorsal largest, erect, elliptical to obovate, 17–25(–30) × 8–12 mm, upper laterals oblong-lanceolate, lower tepals recurved, oblong-lanceolate, 14–20 × 6–8 mm. *Filaments* arcuate, 13–20 mm long, included or slightly exserted; anthers 4–6 mm long. *Style* dividing at or just beyond anther apices. *Capsules* oblong or subglobose, 8–10 × ± 10 mm, papillate. *Seeds* obliquely globose with inflated chalaza and raphe, 2.0–3.0 mm diam., wrinkled, glossy reddish brown. *Flowering time*: mid-April to early June.

Distribution and ecology: relatively common in the lowlands of southwestern Western Cape, South Africa, from Wolseley through the Breede River Valley to Heidelberg in the east, and from the foothills of the Riviersonderend Mtns near Greyton, through Caledon and Napier to Bredasdorp, with a westerly extension along the coast to Hermanus and outlying populations near Grabouw; typically in gravelly clay soils in renosterveld shrubland although also in sandy loam in fynbos or coastal scrub.

Diagnosis: mostly readily recognised by its relatively short, blunt or subacute leaves, often borne in a prostrate fan, and by its ± horizontal inflorescence, typically with rather large bracts. The white flowers are flushed with purple and marked on some or all of the lower tepals with golden-yellow blotches that turn brown as the flowers age, and appear in late autumn or winter, from April to June, rarely into July.

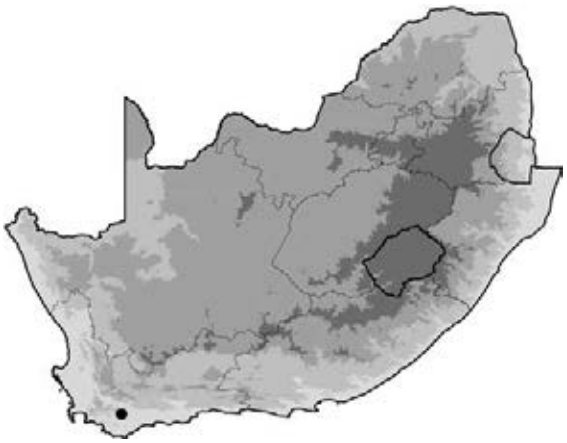
Forms with narrower, suberect leaves and flowers with just the median lower tepal marked with yellow occur on coastal limestones around Bredasdorp and may represent introgression with *Freesia leichtlinii* subsp. *leichtlinii*. Similar plants from coastal outcrops at Onrus and Hermanus have been treated in *F. leichtlinii* subsp. *alba* but they lack the characteristic axillary cormlets of that species. Individuals in these populations with very narrow leaves approach *F. praecox* but tend to have fewer leaves than that species.

14. **Freesia praecox** *J.C.Manning & Goldblatt* in Strelitzia 27: 65 (2010). Type: South Africa, Western Cape, Riviersonderend, hill north of town, 15 June 2004, *J.C.Manning 2921* (NBG, holo.; K, MO, PRE, iso.).

Plants 60–300 mm high. *Corm* conic, 10–20 mm diam., tunics pale, of medium-textured fibres, accumulating with age but not forming collar. *Stem* flexed outward above uppermost sheath and then suberect, minutely puberulous, usually simple. *Leaves* 6 to 9(–11), prostrate or suberect, usually slightly longer than stem, narrowly lanceolate, 50–200(–250) × 4–10(–14) mm, tapering-attenuate. *Spike* lightly flexed to horizontal, 3- to 8-flowered; bracts obovate, herbaceous, green with hyaline margins, 5–10(–12) mm long, acute or lower weakly tridentate, inner slightly shorter. *Flowers* (30–)35–45 mm long, white, usually flushed dull purple on reverse of tepals, base of lower median tepal (rarely lower laterals also) marked yellow-orange, lower tepals, especially laterals, with purple or mauve veins in basal half, strongly violet-scented; perianth tube (15–)20–30 mm long with basal narrow part 5–9 mm long, widening abruptly into wider, flared upper portion; tepals with dorsal largest, suberect, oblong-elliptic, 13–22 × 6–10 mm, upper laterals slightly narrower, oblong, lower tepals recurved, lower laterals oblong-elliptic, 15–20 × 6–8 mm, lower median oblong, 12–20 × 5–7 mm. *Filaments* arcuate, 15–20 mm long, included; anthers 4–6 mm long. *Style* dividing at or slightly beyond anther apices. *Capsules* ovoid, 11–12 × 8–9 mm, papillate-verrucose. *Seeds* obliquely globose with inflated chalaza and raphe, 2.0–3.0 mm diam., finely wrinkled, glossy reddish brown. *Flowering time*: mid-June to mid-July.

Distribution and ecology: a highly localised endemic from the lower end of Olifantskloof and surrounding hills at Riviersonderend in Western Cape, South Africa; in loamy soils in cracks in sandstone outcrops.

Diagnosis: a poorly defined species resembling *Freesia leichtlinii* subsp. *alba* in its finely fibrous corm tunics, numerous, relatively narrow, tapered leaves, and flowers with usually just the lower median tepal marked with yellow but lacking the axillary cormlets diagnostic of that species, and flowering several months earlier, in June and July rather than August and September.



Distribution of ***Freesia praecox***.

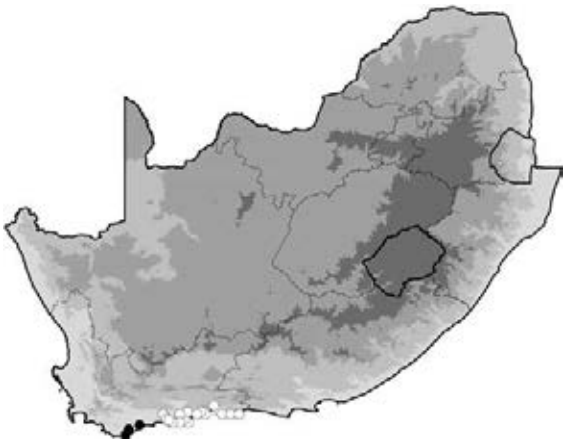
Freesia praecox is most likely to be confused with narrow-leafed forms of *F. caryophyllacea* but tends to have more numerous leaves, usually 6 to 9 and up to 11, with gradually tapering, narrowly lanceolate-attenuate blades that are distinctly longer than the flowering stem.

15. **Freesia leichtlinii** *Klatt* in Regel, Gartenflora 23: 289 (1874). *Nymanina leichtlinii* (Klatt) Kuntze: 701 (1891). *F. xanthospila* var. *leichtlinii* (Klatt) N.E.Br.: 22 (1935). Type: illustration in Regel: t. 808 (1874).

Plants 60–250 mm high (rarely up to 500 mm under bushes). *Corm* conic, 10–15(–20) mm diam., sometimes deeply buried, tunics pale, of fine–medium-textured fibres. *Stem* erect or flexed upward above uppermost sheath and then suberect, minutely papillate, at least toward base, usually simple, producing cormlets in lower, subterranean leaf axils and later at base of corm. *Leaves* 5 to 9, inclined to suberect or rarely prostrate, less than half as long to ± as long as stem, narrowly lanceolate to linear-lanceolate, 40–140(–300) × (3–)6–12 mm, acute. *Spike* deflexed or horizontal, (2–)4- to 9-flowered; bracts obovate, herbaceous and firm-textured, green with hyaline margins, 4–7(–12) mm long, inner slightly shorter. *Flowers* (25–)30–45 mm long, white to cream-coloured or pale yellow, usually ± flushed dull purple on reverse of tepals, base of all 3 lower tepals or only lower median tepal marked yellow to orange, strongly violet-scented; perianth tube funnel-shaped, (15–)20–25(–40) mm long with basal tubular portion (5–)6–9(–20) mm long, widening ± abruptly into flared upper portion; tepals subequal or unequal with dorsal largest, suberect, ovate, 13–18 × 8–14 mm, upper laterals slightly narrower, lower tepals recurved, 12–14 × 6–12 mm. *Filaments* arcuate, (12–)15–18(–22) mm long, included; anthers 6–9 mm long. *Style* dividing at or slightly beyond anther apices. *Capsules* oblong, 10–12 × 8–10 mm, papillate or rugulose. *Seeds* obliquely subglobose with inflated chalaza and raphe, 2.5–3.0 mm diam., wrinkled or smooth, glossy reddish brown. *Flowering time*: August to October.

Distribution and ecology: distributed along the South Coast of South Africa, from Agulhas in Western Cape to Plettenberg Bay in Eastern Cape; in lime-enriched sands or calcareous loam in bush, thicket or restioid fynbos. Naturalised in the winter-rainfall parts of Australia and north of Nice in France.

Diagnosis: distinguished by its deeply buried corms with finely fibrous corm tunics and suberect leaves with the lower always bearing cormlets in their axils along the subterranean portion of the stem. The white to pale



Distribution of ***Freesia leichtlinii*** subsp. ***leichtlinii***, ●; subsp. ***alba***, ○.

yellow flowers are produced in spring, mainly between August and late September.

Key to subspecies

1a Flowers pale yellow or creamy white, lightly flushed purple outside, with base of lower 3 tepals marked deep yellow to orange; perianth tube (15–)20–25 mm long with basal narrow part 5–9 mm long; plants from Agulhas to St Sebastian Bay . . . . . 15a. subsp. *leichtlinii*

1b Flowers uniformly white, or white to creamy white flushed purple outside, usually with base of only lower median tepal marked yellow to orange; perianth tube (15–)20–40 mm long with basal narrow part 5–20 mm long; plants from Still Bay to Plettenberg Bay. . . . . 15b. subsp. *alba*

15a. subsp. **leichtlinii**

Freesia muirii N.E.Br.: 467 (1932). Type: South Africa, [Western Cape], Mossel Bay Division, without exact locality or date, *F. Muir 4849* (K, syn.), *4849A* (K, PRE, syn.).

Freesia gentilis N.E.Br.: 20 (1935). Type: South Africa, cultivated at Botanical Gardens, Cape Town, from corms said to have been collected by G. Alston at Vanwyksvlei, *SAM20966* (SAM, holo.).

Plants mostly 100–200 mm high. *Leaves* usually prostrate or inclined and ± half as long as flowering stem. *Flowers* cream-coloured to pale yellow, usually lightly flushed dull purple on reverse of tepals, base of lower 3 tepals marked deep yellow to orange; perianth tube (15–)20–25 mm long with basal narrow part (5–)6–9 mm long; tepals unequal, dorsal largest, 13–18 × 8–14 mm, lower tepals 12–14 × 8–12 mm. *Seeds* wrinkled. *Flowering time*: August to September.

Distribution and ecology: from Agulhas to St Sebastian Bay in Western Cape; in sandy or calcareous loam in open scrub or coastal thicket.

15b. subsp. **alba** *(G.L.Mey.) J.C.Manning & Goldblatt* in Strelitzia 27: 70 (2010). *Freesia refracta* var. *alba* G.L.Mey: 37 (1881). *F. alba* (G.L.Mey.) Gumbl.: 392 (1896). *F. sparrmanii* [as *sparrmannii*] var. *alba.* (G.L.Mey.) N.E.Br.: t. 11 (1921). Type: illustration in Zeitschrift des Schweizerischen Gartenbauvereins 1, t. 3 (Meyer 1881).

Freesia middlemostii W.F.Barker: 112 (1933). Type: South Africa, [Western Cape], Bredasdorp, Aug. 1932, *A.J. Middlemost s.n.* (BOL, holo.).

Freesia picta N.E.Br.: 21 (1935). Type: South Africa, [Western Cape], Beaufort West [?Cult.], August 1933, *Black s.n. NBG1558/13* (BOL, holo.).

[*Freesia lactea* Fenzl ex N.E.Br. [as Fenzl ex Klatt]: 23 (1935), invalid name without description.]

Plants mostly 200–500 mm high. *Leaves* usually inclined or suberect and ± as long as flowering stem. *Flowers* white to cream-coloured and flushed dull purple on reverse of tepals, or pure white, usually only lower median tepal marked with yellow to orange; perianth tube (15–)20–40 mm long, basal narrow part 5–20 mm long; tepals subequal or unequal then dorsal largest, 13–18 × 8–12 mm, lower tepals 12–14 × 6–10 mm. *Seeds* smooth or slightly wrinkled. *Flowering time*: late July to early October.

Distribution and ecology: from west of Still Bay in Western Cape to Plettenberg Bay in Eastern Cape; in coarse sandy or calcareous soils, often in crevices in rocky outcrops, or in light shade along the margins of coastal scrub or forest patches.

The finest form of the species, with large, pure white flowers 50 mm long with subequal tepals and the lower part of the perianth tube 15–20 mm long, occurs on the Robberg Peninsula at Plettenberg Bay and is the form associated with the species in cultivation. The original freesia of horticulture, subsp. *alba* was hybridised in the late 19th Century with *F. corymbosa* to produce the more robust and larger flowered strains available today in the horticultural trade. In early literature, *F. leichtlinii* and especially subsp. *alba* was misidentified as *F. refracta*, which was never used in the breeding of *Freesia* cultivars.

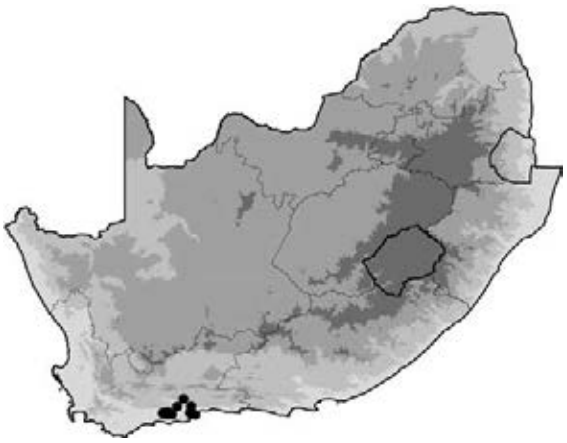
16. **Freesia fergusoniae** *L.Bolus* in South African Gardening and Country Life 17: 337 (1927). Type: South Africa, [Western Cape], Riversdale, Aug. 1926, *Ferguson s.n.* (BOL, holo.).

Plants 60–200(–300) mm high. *Corm* conic, 15–20 mm diam., tunics of pale, coarse-textured fibres, accumulating. *Stem* erect or flexed upward above uppermost sheath and then suberect, minutely papillate at least toward base, usually simple. *Leaves* (5–)7–13, prostrate to inclined, oblong to lanceolate, usually < half as long as stem, 40–140(–200) × 6–16 mm, obtuse to subacute. *Spike* deflexed or horizontal, (2–)4 to 8(–12)-flowered; bracts obovate, firm-textured, green with hyaline margins, 4–7(–10) mm long, inner slightly shorter. *Flowers* (25–)30–45 mm long, pale yellow to cream-coloured

(± white), ± flushed dull purple on reverse of tepals, base of lower tepals marked orange, strongly violet-scented; perianth tube funnel-shaped, (15–)20–25 mm long with basal tubular portion 5–9 mm long, widening ± abruptly into flared upper portion; tepals unequal, dorsal largest, suberect, ovate, 13–18 × 8–14 mm, upper laterals slightly narrower, lower tepals recurved, 12–14 × 8–12 mm. *Filaments* arcuate, 14–20 mm long, included; anthers 6–8 mm long. *Style* dividing at or slightly beyond anther apices. *Capsules* oblong, 10–12 × 8–10 mm, papillate. *Seeds* obliquely subglobose with inflated chalaza and raphe, 2.5–3.0 mm diam., wrinkled, glossy reddish brown. *Flowering time*: July to August.

Distribution and ecology: locally common along the southern foothills of the Langeberg between Heidelberg and Riversdale in Western Cape, South Africa, extending inland along the Gourits River to the Rooiberg and the northern end of Robinson's Pass; in clay soils in renosterveld, flowering best in cleared or burned sites.

Diagnosis: usually readily recognised by the fragrant, pale yellow flowers with prominent orange markings on the lower tepals. The spikes are held well above the leaves, which are typically prostrate and obtuse but in some populations may be suberect and acute. Erect-leaved plants of *Freesia fergusoniae* are most likely to be confused with yellow-flowered *F. leichtlinii* subsp. *leichtlinii*, but that species is restricted to coastal sands or sandy loam and has deeply buried corms with fine to medium-textured tunics, and produces axillary cormlets along the subterranean portion of the stem.



Distribution of ***Freesia fergusoniae***.

Populations from Soetmelksrivier, southeast of Riversdale with cream-coloured or white flowers and a prostrate flower spike are easily confused with *Freesia caryophyllacea*, but the more numerous leaves (9 to 12 vs. 5 to 7) and later flowering (mid- to late July) are consistent with *F. fergusoniae*.

UNCERTAIN SPECIES

[*Freesia curvifolia* Klatt in Th.Durand & H.Schinz, Conspectus florae africae 5: 187 (1894), invalid name without description and identity unknown.]

Freesia herbertii Klatt ex N.E.Br. in Journal of South African Botany 1: 14 (1935). Type: locality and collector unknown, cultivated specimen (B, holo.). Probably a species of sect. *Viridibractea* but otherwise unknown. Brown (1935) took the name from *Sparaxis herbertii,* a name without nomenclatural status that was listed in the synonymy of *F. xanthospila* by Klatt: 673 (1866), regarded as a synonym of *F. caryophyllacea*.

REFERENCES

AITON, W.T. 1789. *Hortus kewensis*. George Nicol, London.

ANDREWS, H.C. 1799. *Gladiolus polystachyus. The Botanist's Repository* 1: t. 66.

BAKER, J.G. 1876. New Gladioleae. *Journal of Botany, British and foreign* 14: 333–339.

BAKER, J.G. 1887. *Lapeirousia grandiflora. Curtis's Botanical Magazine* 113: t. 6924.

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell, London.

BAKER, J.G. 1901. Beiträge zur Kenntnis der Afrikanischen Flora. Iridaceae. *Bulletin de l'Herbier Boissier*, sér. 2, 1: 862–868.

BARKER, W.F. 1933. *Freesia middlemostii.* In L. Bolus, Plants—new or noteworthy, *South African Gardening and Country Life* 23: 111–112.

BOLUS, L. 1927. Plants—new and noteworthy. *South African Gardening and Country Life* 17: 336–337.

BOLUS, L. 1929a. Plants—new and noteworthy. *South African Gardening and Country Life* 19: 385.

BOLUS, L. 1929b. *Novitates africanae*. *Journal of Botany, British and foreign* 67:132–139.

BOLUS, L. 1932. Plants—new or noteworthy. *South African Gardening and Country Life* 22: 275–276.

BOLUS, L. 1933a. Plants—new or noteworthy. *South African Gardening and Country Life* 23: 111–112.

BOLUS, L. 1933b. Plants—new or noteworthy. *South African Gardening and Country Life* 23: 167–168.

BOLUS, L. 1933c. Plants—new or noteworthy. *South African Gardening and Country Life* 23: 255, 266.

BOLUS, L. 1934. Plants—new or noteworthy. *South African Gardening and Country Life* 24: 243, 245.

BROWN, N.E. 1921. *Freesia sparrmannii* var. *flava*. In E.P. Phillips, *Flowering Plants of South Africa* 1: t. 11.

BROWN, N.E. 1928. The South African Iridaceae of Thunberg's Herbarium. *Journal of the Linnean Society, Botany* 48: 15–55.

BROWN, N.E. 1929. The Iridaceae of Burmann's Florae capensis prodromus. *Bulletin of Miscellaneous Information, Kew* 1929: 129–139.

BROWN, N.E. 1932. Plants new or noteworthy: new Iridaceae. *Gardeners' Chronicle*, ser. 3, 92: 466–468.
BROWN, N.E. 1933. A criticism upon South African Iridaceae. *South African Gardening and Country Life* 23: 262, 263.
BROWN, N.E. 1935. *Freesia* Klatt and its history. *Journal of South African Botany* 1: 1–31.
BURMAN, N.L. 1768. *Prodromus florae capensis*. Cornelius Haak, Leiden.
DIETRICH, A.G. 1832. *Species plantarum* 2: 1–747. Nauck, Berlin.
DURAND, T. & SCHINZ, H. 1894 ['1895']. *Conspectus florae africae*, vol. 5. Jardin botanique de l'Etat, Bruxelles etc.
GOLDBLATT, P. 1971. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460.
GOLDBLATT, P. 1972. A revision of the genera *Lapeirousia* Pourret and *Anomatheca* Ker in the winter rainfall region of South Africa. *Contributions from the Bolus Herbarium* 4: 1–111.
GOLDBLATT, P. 1980. Proposal for the conservation of *Freesia* Klatt (Iridaceae). *Taxon* 29: 331, 332.
GOLDBLATT, P. 1982. Systematics of *Freesia* Klatt (Iridaceae). *Journal of South African Botany* 48: 39–91.
GOLDBLATT, P. 1990. Systematics of *Lapeirousia* (Iridaceae–Ixioideae) in tropical Africa. *Annals of the Missouri Botanical Garden* 77: 430–484.
GOLDBLATT, P. 1993. Iridaceae. In G.V. Pope (ed). *Flora zambesiaca* 12: 1–106. Flora Zambesiaca Managing Committee, London.
GOLDBLATT, P. & HUTCHINGS, A. 1993. *Anomatheca laxa* subsp. *azurea* subsp. nov. (Iridaceae) from coastal southern Mozambique and Natal, South Africa. *Novon* 3: 145–147.
GOLDBLATT, P. & MANNING, J.C. 1993. Proposal to amend conserved *Freesia* by rejecting *Anomatheca* (Iridaceae). *Taxon* 42: 891, 892.
GOLDBLATT, P. & MANNING, J.C. 1995. Phylogeny of the African genera *Anomatheca* and *Freesia* (Iridaceae–Ixioideae), and a new genus *Xenoscapa*. *Systematic Botany* 20: 161–178.
GUMBLETON, W.E. 1896. Some fine *Freesias* and others. *Gardeners' Chronicle*, ser. 3, 19: 392.
HARMS, H. 1901. Iridaceae. *Botanische Jahrbücher für Systematik* 28: 364–366.
HEYNHOLD, G. 1841. *Nomenclator botanicus hortensis*, vol. 2. Dresden & Leipzig.
HEYNHOLD, G. 1847 ['1846']. *Alphabetische und synonymische Aufzählung der Gewächse*. Dresden & Leipzig.
JACQUIN, J.F. 1836. Lapeyrouzie à grandes fleurs. *Annales de flora et de Pomone* 4: 120, 121.
JACQUIN, N.J. 1795. *Icones plantarum rariorum*, vol. 2. C.F. Wappler, Vienna.
JACQUIN, N.J. 1804. *Plantarum rariorum horti caesarei schoenbrunnensis*, vol. 4. C.F. Wappler, Vienna.
KER GAWLER, J.B. 1802. *Lapeirousia juncea*. *Curtis's Botanical Magazine* 17: t. 606.
KER GAWLER, J.B. 1804 ['1805']. *Ensatorum ordo*. In J. König & J. Sims, *Annals of Botany* 1: 219–247.
KLATT, F.W. 1866. Revisio Iridearum: *Freesia* Eckl. *Linnaea* 34: 672–674.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
KLATT, F.W. 1894 ['1895']. Irideae. In T. Durand & H. Schinz, *Conspectus florae africae* 5: 143–230. Jardin botanique de l'Etat, Bruxelles etc.
KREYSIG, F.L. 1829. *Verzeichniss der warmen und kalten Hauspflanzen, welche im den Garten des D. Kreysig in Dresden unterhalten warden.* Dresden.
KUNTZE, C.E.O. 1891. *Revisio generum plantarum*, vol. 2. Felix, Leipzig.
LAMARCK, J.B. 1789. *Encylopedie methodique Botanique* 3: 333–342.
LINDLEY, J. 1830. *Anomatheca cruenta*. *Botanical Register*: t. 1369.
LINNAEUS, C. fil. 1782 ['1781']. *Supplementarum plantarum.* Orphanotropheus, Brunswick.
LODDIGES, G. 1832. *Tritonia odorata*. *The Botanical Cabinet* 19: t. 1820. C. Loddiges & Sons, London.
MANNING, J.C. & GOLDBLATT, P. 2001. Two new renosterveld species of Iridaceae: Crocoideae from South Africa. *Bothalia* 31: 189–192.
MANNING, J.C. & GOLDBLATT, P. 2005. A new species of *Freesia* (Iridaceae: Crocoideae) from the Succulent Karoo, South Africa, and notes on nomenclature and infrageneric classification. *Novon* 15: 168–172.
MANNING, J.C. & GOLDBLATT, P. 2010. Botany and horticulture of the genus *Freesia* (Iridaceae). *Strelitzia* 27. South African National Biodiversity Institute.
MEYER, G.L. 1881. *Freesia refracta* var. *alba*. *Zeitschrift des Schweizerischen Gartenbauvereins* 1: 37–39.
PERSOON, C.H. 1805. *Synopsis plantarum* 1. Cramer, Paris.
POIRET, J.L.M. 1826. *Peyrousia.* In G.L.C. Cuvier, *Dictionaire des Sciences Naturelles,* edn. 2, 39: 363–366.
REDOUTÉ, P.J. 1805. *Les Liliacées*, vol. 3. Didot Jeune, Paris.
REGEL, E.A. 1874. *Gartenflora* 23: 289–290.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium secundum*, vol. 1. J.G. Cotta, Stuttgart.
ROEMER, J.J. & SCHULTES, J.A. 1822. *Mantissa in volumen primum systematis vegetabilium secundum*. J.G. Cotta, Stuttgart.
SALISBURY, R.A. 1796. *Prodromus strirpium in horto ad Chapel Allerton vigentium*. London.
SCHRADER, H.A. 1810. Einige neue und seltene Gewächse, die im botanischen Garten zu Göttingen im Jahr 1809 geblüht haben. *Neues Journal für die Botanik* 4: 67–89.
SPRENGEL, K. 1824 ['1825']. *Systema vegetabilium*. Dietrich, Göttingen.
STEUDEL, E.G. 1841. *Nomenclator botanicus*, edn. 2, vol. 2. J.G. Cotta, Stuttgart & Tübingen.
THUNBERG, C.P. 1803. Novae species plantarum capensium examinatae et descriptae. *Phytographische Blaetter von G.F. Hofmann* 1803: 1–34.
THUNBERG, C.P. 1814. *Gladiolus sparrmannii*, ett nytt species, beskrifvit af C.P. Thunberg. *Kongl[iga] Vetenskaps Academiens Handlingar* 1814: 189–192, tab. IX A.
THUNBERG, C.P. 1823. *Flora capensis*, edn. 2. J.G. Cotta, Stuttgart.
TREW, C.J. 1784. *Plantae rariores* 3: 8, t. 24, f. 2. Nürnberg.
VOIGT, J.O. 1845. *Hortus suburbanus calcuttensis*. Bishop's College Press, Calcutta.
WATSON, W. 1898. Kew notes: *Freesia armstrongii*. *Gardeners' Chronicle*, ser. 3, 24: 195.



Plate 34: A, ***Freesia caryophyllacea***, Napier, WC; B, ***F. fergusoniae***, Heidelberg, WC; C, ***F. fucata***, Villiersdorp, WC; D, ***F. grandiflora*** subsp. ***grandiflora***, Mozambique; E, ***F. laxa*** subsp. ***laxa***, Pinetown, KZN; F, ***F. laxa*** subsp. ***laxa***, Stutterheim, EC.

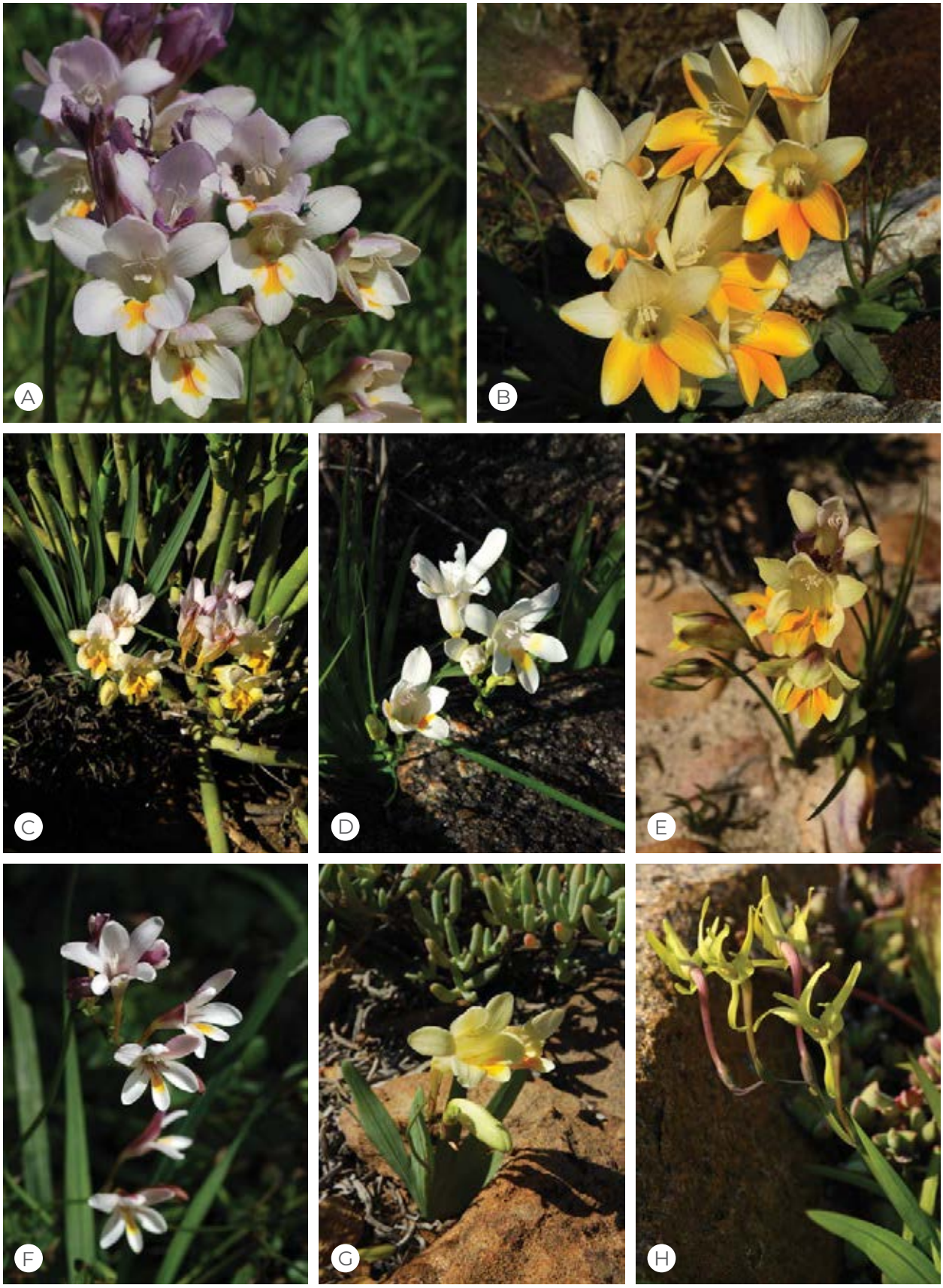


Plate 35: A, ***Freesia leichtlinii*** subsp. ***alba***, Still Bay, WC; B, ***F. leichtlinii*** subsp. ***leichtlinii***, Agulhas, WC, C, ***F. occidentalis***, Karoopoort, WC; D, ***F. praecox***, Riviersonderend, WC; E, ***F. refracta***, Worcester, WC; F, ***F. sparrmanii***, Heidelberg, WC; G, ***F. speciosa***, Ladismith, WC; H, ***F. viridis*** subsp. ***viridis***, Cape Columbine, WC.

18. **Crocosmia**

Crocosmia *Planch.* in Flore des Serres et des Jardins de l'Europe 7: 161, t. 702 (1851). *Tritonia* sect. *Crocosmia* (Planch.) Baker: 163 (1877b), as *'Crocosma'*. Type: *C. aurea* (Pappe ex Hook.f.) Planch.

Curtonus N.E.Br.: 270 (1932). Type: *Curtonus paniculatus* (Klatt) N.E.Br. = *Crocosmia paniculata* (Klatt) Goldblatt

[*Crocanthus* Klotzsch ex Klatt in Peters: 516 (1864), invalid name without description.]

Revisionary accounts: De Vos: 474 (1984); Goldblatt et al.: 63 (2004).

From the Greek *krokos,* that is, crocus, the source of the culinary herb saffron, and *osme,* scent, thus 'smelling of saffron'; the grammatically more correct form *Crocosma* was often used in the 19th century, but *Crocosmia* is now firmly established. The flowers also produce an orange, saffron-coloured dye.

Deciduous geophytes. *Rootstock* a depressed-globose corm rooting from below, those of past seasons often not resorbed, producing thin rhizomes from base in some spp., tunics firm-papery, sometimes becoming fibrous with age. *Stem* smooth, rarely ridged, simple or branched, sometimes repeatedly and strongly flexuose. *Leaves* several, firm-textured, either plane with prominent main vein, or pleated with prominent vein at each fold, mostly basal and forming a 2-ranked fan, lanceolate to sword-shaped, cauline few and reduced; leaf margins without marginal vein, epidermal cells columnar with thickened walls. *Inflorescence* a spike, flowers either arranged in 2 ranks or lying on one side of axis, usually many and crowded, axes often strongly flexuose; bracts small, green, becoming dry at tips, firm-textured, inner ± as long as outer and notched apically. *Flowers* zygomorphic, funnel-shaped to tubular or actinomorphic and pendent, shades of yellow or orange to scarlet, lower tepals sometimes with contrasting markings or green, unscented, with nectar from septal nectaries; perianth tube cylindric or funnel-shaped, widening gradually and flared or tubular above; tepals equal or unequal, then dorsal largest. *Stamens* unilateral and arched, sometimes lying against dorsal tepal, or symmetrically disposed and central; filaments included to well exserted; anthers parallel, subversatile. *Ovary* ovoid, enclosed by bracts; style exserted, ascending or arching over stamens or pendent, branches filiform or expanded apically, notched at tips. *Capsules* depressed-globose, 3-lobed, leathery, often warty above, sometimes reddish to orange inside. *Seeds* globose or angular and prismatic, 2 to several per locule, brown or reddish to black, either shiny and smooth when fresh, coat at least sometimes fleshy and wrinkled on drying, or soft and spongy, the raphal vascular trace excluded. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number x* = 11.

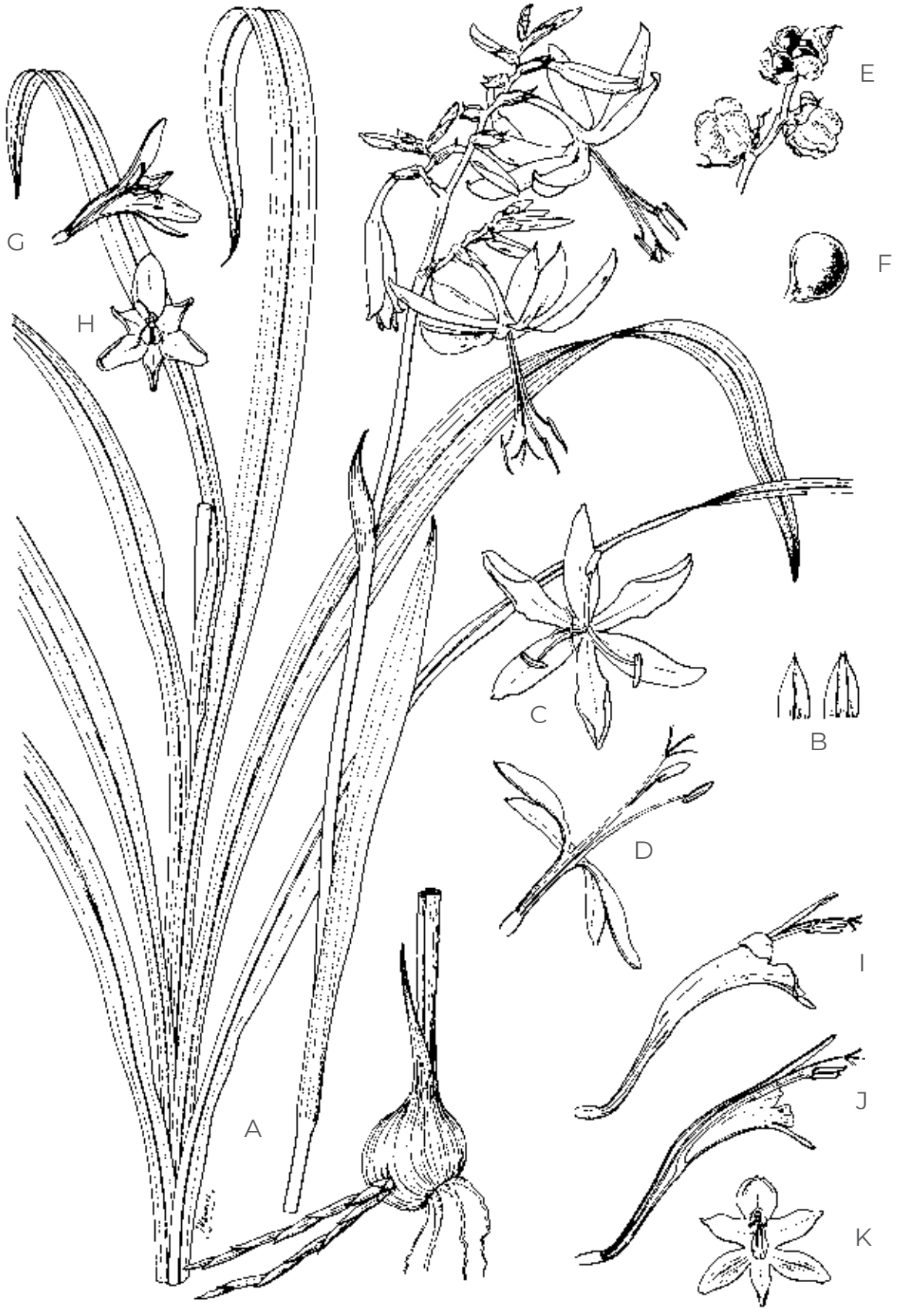
Species 8: confined to Africa south of the Sahara and Madagascar (1 sp.), mostly eastern southern Africa, including Lesotho, South Africa, Eswatini and Mozambique; 1 endemic to Namaqualand, Northern Cape. The disjunct distribution between the northwestern coast of southern Africa, an area of moderate to low winter rainfall, and summer-rainfall eastern southern Africa and tropical Africa, is remarkable.

Crocosmia closely resembles the larger southern and tropical African genus *Tritonia,* which has some 30 species often with orange flowers and short, dry floral bracts. The resemblance is misleading, however, and DNA sequence data from several chloroplast genes show that *Crocosmia* is most closely related to *Devia,* a local endemic with a single species of the Roggeveld Plateau near Sutherland in South Africa. These two genera together are related to *Freesia*. Similarities between *Crocosmia* and *Chasmanthe* in flower form and general habit, long thought to indicate close relationship, are likewise not supported. *Chasmanthe* is related to *Tritonia,* though not, according to available molecular data, its immediate ally. Similarities between *Crocosmia* and *Chasmanthe* are probably associated with their pollination systems. Flowers of three species are adapted for pollination by sunbirds (*Nectarinia*), and like many bird-pollinated flowers they have reddish to orange pigmentation, long stamens and an elongate, relatively wide perianth tube. Flowers of other species are adapted for pollination by butterflies or bees.

Some species and a range of hybrids of *Crocosmia*, sometimes referred to as *Montbretia*, are widely grown, and new cultivars are frequently introduced, both for garden display and for the cut flower trade.

Key to species

1a Leaves sword-shaped and plane, with a prominent central vein:
  2a Flowers actinomorphic and pendent, all tepals spreading from the base; filaments well exserted from the tube and directed downward. . . . . 2. *C. aurea*
  2b Flowers zygomorphic and secund or half-nodding, the dorsal tepal somewhat to much larger and the stamens unilateral; filaments largely exserted from the tube, suberect or horizontal:

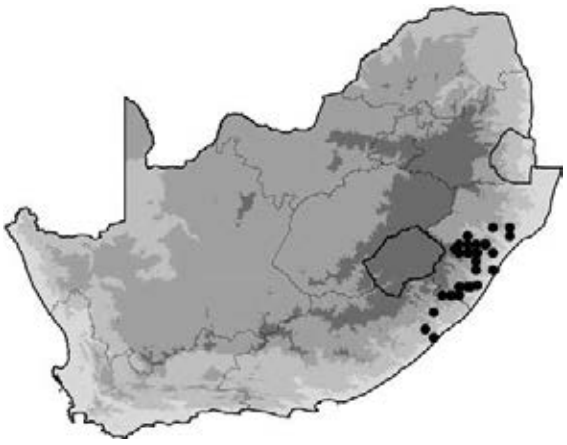


CROCOSMIA. C. aurea: A, flowering plant; B, outer bract (left) and inner bract (right); C, flower front view; D, half-flower; E, dehiscing and undehisced capsules; F, seed. ***C. mathewsiana***: G, half-flower; H, flower front view. ***C. fucata***: I, flower side view; J, half-flower; K, flower front view.

3a Perianth tube elongate and widely cylindric in the upper half; the dorsal tepal extended more-or-less horizontally . . . . . 3. *C. fucata*
3b Perianth tube funnel- or salver-shaped, the upper part flaring and widest at the mouth:
4a Filaments 8–12 mm long; flowers funnel-shaped with the tepals directed forward (plants of southern Africa) . . . . . 1. *C. pottsii*
4b Filaments 15–40 mm long; flowers salver-shaped with the tepals spreading in the upper half (plants cultivated or weedy). . . . . *C. ×crocosmiiflora*
1b Leaves lanceolate and pleated, with several veins more-or-less equally prominent:
5a Perianth tube 15–25 mm long, upper part funnel-shaped and flaring; filaments well exserted from the flower, 13–35 mm long:
6a Flowering stem usually unbranched; spike arching outward to nearly horizontal; dorsal tepal 20–30 mm long; filaments 30–35 mm long . . . . . 4. *C. masoniorum*
6b Flowering stem somewhat to much branched; dorsal tepal 14–22 mm long; filaments 13–20 mm long:
7a Flowering stem branched repeatedly; spikes drooping; dorsal tepal about 14 mm long; filaments 13–15 mm long . . . . . 5. *C. mathewsiana*
7b Flowering stem with just a few branches; spikes arching outward; dorsal tepal 22 mm long; filaments 17–20 mm long . . . . . *C. ×crocosmoides*
5b Perianth tube 33–45 mm long, upper part wide and cylindric or weakly flaring; filaments 25–50 mm long:
8a Dorsal tepal 14–18 mm long; plants often growing in clumps; flowering stem divaricately branched and the branches often also branched; spike axes strongly flexuose . . . . . 6. *C. paniculata*
8b Dorsal tepal 20–30 mm long; plants usually solitary; flowering stem simple or few-branched; spike axes hardly flexuose or straight . . . . . 7. *C. pearsei*

1. **Crocosmia pottsii** *(McNab ex Baker) N.E.Br.* in Transactions of the Royal Society of South Africa 20: 264 (1932); Goldblatt et al.: 69 (2004). *Montbretia pottsii* McNab ex Baker: 424 (1877a). *Tritonia pottsii* (McNab ex Baker) Baker: sub t. 6722 (1883). Type: South Africa, [KwaZulu-Natal], without precise locality or collector, ex hort M. Leichtlin (in Baden-Baden, Germany) (K, holo.).

Plants 70–1 100 mm high. *Corm* subglobose, ± 25 mm diam., producing stolons from base; tunics papery, light brown, becoming fibrous with age. *Stem* with 2–several well-developed, suberect, ascending branches. *Leaves* several in basal fan, reaching ± to base of spike, blades sword-shaped, up to 15 mm wide, medium-textured, plane with prominent main vein, often with a pair of secondary veins ± midway between main vein and margins. *Spike* arching outward, with up to 30 flowers in 2 rows; bracts brown at tips, becoming entirely brown, 4–8 mm long, outer ± acute, inner forked. *Flowers* zygomorphic, nodding, funnel-shaped, scarlet, often paler outside, yellow in throat, unscented; perianth tube obliquely funnel-shaped, 14–20 mm long, narrow lower part ± 7 mm long, ± abruptly expanded; tepals directed forward, spreading in upper ½, dorsal largest, hooded over stamens, 11–15 mm long, lateral and lower tepals 8–12 mm long. *Filaments* unilateral, 10–12 mm long; anthers parallel, 6–7 mm long, yellow; pollen yellow. *Style* arching over stamens, dividing opposite anther tips or up to 2 mm beyond them, branches diverging, 2–3 mm long, notched at tips. *Capsules* ovoid to globose, broadly 3-lobed, 7–8 mm long. *Seeds* angular-prismatic, up to 8 per locule, 24 per capsule, light to midbrown, with a spongy coat. *Chromosome number* 2*n* = 22. *Flowering time*: mainly mid-December to January.



Distribution of ***Crocosmia pottsii***.

Distribution and ecology: occurring in eastern South Africa and extending from near Umtata in Eastern Cape through KwaZulu-Natal as far north as Melmoth; along streams and in light bush along the banks of rivers.

Diagnosis: *Crocosmia pottsii* is distinguished by the small, funnel-shaped flowers with a perianth tube 14–20 mm long, and a dorsal tepal up to 15 mm long. The leaves are sword-shaped and plane, with a prominent main vein.

Plants of *C. pottsii* grown at the nursery of Victor Lemoine in Nancy, France were crossed there with the related *C. aurea* in the late 1870s and the hybrid progeny first flowered in the summer of 1881. Initially called *'Montbretia crocosmaeflora', C. ×crocosmiiflora* was widespread in gardens by the 20th century and is now naturalised in many parts of the world.

2. **Crocosmia aurea** *(Pappe ex Hook.f.) Planch.* in Flore des Serres et des Jardins de l'Europe 7: 161 & t. 702 (1851); Goldblatt et al.: 69 (2004). *Tritonia aurea* Pappe ex J.D.Hook.: t. 4335 (1847). *Babiana aurea* (Pappe ex J.D.Hook) Klotzsch: 293 (1851). Type: South Africa, without precise locality, as 'George', *Pappe s.n.* (K, holo.; SAM, iso.).

Crocosmia aurea var. *maculata* Baker: 407, 565 and f. 80 (1888). *C. maculata* (Baker) N.E.Br.: 264 (1932). Type: South Africa, without locality, cultivated in Britain, September 1888, ex hort. J. O'Brien, Harrow, England; thought to have come from near Algoa Bay, Eastern Cape (K, holo.).

[*Crocanthus mossambicencis* Klotzsch ex Klatt in Peters: 516 (1864), invalid name only in synonymy.]

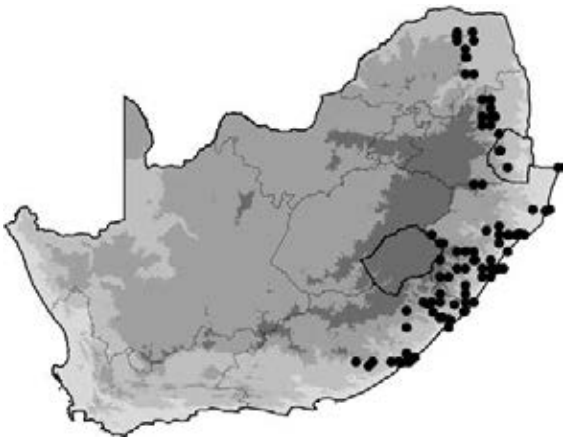
subsp. *auzea*

Plants 400–700 mm high. *Corm* subglobose, 15–20 mm diam., producing long, slender stolons up to 200 mm long terminating in new plants; tunics papery, soft-textured. *Stem* usually 2- to 4-branched. *Leaves* sword-shaped, reaching ± to base of spike, (10–)20–30 mm, wide, fairly soft-textured, plane with prominent main vein, margins not raised. *Spike* arching toward ground, fairly lax, up to 10-flowered; bracts straw-coloured to pale orange, becoming dry, 7–15 mm long. *Flowers* actinomorphic, pendent, salver-shaped with tube arching toward ground, orange, pale in throat, occasionally tepals marked darker orange to brown above base, unscented; perianth tube slender, widening slightly toward mouth, 18–27 mm long; tepals spreading or slightly recurved, 30–35(–40) × 8–12 mm. *Filaments* clasping style below, diverging above, usually white, 20–35 mm long; anthers 7–10 mm long, light orange; pollen orange or yellow. *Style* directed toward ground, mostly 30–45 mm long, dividing opposite anthers, branches diverging, 4–8 mm long. *Capsules* depressed-globose, 3-lobed, showing outline of seeds, orange inside. *Seeds* globose, up to 4 per locule, ± 4 mm diam., dark brown to blackish, coat initially slightly fleshy, wrinkled when dry. *Chromosome number* $2n = 22$. *Flowering time*: mainly February to April.

Distribution and ecology: extending from Eastern Cape to Limpopo in South Africa, also in Lesotho and Eswatini; in tropical Africa in Angola, Zambia, Uganda and Central African Republic; mostly in shade in forest margins.

Diagnosis: a most attractive plant, *Crocosmia aurea* is readily distinguished by the radially symmetric, pendent, orange flowers with narrow perianth tube and subequal tepals. The unusually long filaments are well-exserted from the perianth tube and hang downward. The leaf blades are plane, the ancestral condition in the genus.

Two subspecies are recognised, the widespread subsp. *aurea* and small-flowered subsp. *pauciflora* centred in Angola and western Zambia but extending to Congo and Uganda. A smaller plant, subsp. *pauciflora* often has unbranched stems, flowers with a perianth tube 10–15 mm long, tepals 15–18 mm long and anthers ± 3.5 mm long. The description above applies only to subsp. *aurea* in southern Africa.

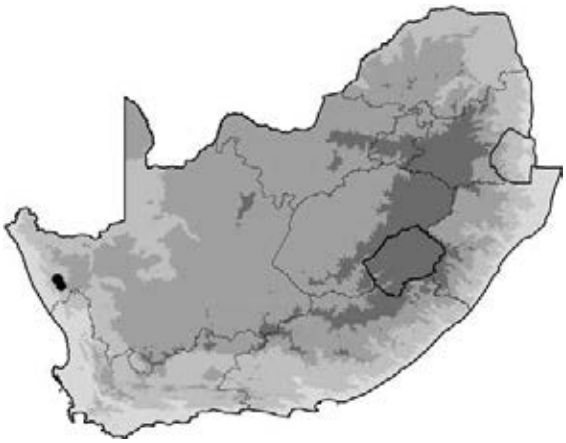


Distribution of ***Crocosmia aurea*** subsp. ***aurea***.

The flowers are adapted for pollination by large swallowtail butterflies (*Papilio*) and perhaps other large butterflies. The large, shiny, almost black seeds contrast with the pale, often orange or even reddish inner surface of the capsules. Resembling a small blackberry, they are dispersed by birds.

3. **Crocosmia fucata** *(Herb.) M.P.de Vos* in Journal of South African Botany 50: 494 (1984); Goldblatt et al.: 77 (2004). *Tritonia fucata* Herb.: t. 35 (1838). *Antholyza fucata* (Herb.) Baker: 180 (1877b). *Chasmanthe fucata* (Herb.) N.E.Br.: 274 (1932). *Petamenes fucata* (Herb.) E.Phillips: 44 (1941). Type: South Africa, without precise locality or collector, illustration in Herbert: t. 35 (1838).

Plants 1.3–1.9 m high, forming large tufts of up to 10 plants. *Corm* globose, 30–50 mm diam., older corms persisting in series under current corm. *Stem* ± erect, bearing up to 3 cauline leaves, inclined more than 60° above basal leaves, 2- to 4-branched, flushed purplish. *Leaves* ± 10, lower 7 basal in 2-ranks, reaching to ± base of spike, sheaths forming a false stem below, blades lanceolate, 300–400 × (11–)20–26 mm, soft-textured, with prominent main vein, margins not raised. *Spike* 2-ranked, main axis up to 22-flowered, lateral spikes up to 16-flowered; bracts membranous below, dry and papery above, outer ± 8 mm long, acute, inner slightly longer to slightly shorter, 2-keeled, forked apically. *Flowers* orange-scarlet, lower 3 tepals usually reddish orange and with narrow red median streak, tube yellow beneath, unscented; perianth tube trumpet-shaped, curved upward at base and suberect, 40–50 mm long, cylindric and slender in lower 20–25 mm, gradually expanded and curved outward, upper ± 20 mm long, ± straight, horizontal, ± 6.5 × 4 mm wide; tepals lanceolate, dorsal



Distribution of ***Crocosmia fucata***.

largest, extended horizontally, ± 16 × 8 mm, upper laterals spreading, ± 12 × 5 mm, lower 3 tepals ± 12 × 5 mm, spreading. *Filaments* 32–34 mm long, exserted ± 10 mm from tube; anthers ± 7 mm long, dark red; pollen yellow. *Style* horizontal, adaxial to stamens, dividing opposite upper ⅓ of anthers, branches ± 2 mm long, minutely notched. *Capsules* subglobose to depressed-globose, 3-lobed, rugose to papillate, 8–9 × 10 mm. *Seeds* globose, 4–5 mm diam., glossy reddish brown, coat loose and wrinkled when dry. *Chromosome number* 2*n* = 22. *Flowering time*: late October and November.

Distribution and ecology: a local endemic of the northern Kamiesberg in Namaqualand, Northern Cape, South Africa, where it is known only from the slopes of Sneeukop and the valleys to the west; in locally moist habitats, thus along drainage lines on cool south-facing slopes and streambanks in light shade in gritty, granite-derived loam.

Diagnosis: *Crocosmia fucata* is a tall plant with fairly narrow, plane leaves, and a flowering stem usually with 2 to 4 branches diverging at a wide angle from the main axis and a strongly arching spike. The flowers are predominantly scarlet with the lower 3 tepals each with a narrow red median streak and the tube yellow in the underside and in the throat.

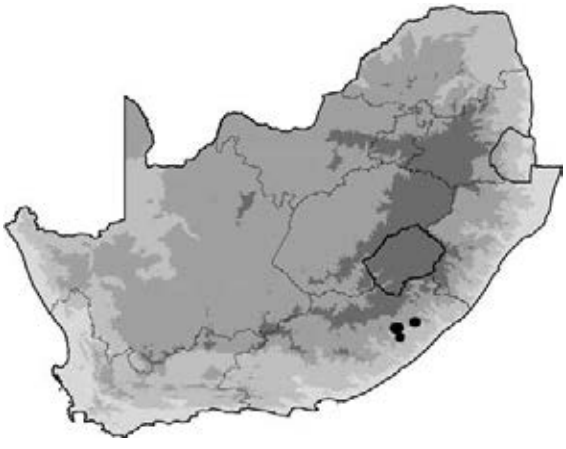
The long-tubed flowers are similar to those of species like *C. paniculata* and *C. pearsei,* with a narrow cylindric lower portion and a wider, also cylindric upper part but both of these species have strongly pleated leaves. In detail, the flowers can be seen to be somewhat different from those of *C. paniculata,* which has the outer whorl of tepals noticeably smaller than the inner three, and a slight but unmistakable pouch where the lower part of the perianth tube expands into the wider upper portion. The flowers are adapted for pollination by sunbirds.

4. **Crocosmia masoniorum** *(L.Bolus) N.E.Br.* in Transactions of the Royal Society of South Africa 20: 264 (1932); De Vos: 484 (1984); Goldblatt et al.: 81 (2004). *Tritonia masoniorum* L.Bolus: 43 (1926) [as *masonorum*]. Type: South Africa, [Eastern Cape], Tembuland, Engcobo Mtn, 4 500 ft [1 400 m], 20 Jan. 1896, *H. Bolus 10303* (BOL, lecto., designated by De Vos (1984); K, isolecto.).

Plants mostly 500–800 mm high. *Corm* globose, persistent in series under main corm, ± 25 mm diam., with cormlets at base and on short rhizome-like stolons; tunics brown, fibrous, soon disintegrating. *Stem* suberect or inclined to drooping, sometimes with 1 or 2 short branches. *Leaves* several in a basal fan, ± lanceolate, tapering to narrow, petiole-like base, pleated, usually shorter than stem, 25–50 mm wide. *Spike* flexed at base and ± horizontal, with numerous flowers borne on upper side facing spike apex; bracts soft-textured, green, becoming dry from tips, outer 5–10 mm long, inner shorter than outer, forked apically. *Flowers* zygomorphic, bright orange (rarely yellow), unscented; perianth tube obliquely funnel-shaped, curving upward, 18–25 mm long, lower ½ narrow and cylindric, widening above to 10 mm at mouth; tepals spreading when fully open, dorsal largest, 20–30 mm long, suberect, others 18–26 mm long, curving outward, outer 5–7 mm wide, inner 7–12 mm wide. *Filaments* 30–35 mm long; anthers 7–9 mm long, reaching apex of dorsal tepal. *Style* exserted from tube, 42–45 mm long, dividing opposite anther tips, branches ± 3.5 mm long, bilobed to forked at tips. *Capsules* depressed-globose, 3-lobed, ± 10 × 9 mm. *Seeds* ± 4 mm diam., ovoid-angular, lightly wrinkled, dark brown, 2 or 3 per locule. *Chromosome number* 2*n* = 22. *Flowering time*: December to January.

Distribution and ecology: known from only a handful of sites in the mountains north of Engcobo and Umtata in Eastern Cape, South Africa, but probably more common than the records suggest; in rocky sandstone outcrops, often on cliffs, or on streambanks.

Diagnosis: perhaps the loveliest of all *Crocosmia* species, *C. masoniorum,* the swan crocosmia, is recognised by the



Distribution of ***Crocosmia masoniorum***.

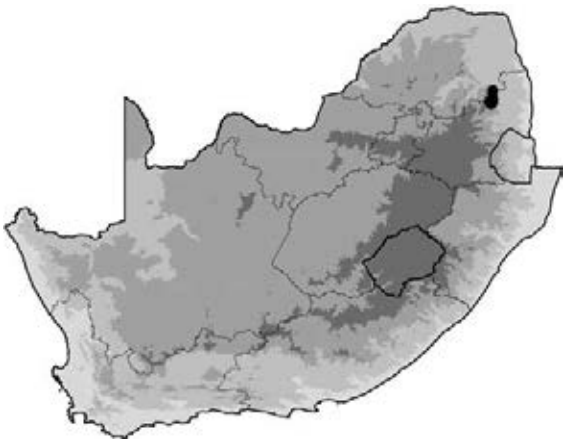
broad, pleated leaves, and the brilliant orange flowers borne on inclined stems with crowded spikes held horizontally. The flowers have a perianth tube 18–25 mm long and spreading, somewhat flaccid tepals, with the rather stiff, diverging stamens prominently displayed.

5. **Crocosmia mathewsiana** *(L.Bolus) Goldblatt ex M.P.de Vos* in Journal of South African Botany 50: 488 (1984); Goldblatt *et al.*: 85 (2004). *Tritonia mathewsiana* L.Bolus: 76 (1921). Type: South Africa, [Mpumalanga, as Transvaal], Pilgrim's Rest District, near Graskop, ex hort. Kirstenbosch, *Wood s.n.* (BOL, holo.).

Plants 1 500–2 000(–2 500) mm high. *Corm* globose, 30–50 mm diam., old corms persisting under current one; tunics of unbroken papery layers, becoming fibrous with age. *Stem* erect or inclined, 4- to 7-branched, lower branches sometimes 1- or 2-branched. *Leaves* several, in basal fan, reaching to ± base of spike, lanceolate, pleated, firm, up to 35 mm wide. *Spikes* drooping in bud, becoming horizontal as flowers open, 2-ranked, main spike 18- to 30-flowered, lateral spikes with fewer flowers; bracts firm-textured, purple below, apices dry and brown, outer apiculate or obscurely trifurcate, 5–7 mm long, inner usually slightly shorter than outer, shortly forked. *Flowers* zygomorphic, bright orange, facing to nodding or half-pendent, unscented; perianth tube trumpet-shaped, 16–20 mm long, slightly arched; tepals ± symmetrically disposed with dorsal slightly larger, inner tepals oval-elliptic, 15–16 × ± 9 mm, outer tepals narrowly deltoid, ± 14 × 5 mm. *Filaments* 13–15 mm long, exserted ± 3 mm; anthers parallel, contiguous, 6–7 mm long, yellow; pollen yellow. *Style* arching adaxial to filaments, 20–23 mm long, dividing just below anther bases, branches 5–10 mm long, laxly spreading, forked apically. *Capsules* depressed-globose and 3-lobed, 6–7 × 8 mm diam. *Seeds* angular-prismatic, dark red-brown, ± 3 mm long, mostly 1 or 2(3) per locule. *Flowering time*: late January to March.

Distribution: a narrow endemic of the lower escarpment of the northern Drakensberg between Graskop and Mariepskop in Mpumalanga, South Africa; in light shade along the edges of elfin forest, sometimes within evergreen forest, in well-drained sandy ground among boulders in Black Reef Quartzite.

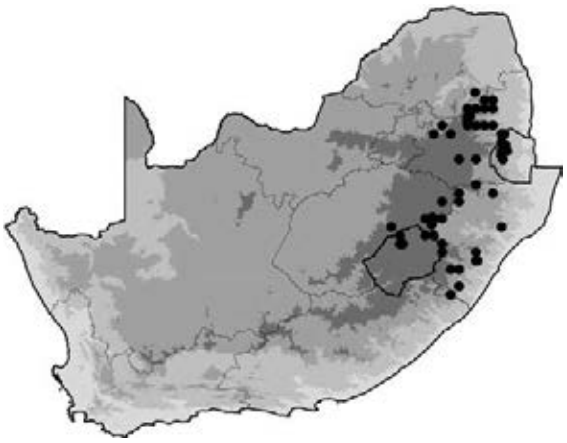
Diagnosis: *Crocosmia mathewsiana* is readily identified by the combination of strongly pleated leaves, multibranched flowering stem, drooping, flexuose spikes, and relatively short-tubed, brilliant orange-scarlet flowers. We assume its relationships lie with the three other pleated-leaved species of the genus, and it is perhaps most closely allied to *C. paniculata,* which also has a multibranched flowering stem and strongly flexuose spikes. Vegetatively the two are almost indistinguishable, although the stem and branches of *C. mathewsiana* are more slender and strongly nodding in bud. The spikes are also less prominently flexuose and the flowers of the two species differ considerably, those of *C. paniculata* having an elongate perianth tube 33–40 mm long (vs. 20 mm), and are adapted for pollination by sunbirds in contrast to pollination by large bees in *C. mathewsiana.*



Distribution of ***Crocosmia mathewsiana***.

6. **Crocosmia paniculata** *(Klatt) Goldblatt* in Journal of South African Botany 37: 444 (1971); De Vos: 490 (1984); Goldblatt *et al.*: 88 (2004). *Antholyza paniculata* Klatt: 379 (1867). *Curtonus paniculatus* (Klatt) N.E.Br.: 270 (1932). Type: South Africa, without precise locality, as 'Natal and Zululand', circa 1864, *W.T. Gerrard 1530* (K, holo.; BOL, NH (as *W.T. Gerrard and M.J. McKen*), iso.).

Plants mostly 1 200–1 500 mm high. *Corm* globose, persisting short chains, 30–35 mm diam.; tunics brown, papery or becoming fibrous with age. *Leaves* several in basal fan, reaching to base of spike, ± lanceolate, pleated, mostly 35–50 mm wide. *Stem* erect or somewhat inclined, with 3 to 6 diverging branches, these sometimes also branched. *Spike* arching outward, ± horizontal, with 18–25 flowers borne on upper side in 2 rows facing outward; bracts firm-textured, purplish green, becoming dry from tips, outer 6–10 mm long, sometimes obscurely 3-fid, inner 2-veined, forked at tip, slightly shorter than outer. *Flowers* zygomorphic, deep orange to orange-brown, sometimes shaded with reddish brown outside, yellowish in tube, lower 3 tepals marked in lower third with a dark red median streak decurrent on tube, ± trumpet-shaped, dorsal tepal extended horizontally, remaining tepals spreading, unscented; perianth tube narrow below, abruptly widened into a cylindric upper part, curved in middle, mostly 33–40(–50) mm long, upper part 15–25 mm long; tepals unequal, dorsal largest, inclined to ± horizontal, 14–18 × 8–10 mm, united with upper laterals for ± 5 mm, upper laterals narrowly deltoid, ± 10 × 5 mm, lower lateral tepals narrowly ovoid to oblong, 11–14 × 5–6 mm, lower median narrowly deltoid, directed downward, ± 10 × 4 mm. *Filaments* 25–40 mm long, exserted 12–18 mm from tube; anthers parallel, contiguous, ± 6 mm long, dull red or yellow, red on lines of dehiscence; pollen yellow. *Style* mostly 50–65 mm long, dividing opposite base to middle of anthers, branches 5–7 mm long, forked apically for < 1 mm, arching forward, shortly exceeding anther



Distribution of ***Crocosmia paniculata***.

apices. *Capsules* depressed-globose, 3-lobed, 5.5 × 8 mm, flushed dull red to purple, slightly rough to touch. *Seeds* globose or sides slightly flattened by pressure, lightly wrinkled, ovoid-angular, 1–3 per locule, ± 3 mm long, dark red-brown. *Chromosome number* 2*n* = 22. *Flowering time*: mainly December to mid-February.

Distribution and ecology: extending in eastern southern Africa from the northern highlands near Blyde River Canyon and Graskop in Mpumalanga, South Africa through Eswatini and interior Mpumalanga and north-eastern Free State into Lesotho and locally in the foothills of the KwaZulu-Natal Drakensberg (also recorded in the eastern highlands of Zimbabwe but probably introduced there); in moist places, along streams, drainage lines and in marshes.

Diagnosis: the tallest species in the genus, *Crocosmia paniculata* reaches well above 1 m sometimes almost 2 m tall and has broad, deeply pleated leaves and erect several-branched stems. The spikes arch outward, becoming almost horizontal so that the bright to dull orange or reddish flowers are displayed above the spike axes, forming two rows facing outward. The flowers have an elongate perianth tube 33–40 mm, narrowed in the lower portion, and large dorsal tepal 15–18 mm long, well exceeding the lateral and lowermost tepals, only 6–12 mm long. The flowers are pollinatwed by sunbirds.

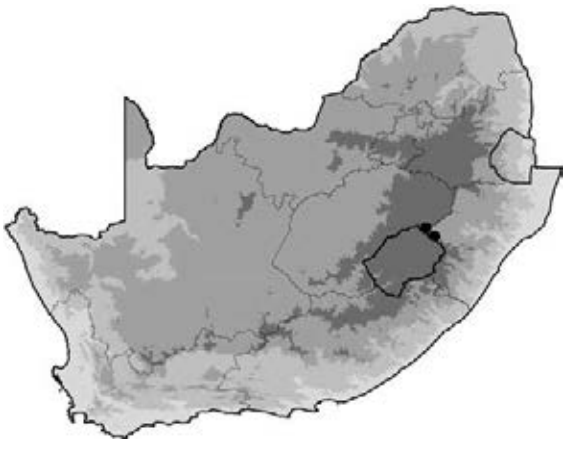
Plants from the KwaZulu-Natal Midlands, for example, near Hilton, Howick and Nottingham Road, have dark red flowers with a shorter perianth tube, only 26–28 mm long. They are seldom seen in truly wild situations but are either cultivated in gardens or found near abandoned dwellings, road verges and ditches. The first record of this form appears to have been collected at Pietermaritzburg in 1909, and it it possibly an old cultivar no longer available in the trade, although similar plants appear to be wild in the Karkloof. It is fertile and appears to breed true from seed.

7. **Crocosmia pearsei** *Oberm.* in Bothalia 13: 450 (1981); De Vos: 493 (1984); Goldblatt et al.: 93 (2004). Type: South Africa, [KwaZulu-Natal], Drakensberg, summit of Mnweni Pass, 1 Apr. 1977, *R.O. Pearse 34* (PRE, holo.).

Plants mostly 800–1 000 mm high. *Corm* globose, persisting series forming chains, ± 25 mm diam.; tunics brown, fibrous. *Stem* suberect or inclined to horizontal, simple or with 1 or 2 short branches. *Leaves* few in basal fan, ± lanceolate with narrow, petiole-like base, pleated, shorter than stem, decreasing in size above, 35–70 mm wide. *Spike* arching outward, ± horizontal, with many flowers borne on upper side in 2 rows facing outward; bracts soft-textured, purplish green, becoming dry from tips, outer 8–10 mm long, inner bifid and shorter than outer. *Flowers* zygomorphic, deep orange, ± trumpet-shaped, dorsal tepal horizontal, remaining tepals arching outward and spreading in upper ½, unscented; perianth tube narrow below, wider and cylindric above, 40–45 mm long; tepals unequal, dorsal largest, 20–30 × 10–12 mm, remaining tepals 14–20 × 7–8 mm. *Filaments* 45–50 mm long; anthers 6–7 mm long. *Style* 50–60 mm long, dividing opposite upper ½ of anthers, ultimately branches exceeding anther tips, 3.5 mm long, bilobed to shallowly forked at tips. *Capsules* depressed-globose, 3-lobed, 6 × 8 mm, green, often flushed dull red, drying brown. *Seeds* ± globose, dull reddish brown. *Flowering time*: mainly December to early February.

Distribution and ecology: originally known from a few inaccessible sites in the high Drakensberg near Cathedral Peak in KwaZulu-Natal, South Africa, but now recorded as far north as Basuto Gate, north of The Sentinel in Free State, and almost certainly also in adjacent eastern Lesotho; in basalt outcrops and cliffs, mostly on cooler slopes at elevations above 2 000 m.

Diagnosis: *Crocosmia pearsei* is recognised by the slender stem seldom reaching 1 m in height, often unbranched or at most with 1 or 2 short branches, unlike the strongly branched *C. paniculata* with which it may be confused. The spikes in both species are strongly flexuose, with the flowers borne in two opposed rows,



Distribution of ***Crocosmia pearsei***.

facing away from one another. The flowers of *C. pearsei* are larger, some 60–70 mm long, with a perianth tube 40–45 mm long and a dorsal tepal ± 20 mm long, whereas typical *C. paniculata* has flowers with a perianth tube 33–40 mm long and a dorsal tepal 14–18 mm long. The two species occupy quite different habitats, *C. paniculata* being a plant of wet sites, growing in deep, rich soils at moderate elevations, unlike the high-altitude, well-drained basalt slopes and cliffs favoured by *C. pearsei*. The flowers of both species are pollinated by sunbirds.

FORMALLY NAMED HYBRIDS

Crocosmia ×crocosmiiflora *(Lemoine) N.E.Br.* [as *C. crocosmiflora*] in Transactions of the Royal Society of South Africa 20: 264 (1932); De Vos: 497 (1984); Goldblatt et al.: 100 (2004). *Montbretia ×crocosmiiflora* Lemoine, The Garden 18: 188 (21 August 1881) [as *M. crocosmiaeflora*]. *Tritonia ×crocosmiiflora* (Lemoine) Nicholson, Illustrated Dictionary of Gardening 4: 94 (1888) [as *T. crocosmiflora*]. Type: illustration in Morren, La Belgique Horticole 31: t. 14 (1881), neo., designated by Goldblatt et al.: 100 (2004).

Plants 350–600(–900) mm high. *Leaves* plane, narrowly lanceolate, ± ⅔ as long as stem, 8–15 mm wide. *Stem* laxly branched, branches ascending and arching outward. *Spike* lightly flexuose, mostly 6- to 10-flowered; bracts reddish with dry brown tips, 6–10 mm long. *Flowers* zygomorphic with radially symmetric perianth but unilateral stamens, bright orange, paler in throat, unscented; perianth tube funnel-shaped, slightly curved forward, 12 mm long, ± 5 mm wide at mouth; tepals subequal, mostly 15–22 mm long. *Filaments* 15–22 mm long; anthers 6–8 mm long, yellow. *Style* arching over stamens, dividing well beyond anther tips, branches ± 4 mm long, forked at tips. *Capsules* globose, showing outline of seeds. *Seeds* often aborted or ± globose, reddish brown.

Crocosmia ×crocosmiiflora is remarkably vigorous, disease resistant and easily propagated primary hybrid between *C. aurea* and *C. pottsii,* made in 1879 in Nancy, France. The flowers are perfectly intermediate between the two species. The taxon remains widely cultivated today because it is so easy to grow, is undemanding of care and soil, and thrives in a wide range of habitats and climate zones. It has been superseded in the nursery trade by larger-flowered or more colourful cultivars. Because of its vigour and rapid vegetative reproduction it persists in abandoned gardens and slowly spreads into meadows, roadsides and eventually into undisturbed vegetation. It is a serious weed in many parts of the world, including Hawaii, North and Central America, Madagascar, Australia, New Zealand, the Philippines and tropical Asia in general.

Crocosmia ×crocosmoides *(Leichtlin ex J.N.Gerard) Goldblatt* in Goldblatt et al., *Crocosmia* and *Chasmanthe*: 103 (2004). *Antholyza ×crocosmoides* Leichtlin ex J.N.Gerard, Garden and Forest 10: 315–316 (1897), as *'A. crocosmoides'*. Type: of cultivated origin, released commercially in The Netherlands by the Van Tubergen bulb company in 1895, and herbarium specimens sent to the Royal Botanic Gardens, Kew, in 1904 (K, neo.).

Crocosmia ×latifolia N.E.Br.: 264 (1932) [as *C. latifolia*]; De Vos: 483 (1984). Type: of cultivated origin, released commercially in the Netherlands by the Van Tubergen bulb company in 1895, and herbarium specimens sent to the Royal Botanic Gardens, Kew, in 1904 (K, syn.).

Plants 500–1 000 mm high. *Leaves* lanceolate, lightly pleated and with multiple major veins, ± ⅔ as long as stem, 20–40 mm wide. *Stem* laxly branched, branches ascending and arching outward. *Spike* flexuose, with many flowers; bracts reddish brown with dry brown tips, 10–15 mm long. *Flowers* zygomorphic, orange-red; perianth tube trumpet-shaped, slightly curved forward, 15–25 mm long, widening gradually from base to mouth, ± 5 mm wide at mouth; tepals unequal, dorsal largest, up to 22 mm long, lateral and lower tepals 12–18 mm long. *Filaments* 17–20 mm long; anthers 7–8 mm long, yellow. *Style* arching over stamens, dividing opposite anthers, branches ± 5 mm long, shortly forked. Capsules and seeds not produced.

Crocosmia ×crocosmoides is the result of a deliberate cross between *C. aurea* and *C. paniculata*, *and* was made available circa 1890. The plants have leaves only lightly pleated but with multiple veins toward the base, rather than a single prominent main vein, which indicates one parent species with pleated leaves and the other with plane leaves. Brown (1932) described it as *C. latifolia,* evidently accepting the plant as a naturally occurring species, and unaware of the valid name *Antholyza ×crocosmoides* Leichtlin ex J.N.Gerard.

REFERENCES

BAKER, J.G. 1877a. *Montbretia pottsii. The Gardeners' Chronicle* 8: 424.

BAKER, J.G. 1877b. Systema Iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1883. *Tritonia pottsii*. *Curtis's Botanical Magazine* 109: t. 6722.
BAKER, J.G. 1888. *Crocosmia aurea* var. *maculata*. *The Gardeners' Chronicle* 4: 407, 565 & f. 80.
BOLUS, L. 1921. Novitates Africanae. *Annals of the Bolus Herbarium* 3: 70–85.
BOLUS, L. 1926. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 37–55.
BROWN, N.E. 1932. Contributions to a knowledge of the Transvaal Iridaceae. *2. Transactions of the Royal Society of South Africa* 20: 261–280.
DE VOS, M.P. 1984. The African genus *Crocosmia* Planchon. *Journal of South African Botany* 50: 463–502.
GERARD, J.N. 1897. *Antholyza crocosmoides*. *Garden and Forest* 10: 315–316.
GOLDBLATT, P. 1971. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460.
GOLDBLATT, P., MANNING & DUNLOP, G. 2004. *Crocosmia* and *Chasmanthe*: biology, classification and cultivation. Timber Press, Portland, Oregon.
HERBERT, W. 1838. *Tritonia fucata*. *Edwards's Botanical Register* 24: t. 35.
HOOKER, J.D. 1847. *Tritonia aurea*. *Curtis's Botanical Magazine* 73: t. 4335.
KLATT, F.W. 1867. Diagnoses Iridearum novarum. *Linnaea* 35: 377–384.
KLOTZSCH, J.F. 1851. *Tritonia* oder *Babiana aurea*. *Allgemeine Gartenzeitung* 1851: 293.
LEMOINE, V. 1881. *The Garden* 18: 188.
MORREN, C.J.E. 1881. *La Belgique Horticole* 31: t. 14.
NICHOLSON, G. (ed.). 1888. *The Illustrated Dictionary of Gardening*, vol. 4. L. Upcott Gill, London.
OBERMEYER, A.A. 1981. A new species of *Crocosmia*. *Bothalia* 13: 450–451.
PETERS, W.C.H. 1864. *Naturwissenschaftliche Reise nach Mossambique*, Band 6, Botanik, II Abteilung. Georg Reimer, Berlin.
PHILLIPS, E.P. 1941. A note on N.E. Brown's sub-division of the genus *Antholyza* Linn. *Bothalia* 4: 43–44.
PLANCHON, J.E. 1851. *Crocosmia urea*. *Flore des Serres et des Jardins de l'Europe* 7: 161, t. 702.

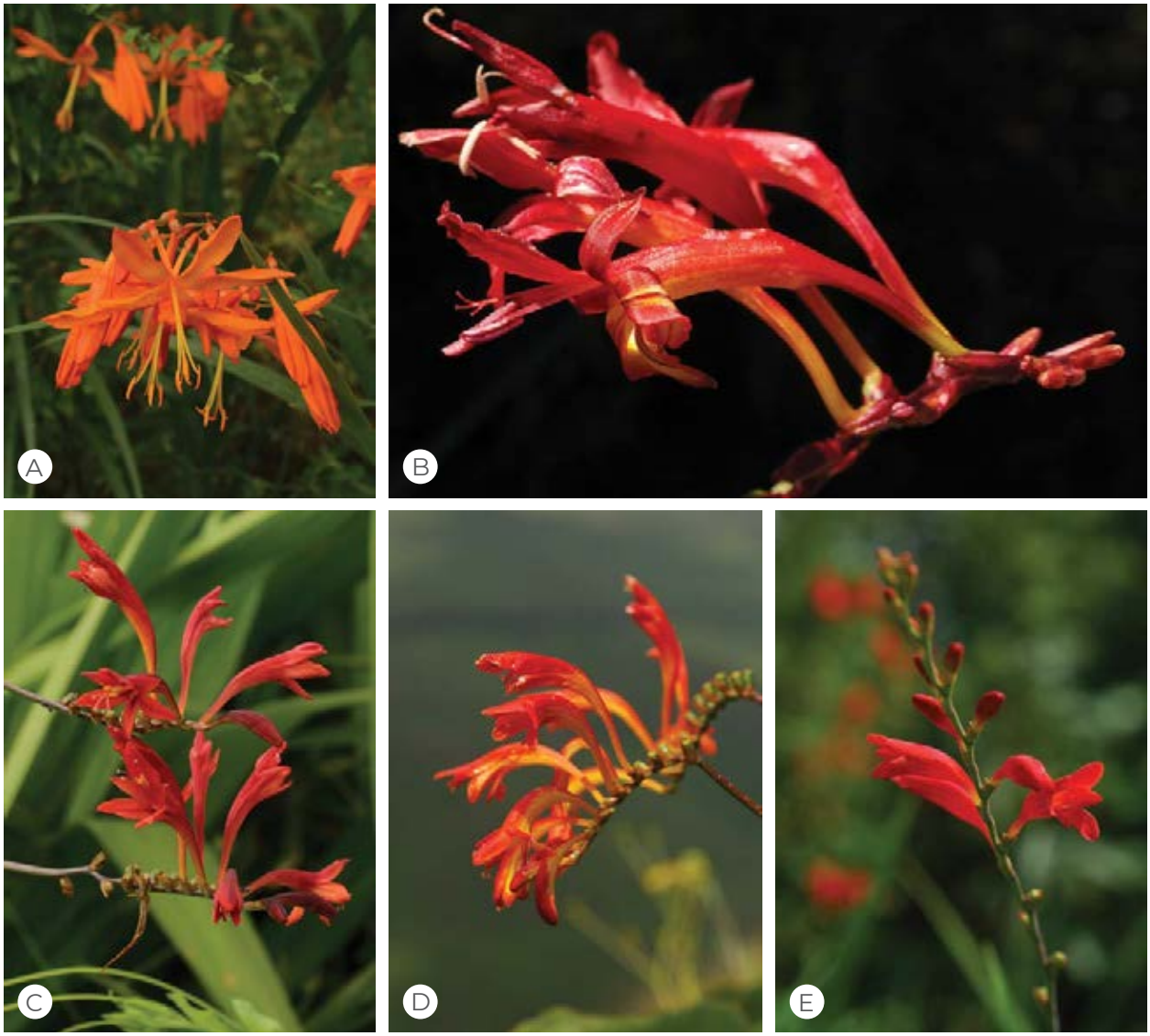


Plate 36: A, ***Crocosmia aurea***, Karkloof, KZN; B, ***C. fucata***, Kamiesberg, NC (photograph: N. Helme); C, ***C. paniculata***, Howick, KZN; D, ***C. pearsei***, Witsieshoek, FS; E, ***C. pottsii***, Balgowan, KZN.

19. Devia

Devia *Goldblatt & J.C.Manning* in Annals of the Missouri Botanical Garden 77: 362 (1990); Goldblatt: 148–150 (1999). Type: *D. xeromorpha* Goldblatt & J.C.Manning

Named in honour of the South African botanist and specialist in the Iridaceae, M.P. de Vos.

More-or-less evergreen geophyte. *Corm* depressed-globose, axial in origin, rooting from below; tunics of coarse fibres. *Stem* round in section, sheathed below by a thick collar of coarse fibres, usually branched. *Leaves* several, mostly basal, dry or becoming dry at flowering time, linear, oval in cross section, with main and second pair of veins heavily thickened, thus with two narrow longitudinal grooves on each surface, cauline leaves few and reduced; margins unthickened and with columnar epidermal cells. *Inflorescence* a many-flowered, secund spike; bracts leathery, dry at anthesis, inner about as long as outer, notched apically. *Flowers* actinomorphic, salver-shaped, pink, with nectar from septal nectaries; perianth tube narrowly funnel-shaped; tepals subequal, ascending. *Stamens* symmetrically disposed, rotated anticlockwise; filaments slender; anthers lying opposite inner tepals, splitting longitudinally. *Ovary* globose; style eccentric, branches short, notched apically. *Capsules* globose, cartilaginous, slightly warty above. *Seeds* globose, flattened at the chalazal end, hard and shiny, up to 2 per locule, smooth, surface cell outlines prominent; ovular vascular trace excluded. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number x* = 10.

Species 1, only *D. xeromorpha*: a local endemic of the high rocky central Roggeveld Escarpment in the western Karoo, Northern Cape.

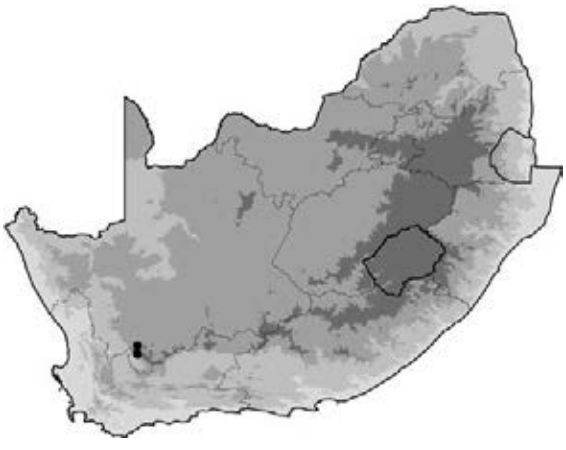
The strange-looking *Devia* has a tuft of grass-like leaves ± dry at flowering and a spike of small, dusty pink flowers with the stamens rotated anticlockwise. The genus is allied to the largely eastern southern African *Crocosmia* of subtribe Freesiinae and shares with this taxon smooth seeds with an excluded vascular trace. Both the internal leaf anatomy and capsule and seed characters are consistent with those of *Crocosmia*. Molecular sequences of several plastid DNA regions confirm the close relationship of *Devia* and *Crocosmia*, retrieving them as sister genera, together forming a clade allied to *Freesia* and *Xenoscapa*.

1. **Devia xeromorpha** *Goldblatt & J.C.Manning* in Annals of the Missouri Botanical Garden 77: 362 (1990) & :149 (1999).Type: South Africa, Northern Cape, Roggeveld Escarpment, Farm Vierfontein, *Snijman & Manning 1194* (NBG, holo.; K, MO, PRE, iso.).

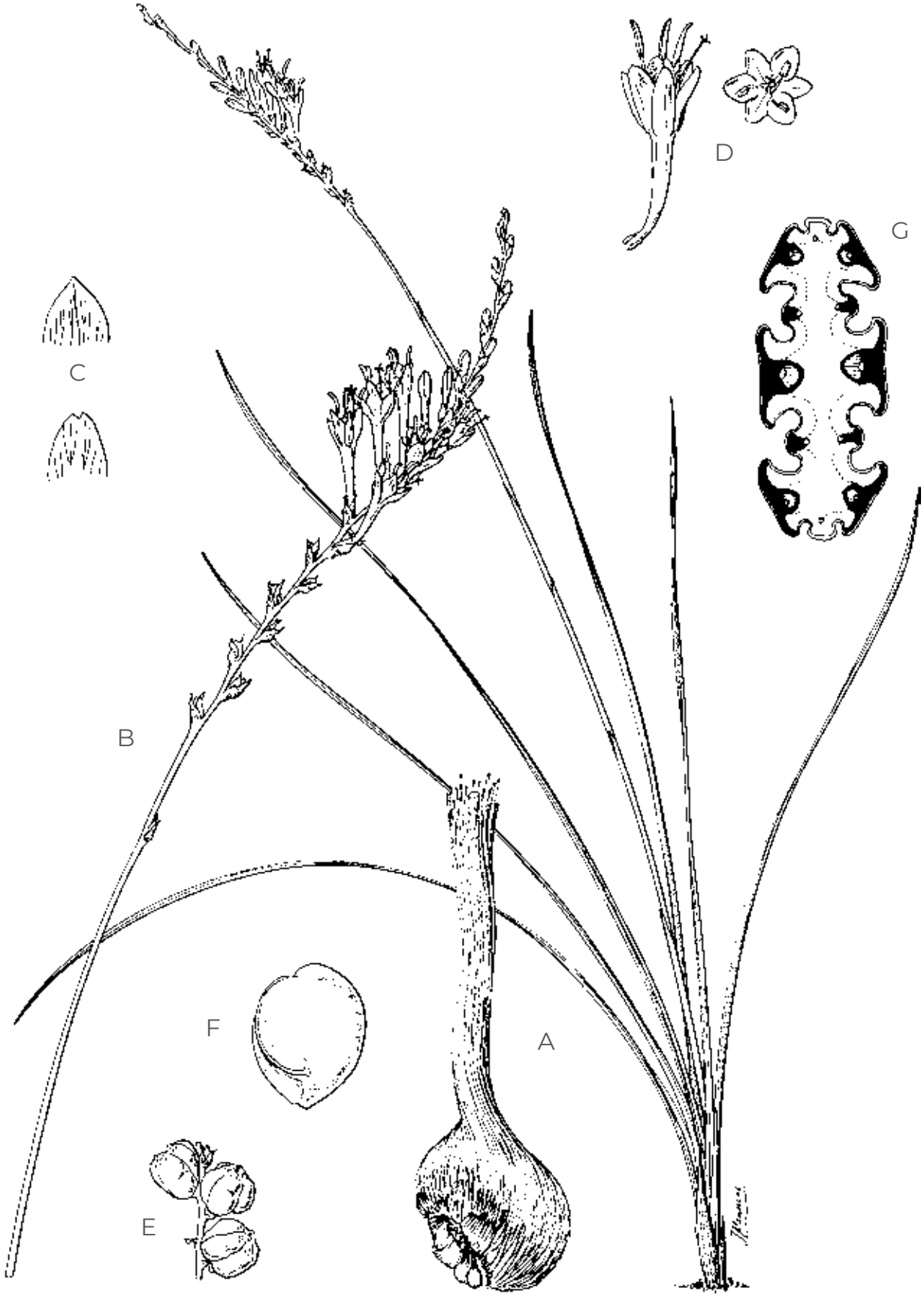
Plants 500–700 mm high, forming dense clumps. *Corm* depressed-globose, 20–27 mm diam.; tunics of coarse fibres accumulating in a dense mass. *Stem* sheathed below by a thick collar of coarse fibres, simple or 1- to 3-branched. *Leaves* ± dry at flowering, linear, mostly 6, all ± basal, oval in cross section, main and second pair of veins heavily thickened, thus with two narrow longitudinal grooves on each surface, apex pungent, margins unthickened, edged by narrow grooves, cauline leaves few and reduced. *Spike* 18- to 26-flowered, secund in 2 ranks, branches with fewer flowers; bracts dry, 2.4–4.0 mm long. *Flowers* actinomorphic, salver-shaped with tepals ascending forming a narrow cup including filaments, dusty dull pink, unscented; perianth tube narrowly funnel-shaped, ± 9 mm long; tepals subequal, ovate-elliptic, ± 6 × 3.5 mm. *Stamens* rotated anticlockwise width of 1 tepal; filaments ± 9 mm long; anthers ± 4 mm long, yellow. *Style* ± 16 mm long, eccentric, dividing opposite middle to upper ⅓ of anthers, ± 0.5 mm long, notched apically. *Capsules* 5–6 mm long, warty above. *Seeds* globose, (0)1 or 2 per locule, smooth, surface cell outlines prominent. *Flowering time*: November and December.

Distribution and ecology: as for the genus, restricted to the central Roggeveld Escarpment in Northern Cape, South Africa; on rocky slopes at close to 2 100 m elevation, usually in dolerite outcrops in mountain renosterveld, flowering late in the season in November and December.

Diagnosis: *Devia xeromorpha* is recognised by the several, linear leaves dry at flowering time and a slender spike of small, relatively inconspicuous, dusty pink flowers. Plants are moderate in size, 500–700 mm high, and form dense tussocks resembling associated clump-forming grasses. The flowers are radially symmetric except that the style is twisted to lie off-centre



Distribution of ***Devia xeromorpha***.



Devia xeromorpha: A, flowering plant and corm; B, inflorescence; C, outer bract (top) and inner bract (bottom); D, flower side view (left) and front view (right); E, capsules; F, seed; G, tissue plan of leaf transection.

while the stamens are rotated anticlockwise, a feature unknown elsewhere in the family. The leaves are unusual in having a pair of narrow longitudinal grooves on each surface, and the margins have columnar epidermal cells with thickened walls. The subglobose capsules are lightly warty and each locule usually contains two rounded to lightly angled seeds which have the ovular vascular trace excluded. The inconspicuous flowers are visited by long-proboscid bee-flies (family Bombyliidae), which may be their legitimate pollinators.

REFERENCES

GOLDBLATT, P. & MANNING, J.C. 1990. *Devia xeromorpha*, a new genus and species of Iridaceae–Ixioideae from the Cape Province, S. Africa. *Annals of the Missouri Botanical Garden* 77: 359–364.

GOLDBLATT, P. 1999. *Devia* (Iridaceae). In G. Germishuizen (ed), *Flora of Southern Africa* 7(2, 1): 148–150. National Botanical Institute, Pretoria.



Plate 37: ***Devia xeromorpha***, Middelpos, NC.

Subtribe 4. **Hesperanthinae**

Hesperanthinae *Goldblatt* in Journal of South African Botany 37: 439 (1971). Type: *Hesperantha* Ker Gawl.

Corm with rounded or flat base (rarely a slender rhizome), tunics hard and woody or less often papery or fibrous; stem well developed or contracted and subterranean. *Leaf* margins with columnar epidermal cells and without subepidermal sclerenchyma. *Inflorescence* a spike, sometimes contracted. *Flowers* mostly actinomorphic, less often zygomorphic with stamens unilateral and decumbent; style branches undivided, sometimes extremely long; seed epidermal cell outlines prominent; ovular vasculature intact; $x = 11$ (10).

Genera 2, Africa, mainly southern Africa; 193 species: *Geissorhiza* 104; *Hesperantha* 89, 87 in southern Africa.

20. **Geissorhiza**

Geissorhiza *Ker Gawl.* in Curtis's Botanical Magazine 18: t. 672 (1803). Type: *G. obtusata* Soland. ex Ker Gawl. = *G. imbricata* subsp. *bicolor* (Thunb.) Goldblatt

Sphaerospora Klatt: 725 (1864), illegitimate homonym, not *Sphaerospora* Sweet ex Loudon (1841). Type: *S. exscapa* (Thunb.) Klatt (lecto., designated by Goldblatt: 303 (1985) = *Geissorhiza exscapa* (Thunb.) Goldblatt

Engysiphon G.J.Lewis: 19 (1941). Type: *E. schinzii* (Baker) G.J.Lewis (lecto., designated by Goldblatt: 303, 1985) = *Geissorhiza schinzii* (Baker) Goldblatt

[*Anomaza* Laws. ex Salisb.: 323 (1812), invalid name without description (also applied to *Freesia* sect. *Anomatheca*).]

[*Rochea* Salisb.: 322 (1812), invalid name without description.]

[*Weihea* Eckl.: 22 (1827), invalid name without description.]

Revisionary accounts: Goldblatt: 277–447 (1985); Goldblatt et al.: 123–152 (2009).

From the Greek *geisson*, tile, *rhizon*, root, for the tiled appearance of the overlapping, segmented corm tunics of subg. *Geissorhiza* (but not of subg. *Weihea*).

Deciduous perennial geophytes. *Corm* globose to ovoid, asymmetric or bell-shaped, usually with a basal ridge from which the roots emerge, axial in origin; tunics woody, or rarely membranous to fibrous, concentric or imbricate, then notched below. *Stem* aerial, simple or branched, terete in section, smooth or minutely hairy or scabrid. *Leaves* few to several, unifacial, usually with a definite main vein, blades plane to terete or I- or H-shaped in section with margins and or main vein raised and winged, occasionally hairy or sticky; margins with subepidermal sclerenchyma bundle and thin-walled epidermal cells. *Inflorescence* a spike, flowers usually spirally arranged, rarely solitary on branches; bracts green and soft-textured to membranous, inner smaller than outer and forked at apex. *Flowers* star-like or funnel–salver-shaped, sometimes with tube elongate, variously coloured, often blue to violet, also pink, yellow, cream-coloured, purple, red or bicoloured, mostly actinomorphic, zygomorphic in some species, faintly scented or unscented, with nectar from septal nectaries; perianth tube short to long, funnel-shaped or cylindric; tepals subequal, inner usually shorter than outer, cupped or spreading from base. *Stamens* symmetrically arranged or unilateral and arching downward (declinate); filaments filiform, equal or unequal with one shorter than other two, exserted, rarely included and inserted well inside tube; anthers erect or ascending, rarely included. *Style* filiform, eccentric or unilateral and held below stamens, usually exserted, the branches usually slender and recurved, rarely broadly expanded above. *Capsules* globose to oblong or cylindric, cartilaginous to bony. *Seeds* ± globose, flattened at chalazal end, sometimes lightly wrinkled, matte, surface cells domed or areolate. *Pollen grains* mostly monosulcate-operculate, usually with 2-banded operculum or with more complex apertures, exine perforate-scabrate (rarely grains with complex, multiple apertures and lacking operculum). *Basic chromosome number* $x = 13$.

Species ± 104: divided among two subgenera; restricted to the winter-rainfall zone of South Africa, extending from northern Namaqualand in Northern Cape through the western Karoo and southwestern Western Cape and east to Grahamstown in Eastern Cape.

A large genus, *Geissorhiza* shows relatively limited floral variation, most species having moderate-sized, radially symmetric flowers with a short perianth tube, a long style dividing opposite the anthers but eccentric in position, and slightly asymmetric corms with woody, rarely fibrous or papery tunics. The corm structure is

the basis for recognition of two subgenera: in subg. *Weihea* the tunics are concentric, fragmenting vertically into sections drawn into points at the top and bottom; whereas the tunics of subg. *Geissorhiza* are imbricate, the older tunics being displaced upward by new tunics and spitting into sections at the base, the corms then appearing to be covered with overlapping tiles.

Leaf morphology is surprisingly diverse. A plane surface is the ancestral condition, but the margins and main veins are often thickened rendering the leaf either oval or terete in section as the thickened areas form ridges occluding most of the surface. Such terete leaves with four longitudinal grooves characterise the *G. juncea* group of subg. *Weihea*. In several species the margins are raised into wing-like flanges held at right angles to the surface, this rendering the leaf I-shaped in section. In the most extreme examples, the marginal wings are nearly as wide and the leaf surface over which they arch, thus rendering the leaf H-shaped in section. Surprisingly, such leaves have evolved in both subgenera, notably in sect. *Engysiphon* of subg. *Weihea* and the *G. heterostyla* group of subg. *Geissorhiza*. Leaves or leaf sheaths are sticky in many species, resulting in the accumulation of sand grains, but neither the source of the sticky substance nor its adaptive value has been investigated.

In an unusual development for Iridaceae, the stamens are unequal in several species of subg. *Geissorhiza*, in which the upper filament is shorter than the lower two but the anthers are of equal length. The character is most frequent in sections *Ciliatae* and *Planifoliae* of the subgenus. *Geissorhiza melanthera* is unique in the genus in having anthers of unequal length and an unusual purple-black colour. Flowers are typically upright and radially symmetric (barring the eccentric style) but nodding, zygomorphic flowers with decumbent, unilateral stamens and style characterise several species of both subgenera, features poorly preserved in pressed herbarium specimens.

Molecular studies in *Geissorhiza* have so far been limited to single species comparisons with other genera of Iridaceae and confirm its immediate relationship with *Hesperantha*, an alliance first proposed on the basis of similar asymmetric corms, woody corm tunics, and shared basic chromosome number $x = 13$.

Key to subgenera

1a Plants with concentric corm tunics, old tunics completely enclosed by new ones and layers splitting vertically from base or apex, tunics usually brown and ± woody to papery or ± fibrous; stamens usually equal in length, rarely one filament shorter or longer ..... 1. subg. *Weihea*
1b Plants with overlapping corm tunics, old tunics pushed upward and fragmenting into tile-like segments from base, usually blackish and woody; stamens equal or unequal with one filament shorter than other two. ... 2. subg. *Geissorhiza*

Subg. *Weihea*

1a Stamens and style included in lower half of perianth tube:
2a Leaf margins winged, lower leaf sticky with adhering sand grains; perianth tube 8–10 mm long; tepals linear 18–28 × 2.5–3.0 mm ..... 52. *G. adriaanii*
2a Leaves plane or margins thickened, not sticky; perianth tube 10–16 mm long; tepals ovate, 12–15 ×6–7 mm:
3a Leaves plane, 3–5 mm wide; bracts 12–14 mm long; flowers white ..... 29. *G. esterhuyseniae*
3b Leaves with margins and central veins heavily thickened, 1.5–2.0 mm wide; bracts 7–11 mm long; flowers pink with dark markings at bases of tepals ..... 30. *G. cedarmontana*
1b Stamens and style, or at least style branches, exserted from perianth tube:
4a Foliage leaf solitary and stem with scale-like, membranous bract in upper half ..... 38. *G. unifolia*
4b Leaves 2 or more in addition to scale-like bracts in upper half of stem:
5a Leaf blades spirally twisted; style usually dividing opposite base of anthers; flowering stems each with a single (rarely 2) flower:
6a Flowers yellow; perianth tube ± 3 mm long ..... 25. *G. corrugata*
6b Flowers mauve; perianth tube 4–5 mm long ..... 26. *G. spiralis*
5b Leaf blades ± straight or falcate but not spirally twisted; style dividing opposite or beyond anthers; flowering stems with one to several flowers:
7a Corm tunics entirely of fibrous layers or softly membranous, either not accumulating or becoming fibrous with age:
8a Perianth tube 2–4 mm long; tepals 10–13 mm long:
9a Flower white to pale mauve-pink ..... 43. *G. umbrosa*
9b Flowers deep blue to mauve or violet ..... 44. *G. alticola*
8b Perianth tube 5–18 mm long; tepals 12–22 mm long:
10a Tepals 17–22 long; perianth tube 9–18 mm long, exserted from or included in bracts:
11a Perianth tube 10–18 mm long, well exserted from bracts; corm tunics of fine, netted fibres, leaves linear, 2-grooved on each surface with margins and central vein heavily thickened; plants of open rocky slopes ..... 46. *G. nubigena*
11b Perianth tube 9–13 mm long, not or barely exserted from bracts; corm tunics soft-textured, soft-papery, not becoming fibrous; leaves linear, ± plane with margins and central veins thickened; plants of waterfalls and wet, shaded rocks ..... 6. *G. uliginosa*
10b Tepals 12–18 mm long; perianth tube 5–8(–10) mm long, not or barely exserted from bracts:
12a Perianth pink; plants 60–120 mm high; lower leaves prostrate, 20–50 × 2.5–6.0 mm, ± plane with thickened margins; flowering January ..... 10. *G. altimontana*



GEISSORHIZA. G. silenoides: A, flowering plant; B, flower. ***G. rupicola***: C, flowering plant. ***G. imbricata***: D, capsule; E, seed.

12b Perianth mauve to violet; plants 100–300 mm high; leaves linear, 1–3 mm wide, 2-grooved on each surface with margins and central vein heavily thickened; flowering mostly late November and December:
13a Corm tunics finely fibrous; leaves 2–3 mm wide; flowers without pale throat; perianth tube 5–8 (–10) mm long. . . . . 45. *G. hesperanthoides*
13b Corm tunics membranous; leaves 1.0–1.5 mm wide; flowers with a pale throat; perianth tube 4–6 mm long . . . . . .47. *G. cataractarum*
7b Corm tunics firm-papery to woody in texture, often drawn into bristles above:
14a Leaves not plane, either strongly ridged, or margins and main vein heavily thickened, or blade terete with 5 narrow longitudinal grooves:
15a Flowers moderate in size to large, tepals (14–)17–40 mm long, mostly whitish or creamy white to beige or pink, usually darker pink on reverse; stamens unilateral and declinate; bracts acute (mostly sect. *Engysiphon*):
16a Leaves not sticky, terete with hairline longitudinal grooves; perianth tube 12–20 mm long; tepals 20–30 mm long; plants of exposed rock outcrops only seasonally moist. . . . . 5. *G. fourcadei*
16b Leaves sticky, sometimes only sheaths, blades always with the margins strongly thickened or raised but if 4-grooved then grooves clearly visible:
17a Leaf blades with margins raised and winged but central vein hardly thickened, thus appearing H-shaped in cross section, marginal wings often curving inward and blade thus often evidently terete:
18a Tepals linear or narrowly lanceolate, 3.0–4.5 mm wide, usually uniformly white. . . . . 55. *G. tenella*
18b Tepals oblong to obovate, 4.5–8.0 mm wide, usually beige to whitish flushed with pink or uniformly pink:
19a Stamens unequal in length, one anther longer than other two; anthers dark purple-black . . . . . 54. *G. melanthera*
19b Stamens equal in length; anthers yellow or pink, never purple-black:
20a Perianth tube 15–30 mm long; spike borne on well-developed stem, (1)2- to 4(5)-flowered . . . . . 53. *G. bonaspei*
20b Perianth tube 40–80 mm long; spike borne on a disproportionately short stem, sometimes spike virtually at ground level, (1–)3- to 9-flowered . . . . . 56. *G. exscapa*
17b Leaf blades terete to linear or falcate, with both central vein and margins thickened and winged but visibly with 2 narrow grooves on each surface:
21a Perianth tube ± 8 mm long, included in bracts and about a third as long as tepals . . . . . 49. *G. brevituba*
21b Perianth tube 20–50 mm long, reaching at least to bract apices or exceeding bracts and about as long as or longer than tepals:
22a Tepals 17–27 mm long, white or barely flushed with pink. . . . . 51. *G. longifolia*
22b Tepals 28–40 mm long, pink or cream-coloured, becoming flushed with pink with age:
23a Tepals slightly longer than perianth tube, 9–15 mm wide. . . . . .50. *G. schinzii*
23b Tepals shorter than perianth tube, 7–10 mm wide . . . . . 52. *G. confusa*
15b Flowers small to moderate in size, tepals mostly 6–25(–30) mm long, either white to yellow, or blue or deep pink (whitish flushed pink in two species); stamens either symmetrically arranged or unilateral and declinate; bracts obtuse:
24a Leaf blade terete with four hairline longitudinal grooves:
25a Perianth tube elongate, 40–80 mm long. . . . . 42. *G. stenosiphon*
25b Perianth tube short, 2–9 mm long:
26a Flowers small, white to creamy white or yellow, tepals cupped or outspread when fully open, 8–14 mm long . . . . . .39. *G. juncea*
26b Flowers moderate in size, pale to golden yellow, tepals often remaining cupped when fully open, 15–25 mm long:
27a Tepals golden-yellow and spreading when fully open; perianth tube 3–5 mm long . . . . . .40. *G. furva*
27b Tepals lemon-yellow and cupped when fully open; perianth tube 7–9 mm long. . . . . 41. *G. sufflava*
24b Leaf blade linear to falcate with two visible, narrow to relatively wide longitudinal grooves on each surface:
28a Flowers mauve, blue, purple or pink:
29a Perianth tube 7–8 mm long; spike 1- to 4-flowered. . . . . 31. *G. lithicola*
29b Perianth tube 3–6 mm long; spike 4- to 10-flowered:
30a Plants 150–350 mm tall; flowers pale mauve. . . . . 32. *G. purpurascens*
30b Plants 80–140 mm tall; flowers pale pink (darkening when dry) . . . . . 48. *G. helmei*
28b Flowers white to cream-coloured or yellow:
31a Stem minutely hairy in upper half. . . . . .37. *G. intermedia*
31b Stem smooth:
32a Flowers small, tepals 7–9 mm long. . . . . .36. *G. pappei*
32b Flower moderate in size, tepals 10–22 mm long:
33a Flowers whitish to cream-coloured, outer tepals usually flushed reddish outside; tepals 10–15 mm long and perianth tube 3–4 mm long . . . . . 35. *G. hispidula*
33b Flower pale or bright yellow, not normally flushed red on reverse; tepals 16–26 mm long and perianth tube 5–11 mm long:
34a Bracts not normally sticky; perianth tube 9–11 mm long; filaments 8–9 mm long; flowers pale yellow with dark centre . . . . . .34. *G. darlingensis*
34b Bracts sticky and usually with sand adhering; perianth tube 5–8 mm long; filaments 3–8 mm long; flowers bright or pale yellow, with or without dark tube . . . . . .33. *G. humilis*
14b Leaves plane or nearly so, margins and central veins only slightly raised:
35a Flowers zygomorphic with stamens and style unilateral and declinate:

36a Flowers purple or blue; tepals 12–18 mm long:
37a Leaves prostrate, soft-textured; flowers blue-mauve; perianth tube ± 3 mm long . . . . . 12. *G. monticola*
37b Leaves upright, firm-textured; flowers purple; perianth tube (5–)6–8 mm long . . . . . 27. *G. karooica*
36b Flowers pink with darker markings; tepals 22–32 mm long:
38a Stems and leaves trailing; leaf blades soft-textured; perianth tube 10–13 mm long . . . . . 4. *G. outeniquensis*
38b Stems and leaves erect; leaf blades firm-textured; perianth tube 8–10 mm long. . . . . 3. *G. roseoalba*
35b Flowers actinomorphic with stamens symmetrically arranged:
39a Leaves linear to narrowly sword-shaped or terete, mostly 1–2(–4) mm wide, never hairy even on margins; spike sometimes with only 1 or 2 flowers:
40a Perianth tube 6–8 mm long, usually exserted from bracts; flowers white to creamy white, rarely pale yellow:
41a Leaf blades plane however narrow; plants 40–80 mm high; stem rarely branched, never dichotomously . . . . . 15. *G. setacea*
41b Leaf blades terete; plants usually more than 120 mm high; stem usually dichotomously branched . . . . . 20. *G. geminata*
40b Perianth tube 2–5 mm long, included in bracts; flowers white, yellow or lilac:
42a Flowers clear yellow; corms pointed at base or bell-shaped with flat base:
43a Flowers cup-shaped; filaments 7–10 mm long; tepals 13–25 mm long; perianth tube ± 4 mm long . . . . . 18. *G. malmesburiensis*
43b Flowers rotate when fully open; filaments 2–4 mm long; tepals (6–)8–15(–18) mm long; perianth tube 2–3(–4) mm long:
44a Style branches 2–3 mm long, filiform, ciliolate with hairs shorter than width of style branch; tepals (6–)8–15(–18) mm long; anthers 3–6 mm long . . . . . 17. *G. ornithogaloides*
44b Style branches ± 1.5 mm long, linear, densely ciliate with hairs longer than width of style branch; tepals 6–7 mm long; anthers ± 1.5 mm long . . . . . 19. *G. platystigma*
42b Flowers white or lilac; corms pointed at base:
45a Flowers tiny, tepals 3–6 mm long; perianth tube 1.0–2.5 mm long . . . . . 14. *G. nana*
45b Flowers somewhat larger, tepals 6–12 mm long; perianth tube 2–5 mm long:
46a Flowers pale lilac or purple; perianth tube 2–3 mm long; leaves soft-textured, spreading or prostrate . . . . . 11. *G. delicatula*
46b Flowers white; perianth tube 2–5 mm long; leaves firm, ascending to erect, plane or terete:
47a Perianth tube 3–5 mm long; outer tepals rarely flushed red or purple outside; leaves ± sword-shaped, 2–9 mm wide. . . . . 13. *G. bracteata*
47b Perianth tube 2.0–2.5 mm long; outer tepals red outside; leaves up to 1 mm wide, linear-falcate, exceeding the spike. . . . . 16. *G. lapidosa*
39b Leaves sword-shaped, lanceolate or ovate, (2–)3–10 mm wide, smooth or hairy, sometimes only on margins; spike often with more than 2 flowers:
48a Basal leaves ± upright:
49a Perianth tube 8–10 mm long; flowers pale pink. . . . . 2. *G. elsiae*
49b Perianth tube 2–6 mm long; flowers white, pink, or blue to violet:
50a Plants branching mainly at base; flowering stems mostly 1- or 2(3)-flowered; flowers white, sometimes flushed red on reverse. . . . . 13. *G. bracteata*
50b Plants branching above ground level, or unbranched; flowering stems usually with at least 3 flowers and as many as 7:
51a Flowers blue; leaf sheaths and sometimes proximal parts of blades and margins minutely hairy to pubescent . . . . . 28. *G. pusilla*
51b Flowers never blue; leaves smooth entirely or minutely hairy on margins:
52a Leaves ½–⅔ as long as spike; flowers white or violet; tepals mostly 8–11 mm long, sometimes longer . . . . . 1. *G. inconspicua*
52b Leaves less than a third as long as spike; flowers mauve, pink or yellow to orange; tepals 13–17 mm long:
53a Flowers deep yellow to orange, dark brown-maroon in centre . . . . . 8. *G. tricolor*
53b Flowers pink or mauve, without dark centre:
54a Perianth tube 4–5 mm long; style branches ± 3 mm long . . . . . 7. *G. foliosa*
54b Perianth tube 2–3 mm long; style branches 4–5 mm long . . . . . 9. *G. nigromontana*
48b Basal leaves prostrate or inclined toward ground:
55a Perianth tube 10–30 mm long, as long as or longer than tepals; leaves usually broadly ovate and minutely velvety along margins. . . . . 24. *G. ovata*
55b Perianth tube 1.5–8.0 mm long; leaves narrowly ovate to lanceolate, usually hairless:
56a Leaves firm-textured; cormlets never produced in aerial leaf axils:
57a Perianth tube 3–4 mm long; flowers creamy white to pale yellow; spike mostly 3- to 6-flowered . . . . . 23. *G. parva*
57b Perianth tube 2.5–3.0 mm long; flowers white; spike 1- or 2-flowered. . . . . 13. *G. bracteata*
56b Leaves soft-textured, often flaccid; cormlets borne in aerial leaf axils:
58a Flowers solitary on each flowering stem, lilac or blue. . . . . 11. *G. delicatula*
58b Flowers usually more than one per flowering stem, white to pale yellow:
59a Stem either without or with only one cauline leaf; flowers fertile, capsules developing rapidly after flowering. . . . . 21. *G. ovalifolia*
59b Stem bearing 2 or more cauline leaves; flowers sterile, and cormlets produced in bract axils in place of capsules after flowering . . . . . 22. *G. bolusii*

Subg. *Geissorhiza*

1a Stem minutely hairy, puberulous or pilose, sometimes only in lower part (hand lens usually needed):
2a Perianth tube (5–)8–25 mm long:
3a Flowers pink; perianth tube 15–17 mm long; one filament shorter than other two . . . . . .78. *G. silenoides*
3b Flowers blue to violet; filaments equal:
4a Perianth tube 18–25 mm long; filaments 8–10 mm long. . . . . 87. *G. kamiesmontana*
4a Perianth tube 5–11 mm long; filaments 5–6 mm long:
5a Tepals 14–18 × 3–6 mm; anthers 5–7 mm long. . . . . .85. *G. namaquensis*
5b Tepals (6–)8–10 × 1.5–2.0 mm; anthers 2–3 mm long . . . . . 86. *G. namaquamontana*
2b Perianth tube < 4 mm long:
6a Leaves ± plane with margins and central vein slightly to moderately thickened, but not obviously winged; margins and central vein smooth or minutely ciliate:
7a Perianth predominantly purple, pale in throat; short filament at least 4 mm shorter than long filaments; tepals 18–23 mm long. . . . . 81. *G. inaequalis*
7b Perianth predominantly blue to violet or white with pale throat OR purple with dark purple throat; short filament no more than 2 mm shorter than long filaments; tepals 7–20 mm long:
8a Flowers radially symmetric except for eccentric style; tepals 7–11 mm long; flowers violet to pale blue, purple or predominantly white:
9a Tepals blue with white throat or partly to entirely white; tepals mostly 11–14 × 4–6 mm; main spike mostly with 3–7 flowers; anthers 3–5 mm long . . . . . .79. *G. aspera*
9b Tepals white, sometimes flushed dull purple outside and tepal tips light violet, 7–10 × 3.5–4.0 mm; main spike with 1–4 flowers; anthers 2–3 mm long. . . . . 80. *G. demissa*
8b Flowers zygomorphic with unilateral stamens and style; tepals 14–20 mm long; flowers predominantly violet with pale throat or pale centre edged in dark pigment:
10a Flowers with large pale, translucent centre edged with dark violet or red; filaments curved and slightly thickened in middle; spike with 1 or 2(–5) flowers; pollen usually red-brown (or white) . . . . . 83. *G. monanthos*
10b Flowers violet with pale throat; filaments straight and filiform throughout; spike with 2–5 flowers; pollen pale mauve or white. . . . . 82. *G. lewisiae*
6b Leaves with raised and winged margins, wings held ± at right angles to blade or arching inward; wing edges smooth or ciliate to long-hairy:
11a Flowering stem with a short, membranous, scale-like bract in upper third sometimes subtending a branch:
12a Style always short, dividing below level of anthers; flowers glossy pink to purple with dark centre; filaments, style and style branches dark purple . . . . . .92. *G. cantharophila*
12b Style usually at least reaching to middle of anthers (occasional short-styled plants may occur in some populations); flowers blue to violet, mauve or white with pale centre, often edged with darker colour, style and style branches white to pale blue or mauve:
13a Leaf margins raised into broad wings, blade thus H-shaped in cross section; tepals 8–9 mm long; anthers ± 2.5 mm long . . . . . 90. *G. scopulosa* (see also 105. *G. sp. 1.*)
13b Leaf margins raised into narrow horizontal or ascending wings, blade ± I-shaped (not H-shaped) in cross section; tepals at least 12 mm long; anthers at least 4 mm long:
14a Long filaments 10–12 mm long; basal leaves prostrate . . . . . .93. *G. reclinata*
14b Long filaments 4–6 mm long; basal leaves erect to falcate . . . . . 91. *G. heterostyla*
11b Flowering stem without a scale-like bract in upper third:
15a Plants rarely higher than 80 mm; tepals 7–8 × 2–3 mm . . . . . 99. *G. saxicola*
15b Plants (120–)160–300 mm high; tepals 12–14 × 4–5 mm:
16a Flowers white to pale pink or pale mauve; stamens unilateral and horizontal to drooping; long filaments 6–7 mm long . . . . . 103. *G. nutans*
16b Flowers usually blue (or white); stamens symmetrically disposed; long filaments 3–4 mm long . . . .94. *G. arenicola*
17a Leaves plane with margins and central vein slightly thickened but not winged; flowers zygomorphic with stamens and style unilateral and declinate; anthers and pollen brown:
18a Flowers white with reddish to brown, patterned centre . . . . . 84. *G. tulbaghensis*
18b Flowers glossy dark blue-violet, pale in throat . . . . . 95. *G. splendidissima*
17b Leaves with margins significantly thickened and/or raised into horizontal or ascending wings; flowers radially symmetric except for eccentric style; anthers and pollen not brown, usually white to yellow:
19a Leaf margins and central vein heavily thickened rendering blades 2-grooved on each surface; margins smooth not ciliate . . . . . 75. *G. ciliatula*
19b Leaf margin edges raised into horizontal or ascending wings; marginal wing edges minutely ciliate:
20a Flowers small; tepals 6–8 mm long; anthers ± 2.5 mm long . . . . . 100. *G. erubescens*
20b Flowers larger; tepals 12–28 mm long; anthers 6–8 mm long
21a Flowers white with yellow-green throat; filaments ± 7 mm long; style dividing opposite or shortly beyond anther tips. . . . . 101. *G. leipoldtii*
21b Flowers mauve-pink with dark centre; filaments 4–5 mm long; style dividing opposite middle of anthers . . . . . 102. *G. ixioides*
1b Stem smooth:
22a Stamens unequal, one at least 0.5 mm and usually more than 2 mm shorter than others; leaf margins lightly to moderately thickened but never raised into wings extended at right angles to surface:
23a Flowers small, with tepals 7–11 mm long:

24a Stem inclined to trailing, usually 1-branched, occasionally 2-branched; flowers white . . . . . 74. *G. bryicola*
24b Stem erect, simple or usually 2- or 3-branched; flowers white or blue to violet:
25a Flowers blue to violet . . . . . 73. *G. ramosa*
25b Flowers white, outer tepals often flushed blue to purple outside . . . . . 65. *G. minuta*
23b Flowers moderate in size to large, tepals (12–)14–30 mm long:
26a Flowers white or creamy yellow with or without dark centre:
27a Flowers pale yellow with blackish centre; tepals 22–30 mm long; stamens unilateral and declinate, longer filaments 15–20 mm long . . . . . 61. *G. barkerae*
27b Flowers uniformly creamy yellow; tepals 18–28 mm long; stamens symmetrically arranged, longer filaments 7–9 mm long . . . . . 62. *G. louisabolusiae*
26b Flowers white, blue, purple, mauve, or pink:
28a Perianth tube short, up to 3 mm long
29a Corm tunics ± soft-papery in texture; tepals 15–18 mm long; plants of the Cape Peninsula . . . . . 72. *G. tabularis*
29b Corm tunics hard and woody; tepals 10–18(–22) mm long; plants of the South Coast, Worcester to Port Elizabeth . . . . . 91. *G. heterostyla*
28b Perianth tube 4–25 mm long:
30a Leaf blades plane . . . . . 76. *G. pseudinaequalis*
30b Leaf blades with margins and central vein moderately to heavily thickened:
31a Perianth tube 4–6 mm long. . . . . 69. *G. burchellii*
31b Perianth tube 10–25 mm long:
32a Tepals 12–15 mm long. . . . . 77. *G. rupicola*
32b Tepals 22–30 mm long:
33a Perianth tube 10–18 mm long; anthers and pollen yellow . . . . . 70. *G. grandiflora*
33b Perianth tube 22–25 mm long; anthers purple and pollen ± pink. . . . . 71. *G. callista*
22b Stamens equal in length; leaf margins either only lightly to moderately thickened or raised into wings held at right angles to surface and minutely hairy to hispid along edges:
34a Leaf blades minutely to velvety hairy on veins and margins; bracts ± dry and rust distally at anthesis:
35a Leaf blades with the margins and central vein raised and winged, minutely hairy to pubescent on edges; stem without scale-like bract in upper half:
36a Plants small, 70–120(–140) mm high; tepals ± 8 × 3–4 mm . . . . . 98. *G. exilis*
36b Plants mostly 150–250 mm high; tepals (8–)10–24 × 6–10 mm:
37a Flowers white to cream-coloured; tepals (8–)10–18 × 6–7 mm; anthers 4–6 mm long. . . . . 96. *G. inflexa*
37b Flowers white to pink, red or purple; tepals 18–24 × 8–10 mm; anthers 7–8 mm long . . . . . 97. *G. erosa*
35b Leaf blades ± ribbed and velvety; stem with 1 or 2 scale-like bracts in upper half:
38a Flowers ± white, outer tepals flushed reddish or mauve on reverse or uniformly blue; tepals ± 10 mm long . . . . . 88. *G. divaricata*
38b Flowers blue to mauve; tepals 12–17 mm long . . . . . 89. *G. subrigida*
34b Leaf blades not visibly hairy or minutely hairy; bracts remaining green or dry and pale distally:
39a Leaf blades of lower 2 leaves linear or terete, margins and central veins moderately to heavily thickened, grooves between raised parts sometimes very narrow:
40a Foliage leaves 2, upper one sheathing lower half of stem and with short free blade; stem bearing short, membranous, scale-like bract in upper half . . . . . 58. *G. scillaris*
40b Foliage leaves 3, sometimes the lowermost lost by flowering time; stem without a scale-like bract in upper half:
41a Leaf blades terete with 4 hair-like longitudinal grooves. . . . . 63. *G. brehmii*
41b Leaf blades with central vein and margins separated by wide grooves. . . . . 59. *G. similis*
39b Leaf blades of lower 2 leaves with two or more ribs (including central vein):
42a Flowers white to pale yellow, sometimes with dark central mark:
43a Tepals mostly 11–25 mm long and perianth tube mostly 4–8 mm long; tepals often flushed reddish on reverse, often without dark centre . . . . . 59. *G. imbricata*
43b Tepals mostly 10–16 mm long and perianth tube 2–4 mm long; tepals seldom flushed red on reverse and with dark centre:
44a Spikes mostly 2- or 3-flowered, rarely more; perianth cream-coloured to yellow with a dark brown to purplish centre . . . . . 60. *G. purpureolutea*
44b Spikes mostly at least 5-flowered; perianth uniformly white or cream-coloured . . . . . 64. *G. sulphurascens*
42b Flowers blue-violet with red centre:
45a Stamens and style unilateral and declinate; style branches linear-filiform; flower with red centre edged in white . . . . . 68. *G. radians*
45b Stamens and style symmetrically arranged; style branches ovate-spathulate, about 2–3 × 2 mm; flower with red centre not edged in white:
46a Perianth tube 6–9 mm long; anthers erect, borne below style branches . . . . . 66. *G. eurystigma*
46b Perianth tube up to 2.5 mm long; anthers arching inward, borne above style branches . . . . . 67. *G. mathewsii*

Subg. 1. **Weihea**

Subg. **Weihea** *(Eckl. ex Baker) Goldblatt* in Annals of the Missouri Botanical Garden 72: 309 (1985). *Geissorhiza* sect. *Weihea Eckl. ex* Baker: 95 (1877); Foster: 39 (1941). Type: *G. ovata* (Burm.f.) Aschers. & Graebn. (as *G. excisa* (Thunb.) Ker Gawl.), lecto., effectively designated by Foster: 39 (1941).

[*Weihea* Eckl.: 309 (1827), invalid name without description.]

Plants with corm tunics concentric, ± woody, splitting vertically into ± elliptic sections, or ± papery to fibrous. *Leaves* lanceolate to sword-shaped, linear, blades plane or with margins and main vein thickened, then sometimes terete with narrow longitudinal grooves, smooth rarely ciliate-pubescent. *Stem* smooth, rarely ciliate. *Spike* with bracts green, sometimes becoming dry above, rarely rusty brown. *Flowers* actinomorphic, rotate to salver-shaped zygomorphic and declinate; perianth tube ± as long as bracts, very short, or extremely long (sect. *Engysiphon*), stamens equal, rarely included in the tube.

Species 57.

Sect. 1. **Weihea** *Eckl. ex Baker* in Journal of the Linnean Society, Botany 16: 95 (1877). Type: *Geissorhiza ovata* (Burm.f.) Aschers. & Graebn.

Geissorhiza subsect. *Foliosae* R.C.Foster: 55 (1941). Type: *G. foliosa* Klatt

Corm tunics woody to soft in texture; leaves lanceolate to sword-shaped or linear, blades plane, smooth, occasionally terete and 4-grooved; stem smooth; spike 1–several-flowered, bracts green, sometimes becoming dry above; flowers rotate to salver-shaped, radially symmetric or zygomorphic, tube ± as long as bracts or up to twice as long; when zygomorphic stamens and style declinate.

Species 24: Core Cape Floristic Region, South Africa.

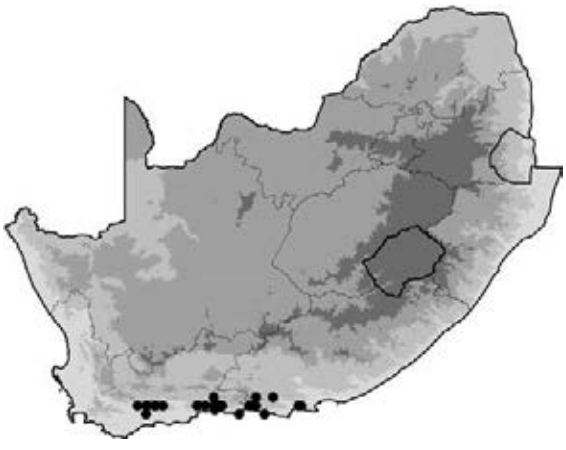
1. **Geissorhiza inconspicua** *Baker* in Bulletin of Miscellaneous Information, Kew 1906: 26 (1906); Goldblatt: 309 (1985). Type: South Africa, [Western Cape], George, Montagu Pass, *Penther 713* (K, holo.).

   Geissorhiza violacea Baker: 26 (1906). Type: South Africa, [Western Cape), Knysna, 'Blau Krantz' River, *Penther 677* (K, holo.).

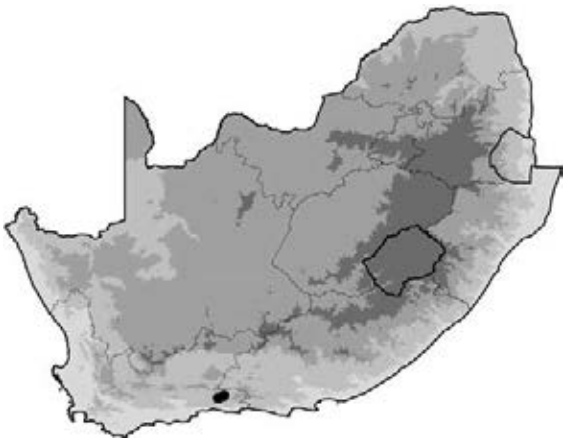
Plants 100–180(–300) mm high. *Corm* globose, asymmetric with obliquely flattened side extending downward, 5–8 mm diam.; tunics concentric, dark brown, outer layers sometimes ± papery and soft, fragmenting irregularly into sections. *Stem* simple or more often 2- to 5-branched from base and upper nodes. *Leaves* 3 to 5, usually erect, lower 2 or 3 basal, largest, 2.5–6.0 mm wide, sword-shaped to linear, ± ½–⅔ as long as stem, upper leaves smaller, sometimes entirely sheathing, uppermost often bract-like. *Spike* (1–)3- to 7-flowered; bracts 6–8 mm long, ± membranous above, often reddish on margins, inner ± as long as outer. *Flowers* rotate, either blue to purple or white with outer tepals pink outside; perianth tube 4–5(–6) mm long, cylindric, reaching ± to apex of bracts; tepals obovate, 8–11(–15) × 5–6 mm wide. *Filaments* equal, 4–6(–8) mm long; anthers 3–4 mm long; pollen yellow. *Style* dividing opposite apex of anthers, branches ± 2 mm long. *Capsules* obovoid, 5–7 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: October to November at low altitudes, occasionally to February at highest altitudes.

Distribution and ecology: extending from the Langeberg near Swellendam in Western Cape, South Africa to Port Elizabeth in Eastern Cape; montane or on flats along the coast.

Diagnosis: *Geissorhiza inconspicua* can usually be distinguished by its 3 to 5 comparatively short leaves clustered at the base of the plant and typically well-branched stems with several-flowered spikes held well above the leaves. Flowers are either white or violet to purple. It is sometimes difficult to separate from the Langeberg species, *G. foliosa*, but this species has shorter and often relatively broad leaves in contrast to the longer, narrowly sword-shaped to linear leaves of *G. inconspicua*, and larger flowers with tepals 13–17 mm long and anthers 4–6 mm long vs. tepals mostly 8–11 mm long (rarely up to 15 mm) and anthers 3–4 mm long in *G. inconspicua.*



Distribution of ***Geissorhiza inconspicua***.



Distribution of ***Geissorhiza elsiae***.

2. **Geissorhiza elsiae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 311 (1985). Type: South Africa, [Western Cape], Kammanassie Mtns, Mannetjiesberg, 4 000–5 000 ft [1 200–1 500 m], southern slopes, *Esterhuysen 6412* (BOL, holo.; BOL, K, PRE, iso.).

Plants 140–250 mm high. *Corm* globose with one side flattened below, 7–10 mm diam.; tunics concentric, dark brown. *Stem* ± erect, simple or branched from upper 1 or 2 nodes. *Leaves* (3)4 or 5, erect to falcate, at least lower 3 basal, (2–)3–6 mm wide, sword-shaped to ± linear, reaching base of spike or only ½–⅓ as long as stem, upper leaf cauline, smaller than basal, sometimes ± bract-like. *Spike* 2- to 4-flowered; bracts 12–14 mm long, soft-textured, becoming reddish distally and on veins, inner usually shorter than outer. *Flowers* ± salver-shaped, purple with darker markings in lower midline of tepals (± colourless when dry); perianth tube 6–10 mm long, cylindric, initially reaching to ± apex of bracts, later shortly exserted; tepals obovate, 15–20 × 7–8 mm. *Filaments* equal, 6–11 mm long; anthers 5–6 mm long; pollen yellow. *Style* dividing opposite apex of anthers, branches up to 3 mm long. *Capsules* 7–9 mm long, ovoid. *Flowering time*: late October to mid-November.

Distribution and ecology: a narrow endemic of the Kammanassie Mtns in the Little Karoo in Western Cape, South Africa; on south-facing slopes in cool damp sites.

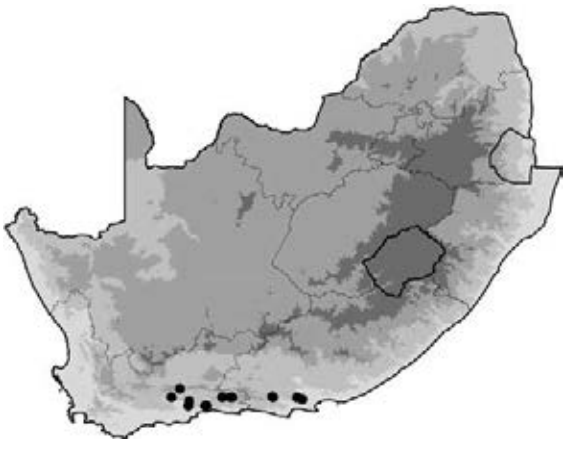
Diagnosis: *Geissorhiza elsiae* is distinguished by its large, purple flowers with tepals 15–20 mm long, 1- to 4-flowered spike, and few-branched habit; branches, when present, are produced from the upper nodes rather than from near the base. It is probably most closely allied to the more widespread southern Cape species, *G. inconspicua* which has smaller flowers, usually violet or white in colour.

3. **Geissorhiza roseoalba** *(G.J.Lewis) Goldblatt* in Annals of the Missouri Botanical Garden 72: 312 (1985). *Acidanthera roseoalba* G.J.Lewis: 266 (1933). *Engysiphon roseoalbus* (G.J.Lewis) G.J.Lewis: 24 (1941). Type: South Africa, [Western Cape], Doorn River, George, *Fourcade 4744* (BOL, holo.; BOL, NBG, iso.).

Plants 150–200 mm high. *Corm* globose, ± asymmetric with an oblique flat side, 8–10 mm diam.; tunics concentric, dark brown, woody, fragmenting irregularly into sections. *Stem* simple or 1-branched from upper node. *Leaves* 3 to 5, erect to falcate, lower 2 or 3 basal, upper cauline and progressively smaller, sometimes uppermost bract-like, 3–6 mm wide, sword-shaped to ± linear, longest usually reaching to ± base of spike or shorter. *Spike* 1- to 3-flowered; bracts 14–18(–25) mm long, becoming membranous above, often reddish on margins, inner equal to or somewhat shorter than outer. *Flowers* zygomorphic, tepals held ± vertically, whitish inside with red markings near base of tepals, flushed reddish outside; perianth tube 8–10 mm long, cylindric, initially included in bracts, or becoming shortly exserted; tepals obovate to elliptic, 22–32 × 10–15 mm wide. *Filaments* equal, unilateral and declinate, 12–20 mm long; anthers 6–8 mm long; pollen yellow. *Style* dividing opposite apex of anthers, branches 3–4 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: August to September.

Distribution and ecology: extending from near Calitzdorp in the Little Karoo in Western Cape, South Africa, east through the Long Kloof and Baviaanskloof to the Great Winterhoek Mtns near Uitenhage in Eastern Cape; mainly on stony sandstone slopes in dry fynbos vegetation, flowering mainly after fire.

Diagnosis: distinguished by the concentric corm tunics, zygomorphic flowers with vertically oriented tepals and unilateral, declinate stamens, *Geissorhiza roseoalba* has relatively large white to pink-flushed tepals, the lower with pink to red markings near the base. At one stage included in the genus *Engysiphon*, now sect. *Engysiphon*, *G. roseoalba* differs markedly from the other species of that section in having three to five fairly soft-textured



Distribution of ***Geissorhiza roseoalba***.

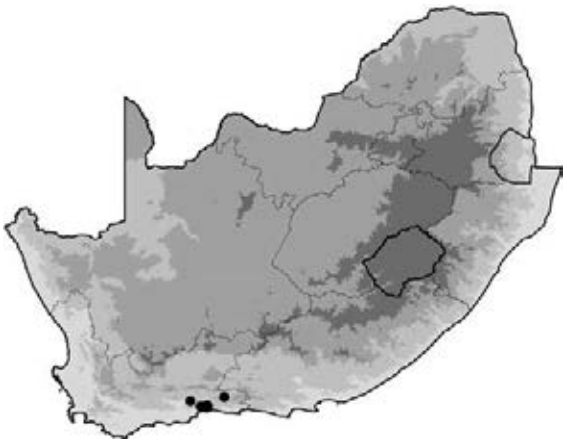
leaves with a plane blade in contrast to the one to two firm leaves with heavily thickened and viscid margins of species of sect. *Engysiphon*.

4. **Geissorhiza outeniquensis** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 313 (1985). Type: South Africa, [Western Cape], George, Outeniqua Mtns, Jonkersberg, wet rocky streambanks and waterfalls, *Esterhuysen 19379* (BOL, holo.; K, PRE, iso.).

Plants 200–500 mm long, usually decumbent or trailing, forming clumps. *Corm* depressed-globose, symmetric, 6–8 mm diam., forming short runners terminating in new plants; tunics apparently concentric, light brown, soft-papery, decaying readily and not accumulating. *Stem* decumbent, unbranched. *Leaves* 4–several, decumbent to trailing, at least lower 2 basal, upper cauline and progressively smaller, sometimes bract-like, 3–6 mm wide, linear, usually reaching base of spike, sometimes longer. *Spike* 2- to 4-flowered; bracts 16–20(–24) mm long, green, becoming submembranous above, inner slightly shorter than outer. *Flowers* zygomorphic, declinate, pink to purple with dark pink markings near base of lower tepals, purple outside; perianth tube 10–13 mm long, cylindric, ± as long or slightly longer than bracts; tepals ellipsoid, 26–32 × 10–14 mm. *Filaments* equal, unilateral, declinate, 15–20 mm long; anthers 6–8 mm long; pollen yellow. *Style* dividing opposite apex of anthers, branches 3–4 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: December to mid-January.

Distribution and ecology: restricted to the Outeniqua Mtns immediately around George in Western Cape, South Africa; along streams and waterfalls in moist shady kloofs.

Diagnosis: a member of sect. *Weihea* and evidently most closely related to *Geissorhiza roseoalba*, *G. outeniquensis* has, like that species, a zygomorphic flower with declinate stamens and style. The flowers have a perianth tube 10–13 mm long vs. 8–10 mm in *G. roseoalba* and it also differs in its riverine habitat, soft-textured corm tunics and four to several, soft-textured, often trailing leaves. *Geissorhiza outeniquensis* has an unusual caespitose habit: the main plants produce short runners which sprout to form new stems and leaf clusters close to the parent plant. It seems to have lost the deciduous habit of the genus and does not die back and become dormant during the later summer and autumn.



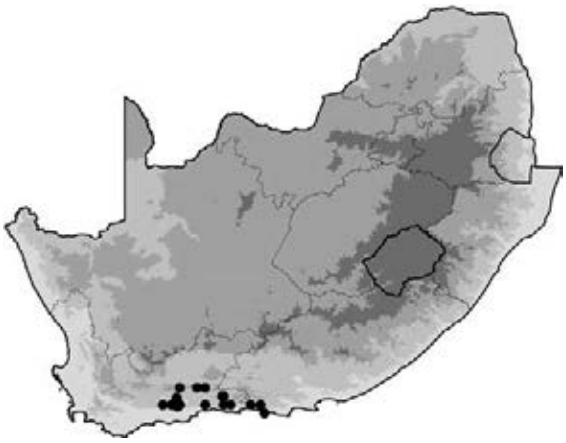
Distribution of ***Geissorhiza outeniquensis***.

5. **Geissorhiza fourcadei** *(L.Bolus) G.J.Lewis* in Journal of South African Botany 7: 32 (1941); Goldblatt: 315 (1985). *Acidanthera fourcadei* L.Bolus: 118 (1927). Type: South Africa, [Eastern Cape], Humansdorp, southern slopes of Witte Els Berg, *Fourcade 2968* (BOL, lecto., designated by Goldblatt: 315 (1985); BOL, MO, PRE, S, isolecto.).

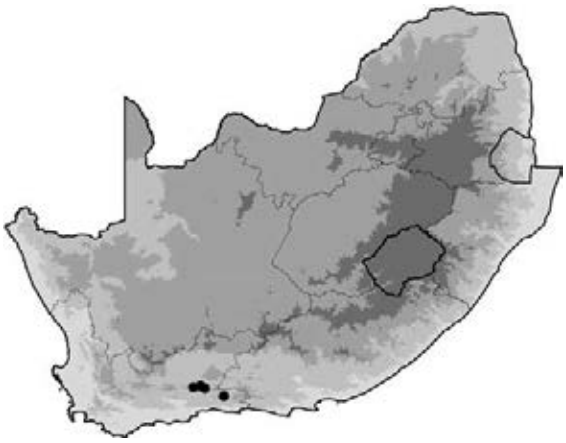
Plants 150–300 mm high. *Corm* ± ellipsoid, 6–10 mm diam., corms of previous seasons persistent and accumulating below current corm; tunics brown, woody to soft-papery, concentric but sometimes imbricate by displacement especially when soft, fragmenting irregularly from base and apex, outer layers sometimes ± fibrous, extending upward in a collar with decaying leaf bases. *Stem* erect, smooth, simple or 1- or 2-branched, bearing 2 or 3 dry sheathing bracts below spike. *Leaves* 3 to 5, lower 2 to 4 leaves basal, terete or nearly so, margins and main vein much enlarged, thus narrowly 4-grooved, ± ½ to as long as stem, uppermost cauline, short, partly to entirely sheathing. *Spike* 1-flowered on main axis and lateral branches; bracts drying near apex, (12–)16–30 mm long, inner as long, or slightly shorter than outer. *Flowers* salver-shaped, pink to purple; perianth tube (8–)17–20 mm long, cylindric, widening gradually near apex, reaching almost to tips of bracts or shortly exserted; tepals oblanceolate-elliptic, 25–30 × ± 11 mm. *Filaments* equal, 13–20 mm long; anthers 10–12 mm long, brown; pollen brown. *Style* eccentric, dividing opposite or beyond anther tips. *Flowering time*: mid-January to early May.

Distribution and ecology: widespread but fairly rare in the mountains of southern Western Cape, South Africa and recorded from the Great Swartberg between Swartberg Pass and Meiringspoort, the Kammanassie Mtns and the Outeniqua and Tsitsikamma mtns from Robinson's Pass to Witte Els Berg; in stony sandstone ground, evidently in damp situations, including seeps and streambanks. The late summer to autumn blooming habit is unusual and related to its pollination by long proboscid flies that are on the wing at this time of year.

Diagnosis: *Geissorhiza fourcadei* is distinctive in the genus in the persistent bases of leaves and cataphylls which accumulate in a collar around the stem base and in the spike and its branches always bearing just one flower. It is also notable in having the corms of past seasons often persist instead of decaying, so that a series of old corms accumulate behind the current one. *Geissorhiza fourcadei* seems isolated in the subgenus but is best referred to sect. *Weihea* in which there is a tendency



Distribution of ***Geissorhiza fourcadei***.



Distribution of ***Geissorhiza uliginosa***.

for the reduction of the number of flowers in the spike. It is also distinctive here in its terete, 4-grooved leaf.

Some collections from the Swartberg stand out in having unusually short bracts (12–15 mm long) and a short perianth tube (± 8 mm long) but otherwise match *G. fourcadei* well. They may represent a depauperate population as other collections from the Swartberg are more-or-less typical and accord with those from the Outeniqua Mtns, or they may represent local adaptation to shorter-tongued pollinators.

6. **Geissorhiza uliginosa** *Goldblatt & J.C.Manning* in Novon 5: 159 (1995). Type: South Africa, [Western Cape], Oudtshoorn District, Swartberg Mtns, stream east of Gouekrans Hiking Trail hut, 15 Jan. 1989, *Vlok 2075* (NBG, holo.; MO, iso.)

Plants 150–300 mm high. *Corm* much reduced, 3–5 mm diam.; tunics light brown, soft-textured, not accumulating with age. *Stem* trailing, usually with at least 1, sometimes up to 4 branches. *Leaves* usually at least 5, lower 3 basal and longest, usually shorter than stem but trailing, plane with lightly thickened margins and main vein, cauline leaves shorter than basal, largely or entirely sheathing. *Spike* 1-flowered; bracts green, margins often red, outer 16–20 mm long, inner ± as long or slightly shorter than outer. *Flowers* zygomorphic, funnel-shaped, pale pink to purple, creamy white in throat, base of tepals dark pink; perianth tube narrowly funnel-shaped, 9–13 mm long; tepals ovate-elliptic, subequal, 20–22 × 9–11 mm, subpatent when fully open. *Filaments* equal, unilateral, declinate, 12–14 mm long; anthers 7–9 mm long, dark brown; pollen brown. *Style* declinate, extended below filaments, branches ± 4 mm long. *Flowering time*: December and January.

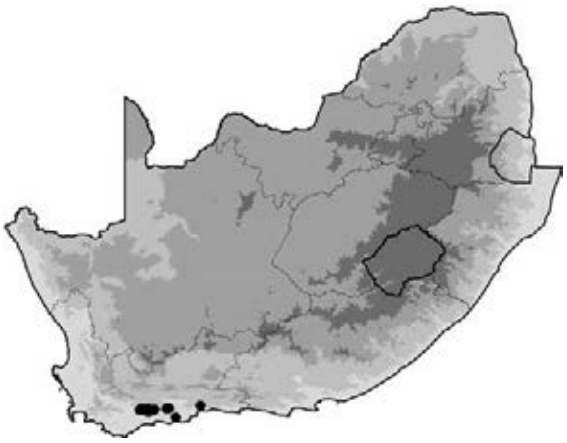
Distribution and ecology: restricted to the Great Swartberg in southern Western Cape, South Africa; in wet sites on cliffs, streambanks and waterfalls.

Diagnosis: *Geissorhiza uliginosa* is distinguished by the branched stems, each branch bearing just a single flower, a small corm with soft corm tunics and plane, trailing leaves. The pink flowers are zygomorphic and have a short perianth tube 9–13 mm long and subequal tepals 20–22 mm long. The single-flowered branches and unilateral declinate stamens recall *G. fourcadei*, but this has a longer perianth tube, (8–)17–20 mm long, xeromorphic, terete, 4-grooved leaves and larger corms with persistent firm-papery corm tunics.

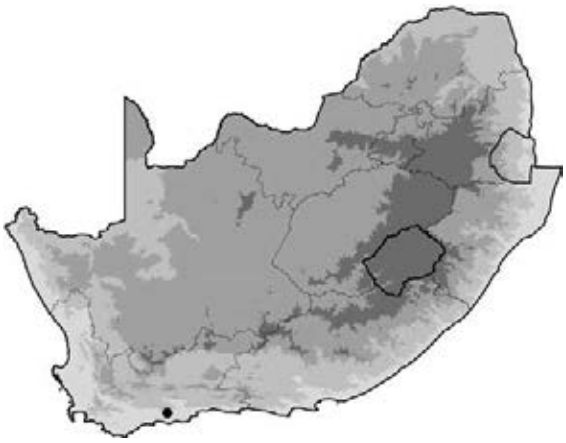
7. **Geissorhiza foliosa** *Klatt* in Linnaea 34: 658 (1866); Goldblatt: 317 (1985). Type: South Africa, [Western Cape], Swellendam, 'Berge bei Puspasvlei,' *Ecklon & Zeyher Irid. 218* (70.10) (B, lecto. effectively designated by Foster: 62 (1941); B, BM, E, FI, K, L, LD, MO, P, PRE, S, SAM, W, Z, isolecto.).

[*Geissorhiza nigromontana* Eckl.: 21 (1827), invalid name without description.]

Plants 80–200(–300) mm high. *Corm* globose, asymmetric with an obliquely flattened side extending shortly downward, 5–10 mm diam.; tunics concentric, dark brown, hard and woody, fragmenting irregularly into sections. *Stem* simple or 1- or 2-branched either from base or from upper nodes. *Leaves* 5 to several, at least lower 3 or 4 basal, erect to falcate, 3–6 mm wide, lanceolate to sword-shaped, typically short and seldom > ⅓ as long as stem, upper leaves cauline, progressively smaller, uppermost often entirely sheathing. *Spike* 2- to 5-flowered; bracts 9–12(–15) mm long, evidently green, becoming dry-membranous above, often reddish along margins, inner usually slightly shorter than outer. *Flowers* actinomorphic, rotate, pale pink to purple, rarely white; perianth tube ± 5 mm long, cylindric, included in bracts; tepals obovate, 13–17 × 6–7 mm. *Filaments* equal, 4–5 mm long; anthers 4–6 mm long; pollen yellow. *Style* dividing opposite apex of anthers, branches 3–4 mm long. *Capsules* 7–9 mm long, narrowly ovoid. *Chromosome number* 2*n* = 26. *Flowering time*: September to early November.



Distribution of ***Geissorhiza foliosa***.



Distribution of ***Geissorhiza tricolor***.

Distribution and ecology: local in southern Western Cape, South Africa along the southern slopes and foothills of the Langeberg between Swellendam and Riversdale; on clay or clay loam slopes and flats.

Diagnosis: distinguished by its 5 to 7, characteristically short, lanceolate leaves, *Geissorhiza foliosa* has relatively large pink to purple flowers with tepals 13–17 mm long and a short perianth tube ± 5 mm long. It is perhaps most easily confused with *G. inconspicua* but this species has smaller, violet to purple or white flowers, with shorter tepals mostly 8–11 mm long and longer leaves reaching at least to the base of the spike.

8. **Geissorhiza tricolor** *Goldblatt & J.C.Manning* in Goldblatt et al., *Bothalia* 39: 127 (2009). Type: Western Cape, Werner Frehse Nature Reserve, south of N2, east of Riversdale, pebbly ferricrete in renosterveld-fynbos transitional vegetation, 6 Oct. 2006, *Manning 3071* (NBG, holo.; MO, PRE, iso.).

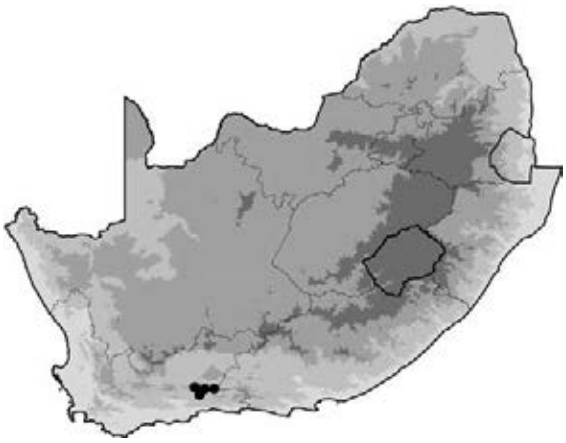
Plants 100–150(–200) mm high. *Corm* obliquely globose, asymmetric and flattened slightly below on one side, 5–6 mm diam., tunics concentric, brown, hard and woody, fragmenting irregularly into sections. *Stem* erect, simple or 1- or 2-branched, either from base or from upper nodes. *Leaves* 6 to 8, lower 4 or 5 basal and largest, lanceolate to sword-shaped, short and mostly < ⅓ as long as stem, 15–50 × (2–)3–5 mm, upper decreasing progressively in size, uppermost bract-like and often without blade. *Spike* (1)2- or 3-flowered; bracts green, flushed reddish distally, elliptic, (12–)15–18 mm long, subequal, inner not notched apically. *Flowers* rotate, golden-yellow with glossy blackish maroon eye covering basal ¼ of tepals, yellowish green in tube, outer tepals flushed reddish on reverse, unscented; perianth tube funnel-shaped, 3–4 mm long; tepals broadly obovate-quadrate, margins irregularly crenulate in distal half, 15–18 mm long, outer 10–11 mm wide, inner 12–14 mm wide. *Filaments* equal, ± 3 mm long, exserted for ± 1 mm, dark maroon; anthers ± 5 mm long at anthesis; pollen yellow. *Style* eccentric, ± 6 mm long, dark maroon, exserted ± 1 mm, dividing opposite lower ½ of anthers, branches 2.5–3.0 mm long. *Flowering time*: September and early October.

Distribution and ecology: a narrow endemic of the hills southeast of Riversdale in Western Cape, South Africa, with the largest population in the small Werner Frehse Nature Reserve; in pebbly ironstone (ferricrete) at the transition between renosterveld and fynbos-thicket.

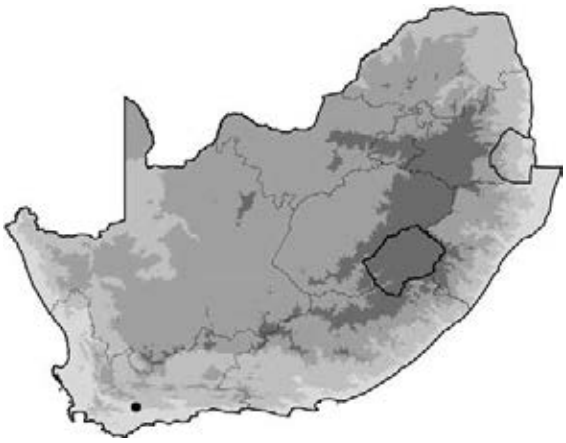
Diagnosis: *Geissorhiza tricolor* is recognised by its deep yellow flowers with exceptionally broad tepals and a dark, maroon-black central eye. The perianth tube, 3–4 mm long, is relatively short in comparison to the tepals, 12–15 mm long. The species recalls *G. inconspicua* and *G. foliosa* in vegetative morphology, but the flowers are larger than in both of these species and very different in colour. *Geissorhiza foliosa* has pink to light purple flowers with a tube ± 5 mm long and tepals 13–17 mm long, and *G. inconspicua* has blue-violet, pink or white flowers with a perianth tube 4–6 mm long and tepals 8–11, rarely up to 15 mm long. The flowers of *G. tricolor* closely resemble those of orange-flowered *Ornithogalum dubium* (Hyacinthaceae), which blooms together with it at the type locality, and both species are assumed to be pollinated by the same suite of hopliine beetles, but no potential pollinators have so far been recorded.

9. **Geissorhiza nigromontana** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 318 (1985). Type: South Africa, [Western Cape], Great Swartberg, Blesberg at Tierkloof, along stream, *Vlok 93* (MO, holo.; NBG, SAAS, iso.).

Plants 100–160 mm high. *Corm* globose, asymmetric with obliquely flattened side extending downward, ± 6 mm diam.; tunics ± concentric, light brown, outer layers apparently brittle-papery. *Stem* usually prostrate below, upright above, simple or branched from base or upper nodes, bearing cormlets at lower nodes. *Leaves* 3 to 6, falcate, at least lower 2 basal, 4–10 mm wide, ⅓–⅔ as long as stem, upper leaves cauline and progressively smaller, uppermost often entirely sheathing. *Spike* 2- or



Distribution of ***Geissorhiza nigromontana***.



Distribution of ***Geissorhiza altimontana***.

3-flowered; bracts 8–10 mm long, green, ± membranous above, inner slightly shorter than outer. *Flowers* rotate, blue-purple; perianth tube 2–3 mm long, cylindric, included in bracts; tepals obovate, 14–16 × ± 6 mm wide. *Filaments* equal, ± 6 mm long; anthers ± 5 mm long; pollen yellow. *Style* dividing ± opposite middle of anthers, branches 4–5 mm long. *Flowering time*: January to February.

Distribution and ecology: local in the Great Swartberg in Western Cape, South Africa; along streams in shade at ± 1 800 m elevation, flowering near the end of summer.

Diagnosis: distinctive in its short-tubed blue-purple flowers, the perianth tube 2–3 mm long and much longer tepals 14–16 mm long, *Geissorhiza nigromontana* has spikes of only 2 or 3 flowers. The style branches are unusually long, 4–5 mm long, and the corm tunics are softly papery. Notably the stem is prostrate at the base and becomes abruptly erect above. It is most probably closely related to *G. foliosa*, a species of the Langeberg foothills, which blooms mainly in October and November and it has the broad flat leaves typical of that species, but *G. foliosa* has a perianth tube 5–6 mm long, a spike of up to 7 flowers and style branches up to 3 mm long. *Geissorhiza nigromontana* is also distinctive in bearing cormlets in the lower stem axils, a feature rare in the genus.

10. **Geissorhiza altimontana** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 39: 129 (2009). Type: South Africa, Western Cape, Langeberg, upper slopes of Leeuriviersberg, 300 m east of peak, 1 550 m, 15 Jan. 2006, *Helme 3778* (NBG, holo.).

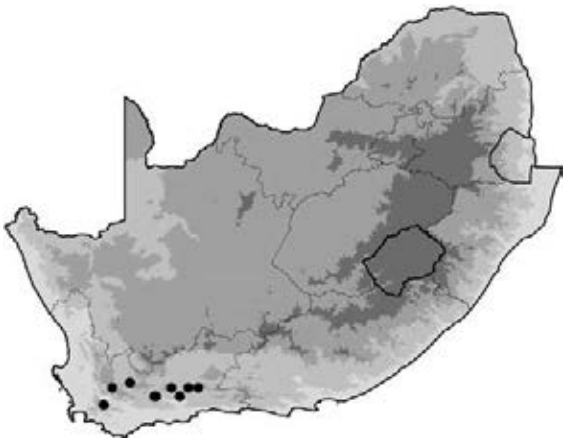
Plants 60–120 mm high, including flowers, base sheathed underground by a collar of dry, persistent fibrous leaf bases, and above ground by dry cataphylls. *Corm* ovoid, 4–6 mm diam.; tunics soft-textured, light brown, evidently concentric, becoming fibrous, not accumulating with age. *Stem* sometimes horizontal at ground level for a short distance, erect above, unbranched, smooth. *Leaves* 5 or 6, lower 4 basal, spreading horizontally and ± prostrate, blades lanceolate, leathery, 20–50 × 2.5–6.0 mm, margins moderately thickened, upper 1 or 2 cauline and shorter, sheathing for ½ their length. *Spike* erect, ± straight, 1- or 2-flowered; bracts with red tips, 7–10 mm long, outer obtuse, inner notched apically. *Flowers* radially symmetric with tepals ascending, pink but ± greenish in throat, unscented; perianth tube ± cylindric, 7–8 mm long; tepals subequal, oblong, ± 14 × 6 mm, ascending and forming a wide cup. *Filaments* equal, ± 8 mm long; anthers ± 4 mm long, sagittate at base for ± 1 mm, yellow; pollen yellow. *Style* dividing opposite anther apices, branches ± 1.3 mm long. *Flowering time*: January.

Distribution and ecology: known from just one collection on Leeuriviersberg (Grootberg) west of Swellendam, in Western Cape, South Africa; high in the Langeberg at ± 1 550 m elevation in unburned veld, on damp, mossy ledges on steep, south-trending slopes.

Diagnosis: with its five or six relatively short leaves, the basal with horizontally spreading blades, low stature and 1- or 2-flowered spikes, *Geissorhiza altimontana* appears most closely allied to the Swartberg species, *G. nigromontana* and *G. uliginosa*. *Geissorhiza uliginosa* is essentially aquatic, growing in streams and waterfalls, and has reduced corms, but *G. nigromontana* has a similar habitat to *G. altimontana*, viz.; damp, mossy ledges in shallow soil and south-facing slopes, and both species flower in the summer months of January and February. The longer perianth tube, 7–8 mm long, and tepals ± 14 mm long, readily separate *G. altimontana* from *G. nigromontana*, which has a very short perianth tube, 2–3 mm long, and tepals 14–16 mm long.

11. **Geissorhiza delicatula** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 319 (1985). Type: South Africa, [Western Cape], shady mountainside, Seven Weeks Poort, *Compton 4016* (NBG, holo.; BOL, iso.).

Plants 30–90(–120) mm high. *Corm* globose, asymmetric with obliquely flattened side extending downward,



Distribution of ***Geissorhiza delicatula***.

3–8 mm diam.; tunics concentric, brown, firm to softly membranous, fragmenting irregularly into sections. *Stem* simple or 1- to 3-branched from base or upper nodes. *Leaves* 3 to 6, at least lower 2 or 3 basal, often prostrate or erect to falcate, 1.5–4.5 mm wide, linear to sword-shaped, half as long as stem, upper cauline and progressively becoming shorter, uppermost often entirely sheathing. *Spike* usually 1(rarely 2 or 3)-flowered; bracts 4–8 mm long, becoming membranous and dry above, sometimes reddish on margins, inner ± as long as outer. *Flowers* rotate, pale lilac-purple, cream-coloured in throat and tube; perianth tube cylindric, 2–3 mm long, included in bracts; tepals obovate, 7–12 × 2.5–4.5 mm. *Filaments* equal, erect, 3–5 mm long; anthers 2.5–3.5 mm long, white; pollen yellow. *Style* dividing toward apex of anthers, branches up to 1.5 mm long. *Capsule* narrowly obovoid, 4–7 mm long. *Seeds* light brown, angular. *Flowering time*: August to September in drier sites, November to December at higher elevations.

Distribution and ecology: local in the mountains of southern Western Cape, South Africa, from Jonas Kop in the west to Swartberg Pass in the east; in stony ground in sheltered often shady sites.

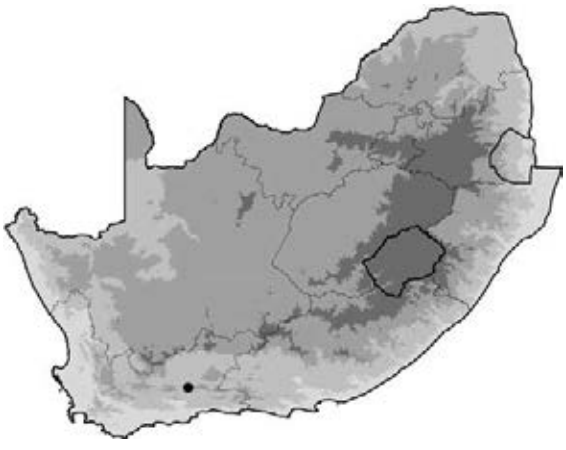
Diagnosis: a small, delicate plant mostly 30–90 mm high, *Geissorhiza delicatula* has simple or 1- or rarely 2-branched, slender stems and small flowers, with tepals 7–12 mm long and a short perianth tube, 3–4 mm long, included in the bracts. It is apparently related to *G. inconspicua* and *G. foliosa*, both larger plants with larger flowers and spikes typically with at least 3 and up to 7 flowers. The plane leaves are soft-textured leaves and often prostrate or decumbent.

12. **Geissorhiza monticola** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 39: 129 (2009). Type: South Africa, Western Cape, Western Cape, Swartberg, road to Gamkasloof, 10 Sept. 2001, *Goldblatt & Porter 11872* (NBG, holo.; MO, iso.).

Plants 100–160 mm high. *Corm* globose, asymmetric with oblique, flattened side, ± 10 mm diam.; tunics concentric, dark brown, fragmenting into vertical sections. *Stem* filiform, flexuose, with up to four branches from axils of cauline leaves. *Leaves* 4 to 7, soft-textured, lower 2 or 3 basal and ± half as long as stem, spreading to prostrate, linear to falcate, plane with slightly thickened and raised main vein, 2–3 mm wide, upper leaves cauline, progressively decreasing in size, partly to entirely sheathing. *Spike* 1-flowered on main axis and branches; bracts green, soft, flushed purple, margins membranous, ± transparent, 8–10 mm long, inner slightly shorter. *Flowers* zygomorphic, nodding with tepals held vertically, blue-mauve with greenish cream-coloured throat edged with dark blue; perianth tube funnel-shaped, slightly curved, ± 3 mm long; tepals narrowly oblong, obtuse, spreading at right angles to tube, 14–18 × 4.0–5.5 mm, inner slightly narrower than outer. *Filaments* unilateral, declinate, 7–9 mm long, exserted 7–8 mm; anthers 3–4 mm long, dull pink. *Style* dividing near apex of anthers, branches 3–4 mm long. *Flowering time*: September.

Distribution and ecology: known only from the central Swartberg, west of Swartberg Pass in Western Cape, South Africa; on south-trending, rocky sandstone slopes in pockets of peaty sand.

Diagnosis: distinguished by its large, zygomorphic flowers solitary on the branches, *Geissorhiza monticola* has a nodding blue perianth and well-exserted, declinate stamens The flowers have a short perianth tube ± 3 mm long and tepals 14–18 mm long. The plane leaves are prostrate with slightly thickened margins and main veins. Its relationships presumably lie with *G. delicatula* of the Langeberg and Swartberg and its allies, with which it shares an oblique corm, several plane leaves with the marginal vein set slightly away from the margin itself, and solitary flowered spikes. *Geissorhiza delicatula* has much smaller, cup-shaped flowers held upright, with elliptical or obovate, pale mauve tepals mostly 7–10 mm long, erect stamens with filaments 3–5 mm long, and a central style of similar length with short style branches



Distribution of ***Geissorhiza monticola***.

up to 1.5 mm long, thus less than half as long as in *G. monticola*. *Geissorhiza nigromontana* may also be confused with *G. monticola*, but it has a stem ± prostrate toward the base, a spike of 2 or 3 flowers (flowers always single in *G. monticola*), bears cormlets in the leaf axils, shorter leaves with blades 4–10 mm wide vs. 2–3 mm in *G. monticola*, and the flowers are, as far as known, upright and radially symmetric.

13. **Geissorhiza bracteata** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 391 (1882); Goldblatt: 319 (1985). Type: South Africa, [Eastern Cape], Olifantshoek, Uitenhage, *Ecklon & Zeyher s.n.* (B: Herb. Lubeck, holo.; probable isotypes *Ecklon & Zeyher Irid. 221* (10.9), B, BM, E, FI, G, LD, MO, PRE, S, W, Z).

[?*Weihea elatior* Eckl.: 22 (1827), invalid name without description. *Geissorhiza tabularis* var. *elatior* Eckl. ms. *Ecklon & Zeyher Irid. 221* (10.9)].

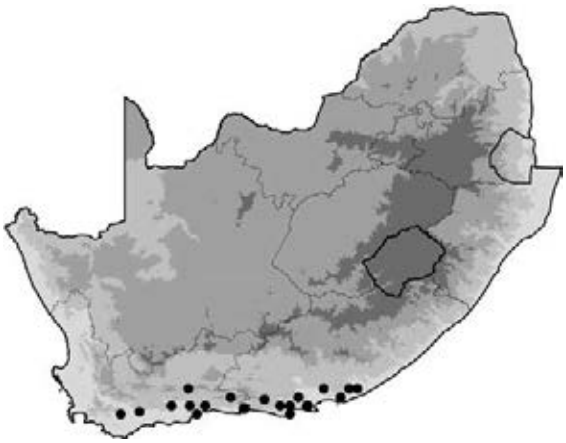
Plants (40–)60–180 mm high. *Corm* ovoid, asymmetric with oblique flat side directed downward, 4–6 mm diam.; tunics pale to dark brown, concentric, outer layers fragmenting irregularly into elliptic sections drawn into points above. *Stem* simple or 2- to 5-branched from base, occasionally also from cauline node. *Leaves* (3)4 to several, lower 2 or 3 basal, sword-shaped, ⅓–½ as long as stem, often prostrate, 2–9 mm wide, upper leaves cauline, progressively smaller, sometimes entirely sheathing. *Spike* usually 1(rarely 2 or 3)-flowered; bracts often reddish along margins, 6–10 mm long, inner usually slightly shorter than outer. *Flowers* actinomorphic, rotate, white, outer tepals sometimes red-flushed outside; perianth tube funnel-shaped, 2.5–5.0 mm long, flared from base; tepals obovate, (5–)8–12 × 4.5–6.0 mm. *Filaments* erect, equal, 5–7 mm long; anthers 2.0–3.5 mm long; pollen yellow. *Style* dividing opposite apex of anthers. *Capsules* narrowly ovoid, 7–9 mm long. *Chromosome number* 2*n* = ± 52. *Flowering time*: September to mid-October.

Distribution and ecology: widespread in southern South Africa, from Montagu and Touws River in Western Cape to Grahamstown in Eastern Cape; in clay or loamy sand in fynbos or forest edges.

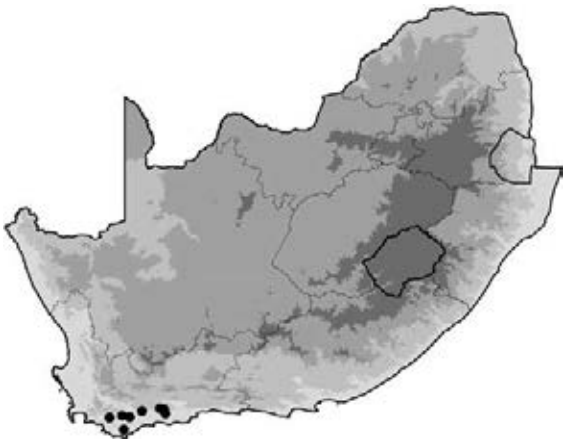
Diagnosis: *Geissorhiza bracteata* is recognised by its relatively small size, several plane leaves often inclined toward the ground or even prostrate, and small white flowers mostly 1 or 2, rarely 3 per spike. Branches, when present, are typically produced from the base of the stem. The flowers have a perianth tube up to 5 mm long and tepals up to 12 mm long. Based on studies of a single population from Hankey in Eastern Cape, *G. bracteata* is polyploid, 2*n* = ± 52, and in the greenhouse proved to be autogamous, which is unusual in the genus.

14. **Geissorhiza nana** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 391 (1882); Goldblatt: 321 (1985). Type: South Africa, [Western Cape], 'Rivierzondereinde,' Swellendam, *Ecklon & Zeyher 3967* (90.9) (as *3969*) (B: Herb. Lubeck, holo.; B, FI, G, K, SAM, W, Z, iso.).

Plants tiny, 25–40(–80) mm high. *Corm* narrowly ovoid, asymmetric, with oblique flat side, 35 mm diam.; tunics middle brown, concentric, drawn into bristles above. *Stem* simple, or up to 3-branched, branches produced from near base, rarely also from aerial node. *Leaves* (3)4 to 6, usually all basal, or uppermost inserted on lower part of stem, plane, half as long, to slightly longer than stem, 1–2 mm wide, narrowly sword-shaped. *Spike* 1- or 2(3)-flowered; bracts 4–6 mm long, sometimes red along margins. *Flowers* actinomorphic, tiny, rotate, white, pale red-brown on outside of outer tepals; perianth tube 1.0–2.5 mm long, nearly cylindric; tepals obovate, 3–6(–8) mm long. *Filaments* erect, equal, ± 2 mm long; anthers 1.2–1.8 mm long, white; pollen creamy-white. *Style* dividing at mid-anther level, branches < 1 mm long. *Capsules* 4–6 mm long, obovoid, usually slightly exceeding bracts. *Chromosome number* 2*n* = 26. *Flowering time*: September to early October.



Distribution of ***Geissorhiza bracteata***.



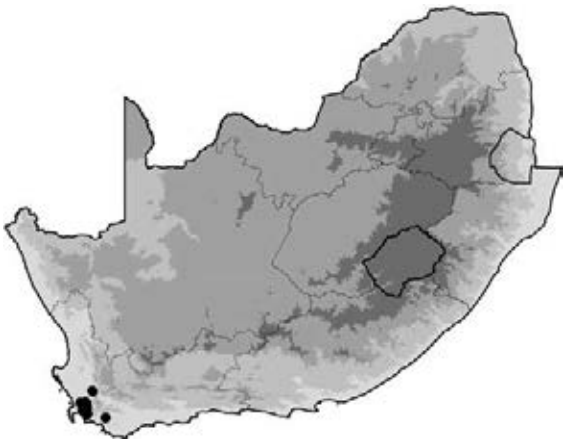
Distribution of ***Geissorhiza nana***.

Distribution and ecology: restricted to the Caledon, Bredasdorp and Swellendam Districts of Western Cape, South Africa; on clay flats and slopes in renosterveld.

Diagnosis: a dwarf species, *Geissorhiza nana* rarely reaches up to 80 mm high and has tiny creamy white flowers with a perianth tube 1.0–2.5 mm long and spreading tepals 3–6(–8) mm long. It is closely allied to and easily confused with *G. bracteata,* which has somewhat larger flowers with a perianth tube 2.5–5.0 mm long and tepals 8–12 mm long, rarely smaller. *Geissorhiza setacea* is very similar in general appearance to *G. nana* but is larger in all features, having flowers with a tube ± 6 mm long and tepals mostly 8–12 mm long.

15. **Geissorhiza setacea** *(Thunb.) Ker Gawl.* in König & Sims, Annals of Botany 1: 224 (1804); Goldblatt: 322 (1985). *Ixia setacea* Thunb.: 146 (1783). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* (UPS–THUNB 995, lecto., designated by Foster: 64 (1941); S: Herb. Osbeck, S: Herb. Alstroemer, S: Herb. Montin, isolecto.).

Plants small, 40–80 mm high. *Corm* globose, asymmetric, one side flattened below and extending downward in a fan-like ridge, 3–4 mm diam.; tunics concentric, outer layers irregularly fragmented. *Stem* occasionally 1(rarely 2)-branched from base. *Leaves* usually 4, lower 3 basal, ± half as long as stem, erect to falcate, linear to narrowly sword-shaped, 1.0–2.5 mm wide, plane, uppermost leaf cauline, smaller than basal leaves, lower half sheathing stem. *Spike* 1(rarely 2)-flowered; bracts 5–7 mm long, upper margins sometimes reddish, inner slightly longer than outer. *Flowers* actinomorphic, salver-shaped, creamy white or pale yellow with a dark centre, flushed red to purple on outside of outer tepals; perianth tube ± 6 mm long, narrowly funnel-shaped; tepals obovate, (8–)10–12 × 6–8 mm. *Filaments* erect, equal, 3–4 mm long; anthers 2.5–4.0 mm long. *Style* dividing opposite apex of anthers. *Flowering time*: July to August (to September).



Distribution of ***Geissorhiza setacea***.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, extending from near Gouda in the north to the Cape Peninsula, the foot of the Hottentots Holland Mtns and possibly Caledon in the south; on wet sandy or loamy clay flats.

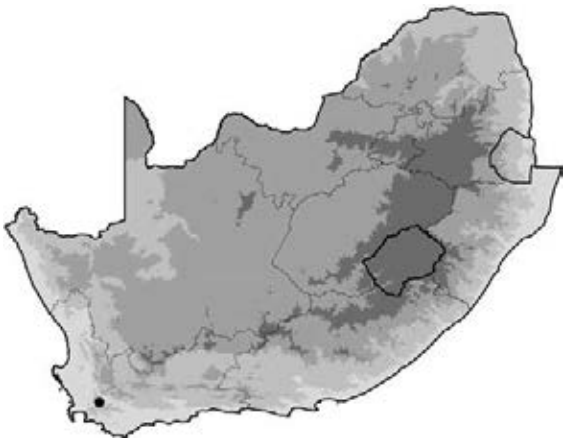
Diagnosis: a dwarf species 40–80 mm tall, *Geissorhiza setacea* is most easily recognised by its fairly large, relatively long-tubed flowers usually borne singly on short stems. The flowers are usually white and have a perianth tube ± 6 mm long and tepals 8–12 mm long. Also short in stature, *G. nana* has similar but smaller flowers with a perianth tube 1.0–2.5 mm long and tepals 3–6(–8) mm long. Although usually white-flowered, populations of *G. setacea* have pale yellow flowers with a blackish centre in the north of its range at Elandsberg Nature Reserve near Gouda. These plants appear to differ in no other characters from the typical white-flowered plants.

16. **Geissorhiza lapidosa** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 39: 131 (2009). Type: South Africa, Western Cape, Du Toit's Kloof Mtns, Goudini Sneeukop, western and southern edges of shale band, 1 700–1 730 m, seasonally damp, shallow moss and shale-derived silt overlying sandstone shelf, rare and localised, 9 Nov. 2008, *Helme & Turner 5747* (NBG, holo.).

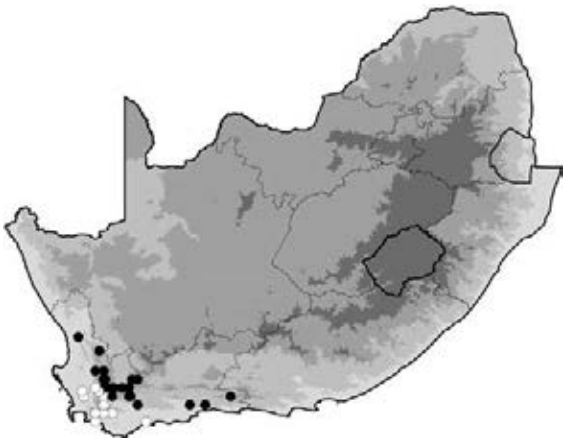
Plants ± acaulescent, 20–40 mm high. *Corm* obliquely ovoid with narrow flat side, 4–5 mm diam., tunics woody, dark, blackish, concentric. *Stem* smooth, flushed red, not or barely extending above ground, unbranched. *Leaves* 4, lower 2 basal, third leaf inserted at or shortly above ground, linear-falcate, exceeding spike, 0.5–1.0 mm wide, thick and leathery, elliptic in section when fresh, glaucous with margins often reddish, uppermost leaf cauline, entirely sheathing. *Spike* 1- or 2-flowered; bracts leathery and glaucous flushed reddish but submembranous and finely flecked with brownish red on margins, outer truncate or obscurely tricuspidate, 4–5 mm long, inner as long or slightly shorter, notched at apex. *Flowers* actinomorphic, rotate, white with outer tepals reddish pink outside; perianth tube funnel-shaped, 2.0–2.5 mm long; tepals oblanceolate, ± 6 × 2 mm. *Filaments* erect, equal, 3.5–4.0 mm long; anthers 1.5–2.0 mm long, ± white; pollen white. *Style* dividing opposite lower ½ of anthers, branches 1.5–2.0 mm long. *Flowering time*: November.

Distribution and ecology: restricted to Goudini Sneeukop in the Du Toits Kloof Mtns in Western Cape, South Africa; along a narrow band of sandstone pavement at the edge of cliffs in moist seeps draining from a shale sponge overlying the sandstone, a very restricted habitat less than 4 m wide, unusual for the genus. The two known colonies are about 800 m apart in an area regularly covered by snow in winter and spring.

Diagnosis: distinguished by its small size and underground stem, *Geissorhiza lapidosa* has a corm with



Distribution of ***Geissorhiza lapidosa***.



Distribution of ***Geissorhiza ornithogaloides*** subsp. ***ornithogaloides***, ●; subsp. ***flava***, ○.

concentric tunics and smooth, ± plane, falcate leaves. It differs from other dwarf species of subg. *Weihea* in its high mountain habitat and unusual leathery, falcate leaves at most 1 mm wide. The short-tubed, white flowers have an unusually short style dividing opposite the lower half of the anthers. Similar flowers are found in *G. nana* and *G. setacea*, both lowland species: *G. nana* occurs in renosterveld vegetation in the Overberg between Caledon and Swellendam and has broader, thin-textured leaves up to 2 mm wide and even smaller flowers with the tepals mostly 3–6 mm long, and very short filaments ± 2 mm long; *G. setacea* grows in seasonally wet places on flat sandy or loamy ground in Western Cape between Gouda and Caledon and has similarly narrow but linear leaves, 0.5–1(–2) mm wide but larger flowers with tepals 6–8 mm long, a longer tube ± 6 mm long, and the style branching opposite the tips of the anthers.

17. **Geissorhiza ornithogaloides** *(Licht. ex Roem. & Schult.) Klatt* in Linnaea 34: 656 (1866); Goldblatt: 323 (1985). *Ixia ornithogaloides* Licht. ex Roem. & Schult.: 376 (1817). *Trichonema ornithogaloides* (Licht. ex Roem. & Schult.) A.Dietr.: 583 (1833). Type: South Africa, [Western Cape], Cold Bokkeveld, *Lichtenstein s.n.* (B, holo.).

Plants small, 40–70(–100) mm high. *Corm* either ± ovoid or bell-shaped with broad flat base, 4–6 mm at widest diam.; tunics medium brown, concentric, either fragmenting into elliptic or irregular sections when bell-shaped and lower margins minutely serrated. *Stem* ± erect, usually branching from cauline leaves. *Leaves* usually 4, lower 2 basal, linear to lanceolate, erect to falcate, 1–3 mm wide, flat, upper two leaves cauline and sheathing below, sheaths often inflated. *Spike* 1(rarely 2)-flowered; bracts green, becoming dry above, 7–10 mm long. *Flowers* actinomorphic, clear yellow, rotate; perianth tube 2–4(–5) mm long, included in bracts; tepals obovate, (6–)8–15(–18) × 3.5–6.0 mm. *Filaments* erect, equal, 2–4 mm long; anthers 3–6 mm long, yellow; pollen yellow. *Style* dividing opposite apex of anthers, branches 2–3(–4) mm long. *Capsules* obovate, 7–9 mm long, usually exceeding bracts. *Chromosome number* 2*n* = 26. *Flowering time*: mid-August to early October.

Distribution and ecology: extending in Western Cape, South Africa from the Koudeberg near Wuppertal in the northern Cederberg south to Paarl and eastward through the Worcester District and interior southern Cape to Companies Drift in the Long Kloof in Eastern Cape; on stony sandstone and clay flats and slopes.

Diagnosis: a dwarf and typically slender species, *Geissorhiza ornithogaloides* is recognised by the mostly solitary, bright yellow flowers, unusual in the genus. It is morphologically variable and even within populations plants may be more robust and have much larger flowers than others, the extremes seemingly almost different species. The vegetative morphology is, however, quite uniform, with plants always having spikes with either one or two flowers, two narrow, plane, basal leaves and two cauline and partly sheathing leaves. The corms are of two types: the interior and eastern populations, subsp. *ornithogaloides*, have small ellipsoid corms with concentric tunics of the type characteristic of subg. *Weihea*, whereas the southwestern populations, subsp. *flava*, have bell-shaped corms with a flat base and minutely serrated margins. The two sets of populations otherwise appear identical.

Geissorhiza ornithogaloides is most closely related to *G. malmesburiensis*, which is broadly similar to subsp. *flava* in the yellow flowers and bell-shaped corms, but differs in having somewhat larger, cupped flowers, the perianth tube ± 4 mm long, tepals mostly 18–20(–25) mm long and filaments 7–10 mm long.

Key to subspecies

1a Corm ± ellipsoid, tapering at both ends, not campanulate in outline; lower margins of tunics not or rarely slightly serrated. . . . . 17a. subsp. *ornithogaloides*
1b Corm bell-shaped with flat base; lower margins of the tunics minutely serrated . . . . . 17b. subsp. *flava*

17a. subsp. **ornithogaloides**

Geissorhiza marlothii R.C.Foster: 66 (1941). *G. ornithogaloides* subsp. *marlothii* (R.C.Foster) Goldblatt: 325 (1985). Type: South Africa, [Western Cape], Cold Bokkeveld, Houdenbeck, 850 m, *Marloth 10612* (B, holo.; NBG, PRE, iso.); [Western Cape], Schoongesig, Ceres, *Hanekom 1222* [NBG, epi., designated by Goldblatt & Manning: 7 of 9 (2014)].

Corm ovoid-ellipsoid, tapering at both ends, obliquely flattened on one side, 3–5 mm diam.; tunics concentric, fragmenting vertically into elliptic segments. *Flowers* sometimes very small, with tepals (6–)8–12(–15) mm long. *Filaments* 2–4 mm long; anthers 3–4 mm long. *Flowering time*: late August to October.

Distribution and ecology: extending from Wuppertal and the Cold Bokkeveld in the northeast through the Warm Bokkeveld and the Witteberg and Voetpadsberg, with outlying populations in the Little Karoo, the Albertinia District and the upper Long Kloof in Eastern Cape; on sandy and stony clay slopes and flats.

Diagnosis: subsp. *ornithogaloides* is distinguished from subsp. *flava* only by the corms, ovoid-ellipsoid and tapering at both ends, this typical of subg. *Weihea* and the ancestral type in *Geissorhiza ornithogaloides*. The bell-shaped corm of subsp. *flava* is specialised and derived. In all other features, the two subspecies are essentially identical, although there are several populations of subsp. *ornithogaloides* on the edges of the range of this subspecies that have smaller flowers than any found in subsp. *flava*.

17b. subsp. **flava** *(Klatt) Goldblatt & J.C.Manning* in Bothalia 44: 7 of 9 (2014). *Geissorhiza flava* Klatt: 392 (1882). *G. ornithogaloides* var. *flava* (Klatt) R.C.Foster: 68 (1941). Type: South Africa, [Western Cape], without precise locality, *Breutel s.n.* (B, holo.).

[*Waitzia flava* Reichb. in Klatt: 392 (1882), invalid name only in synonymy.]

[*Geissorhiza romuleoides* Eckl.: 27 (1827), invalid name without description.]

Corm bell-shaped obliquely flattened base, 4–6 mm diam.; tunics medium brown, concentric, lower margins minutely serrated. *Flowers* with tepals 8–12(–18) mm long. *Filaments* 2.5–4.0 mm long; anthers 3–6 mm long. *Flowering time*: September and October.

Distribution and ecology: extending in Western Cape from near Paarl east to Worcester and the Hex River Valley and south to the Caledon District; on stony sandstone and clay flats and slopes.

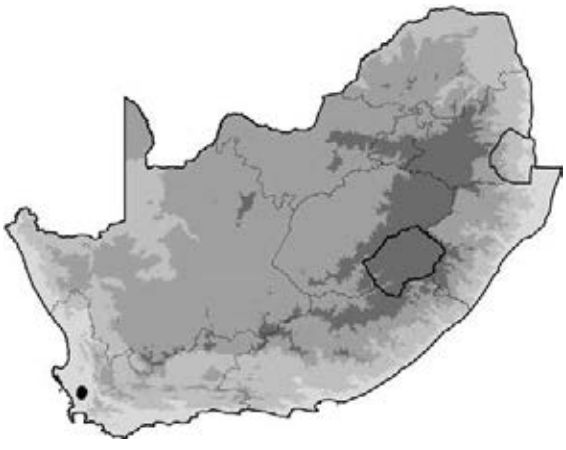
Diagnosis: subsp. *flava* differs from subsp. *ornithogaloides* almost exclusively by its bell-shaped corms with flat base and minutely serrated lower margins. In other features the two subspecies are virtually identical, although some populations of subsp. *ornithogaloides* have smaller flowers than any found in subsp. *flava*.

18. **Geissorhiza malmesburiensis** *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 66 (1941); Goldblatt: 327 (1985). Type: South Africa, [Western Cape], hill near Malmesbury, 300 m, *Schlechter 1654* (B, holo.; B, BOL, BR, L, MO, PRE, Z, iso.).

Plants small, 50–80 mm high. *Corm* bell-shaped with flat base, 4–6 mm diam.; tunics medium brown, concentric, lower margins minutely serrated. *Stem* erect, simple or branched from upper leaves. *Leaves* usually 4, lower 2 or 3 basal, linear-filiform, ± erect, 0.8–1.1 mm wide, plane, upper 1 or 2 leaves cauline, sheathing part inflated. *Spike* 1-flowered; bracts pale green with hyaline margin, becoming dry above, 7–11 mm long. *Flowers* actinomorphic, cup-like, clear yellow; perianth tube ± 4 mm long, included in bracts; tepals obovate, 13–25 × 4–7 mm. *Filaments* erect, equal, 7–10 mm long; anthers 4–5 mm long, yellow; pollen yellow. *Style* dividing between middle and apex of anthers, branches ± 4 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: September to early October.

Distribution and ecology: restricted to the immediate vicinity of Malmesbury and the northern end of the Paardeberg in Western Cape, South Africa, where it is currently known from just three sites, one surrounded by wheat fields; on gravelly soils in renosterveld.

Diagnosis: with a bell-shaped corm with a somewhat oblique, flat base with toothed margins, *Geissorhiza malmesburiensis* closely resembles *G. ornithogaloides* subsp. *flava* in habit, corm and leaves. The pale yellow flowers are, however, somewhat larger, with a perianth tube ± 4 mm long, tepals mostly 15–25 × 4–7 mm and remaining cupped when fully open, and longer filaments, 7–10 mm long. *Geissorhiza ornithogaloides* has smaller flowers with the perianth tube 2–3(4) mm long, tepals (6–)8–15 mm long, rarely up to 18 mm, and



Distribution of ***Geissorhiza malmesburiensis***.

shorter filaments, 2–4 mm long. Also, robust plants of *G. ornithogaloides* are often branched and have spikes of more than one flower each.

19. **Geissorhiza platystigma** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 39: 132 (2009). Type: South Africa, Western Cape, gravelly, north-facing slopes in Darling Nature Reserve, 22 Sept. 1999, *Goldblatt & Nänni 11162A* (NBG, holo.; MO, iso.).

Plants 25–50 mm high. *Corm* bell-shaped, ± 3 mm diam., with minutely toothed margins; tunics light brown, concentric, woody. *Stem* usually 1- or 2-branched from near base. *Leaves* usually 3, linear, ± 1 mm wide, sheaths inflated, plane, ± as long as stem. *Spike* 1-flowered; bracts sometimes flushed purple distally, outer ± 8 mm long, inner ± 6 mm long, not forked at apex. *Flowers* actinomorphic, rotate, pale yellow, unscented; perianth tube funnel-shaped, ± 1.5 mm long; tepals narrowly ovate, 6–7 × ± 3 mm. *Filaments* erect, equal, ± 2 mm long; anthers ± 1.5 mm long, pale yellow. *Style* erect, dividing opposite upper third of anthers, branches ± 1.5 mm long, with prominent hairs longer than width of branch. *Capsules* barrel-shaped, ± 5 mm long. *Flowering time*: September, probably also in late August.

Distribution and ecology: known only from the Darling Nature Reserve in the hills above Darling in Western Cape, South Africa; in granite-derived soils on east-trending slopes in open ground or in the shade of low shrubs in renosterveld.

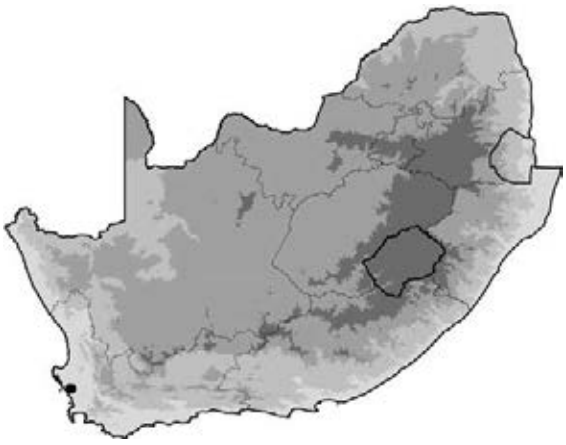
Diagnosis: one of the most inconspicuous species of *Geissorhiza*, *G. platystigma* stands just 25–50 mm high with the main stem and branches each bearing a single small flower. The style branches, its most distinctive feature, are short, ± 1.5 mm long, broad and densely covered in prominent hairs much longer than the width of the branches. The corm closely resembles that of *G. ornithogaloides* subsp. *flava* in its bell shape with flat base and minutely serrated margins. Seemingly immediately allied to this widespread species of the southern Cape and interior, *G. platystigma* differs from it in flower size and details; *G. ornithogaloides* has a perianth tube 2–3(–4) mm long, tepals (6–)7–12(–18) mm long, much larger anthers 3–6 mm long, and the style branches are slender, 2–3 mm long, and thread-like as is typical of the genus.

20. **Geissorhiza geminata** *E.Mey. ex Baker*, Handbook of the Irideae: 159 (1892); Goldblatt: 327 (1985). Type: South Africa, (Western Cape], between 'Slangenheuwel, Franschehoek und Donkerhoek', *Drège s.n.* '*G. geminata* EM. a' (K, lecto., designated by Goldblatt: 327 (1985); B, BM, E, G, K, L, MO, P, S, isolecto.).

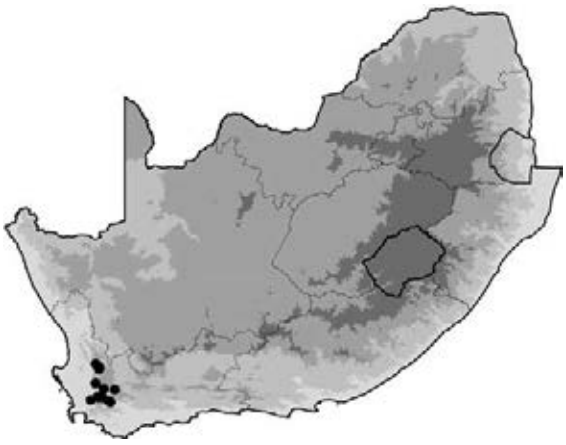
Ixia geminata Vahl: 68 (1805). Type: unknown, assigned here by G.J.Lewis: 189 (1962).

[*Geissorhiza geminata* Drège ms. in E.Mey.: 119–187 (1844), invalid name without description.]

Plants (120–)160–300 mm high. *Corm* globose, ± symmetric, obliquely flattened below; tunics concentric, light brown, fragmenting irregularly into segments, drawn into short bristles above. *Stem* often branched, then dichotomously so, or simple, sometimes with a small scale-like leaf in upper third. *Leaves* 3 to 5, lower 2 or 3 basal, lowermost shortest, others shorter or longer than stem, 1–2 mm wide, plane when dry with slightly raised main vein, possibly inflated and terete when live in some populations, upper leaves cauline and partly sheathing, uppermost entirely sheathing, often vestigial. *Spike* (1)3- or 4-flowered, branches 1- to 3-flowered; bracts green, hyaline or reddish along margins, 6–8 mm long, inner ± as long, or longer than outer. *Flowers* actinomorphic, white (to creamy white), often yellow in throat, rotate to cup-like, outer tepals usually flushed deep pink or purple outside; perianth tube 6–8 mm long, exceeding bracts by 1–2 mm or more; tepals 8–15 × ± 6 mm. *Filaments* erect, equal, 3–5 mm long; anthers 3–5 mm long, white; pollen creamy white. *Style* dividing opposite or above apex of anthers, branches 3–4 mm long. *Capsules* ± ovoid, 7–8 mm long. *Flowering time*: September to November.



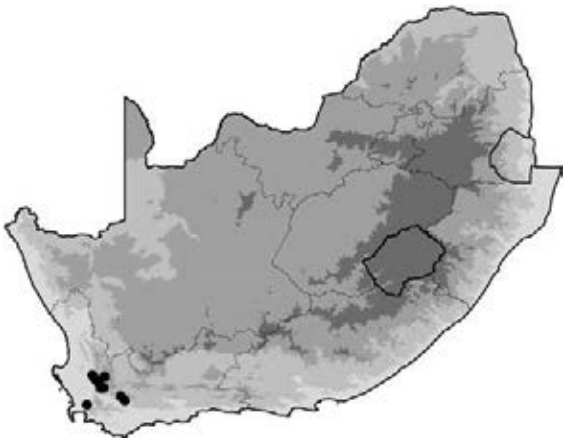
Distribution of ***Geissorhiza platystigma***.



Distribution of ***Geissorhiza geminata***.

Distribution and ecology: a narrow endemic of Western Cape, South Africa, extending from the Cold Bokkeveld and upper Tulbagh Valley in the north to Brandvlei near Worcester in the south; semi-aquatic, in sandy marshes, ponds and vleis, often in standing water.

Diagnosis: recognised by the wetland habitat, white flowers, and corms with concentric tunics, *Geissorhiza geminata* also has an unusual branching pattern: when branched, the stem forks into two ± equal axes, thus in dichotomous fashion, the main stem then hardly different from the branch. *Geissorhiza geminata* is superficially similar to *G. brehmii*, which is also semi-aquatic and has fairly large white flowers, but *G. brehmii* has the imbricate corm tunics of subg. *Geissorhiza* and also differs in having terete leaves, whereas *G. geminata* has plane or possibly hollow terete leaves without visible or raised margins.



Distribution of ***Geissorhiza ovalifolia***.

21. **Geissorhiza ovalifolia** *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 58 (1941); Goldblatt: 329 (1985). Type: South Africa, [Western Cape], 'Drakensteinsbergen, 4 000–5 000 ft [1 200–1 500 m]', Oct., *Drège s.n.* (B, holo.; G, S, iso.).

Plants small, 30–70(–90) mm high. *Corm* ovoid, ± 2 mm diam., tunics concentric, soft-papery. *Stem* usually prostrate near base, upright distally, rarely 1-branched. *Leaves* 4 or 5, lower 3 or 4 basal, prostrate, plane, lanceolate-oblong, or ovate, acute, 10–40 × 2–5 mm wide, uppermost cauline, entirely sheathing, with a cormlet in axil of 1 or more basal or rarely cauline leaves. *Spike* 1 to 4(–6)-flowered, flexuose; bracts soft, ± membranous above, 4–7 mm long, inner usually slightly shorter than outer. *Flowers* actinomorphic, rotate, white, yellow in throat; perianth tube 2–3 mm long, flaring from base; tepals ovate, 6–8 × ± 3.5 mm. *Filaments* erect, equal; 2–3 mm long; anthers 1.5–3.0 mm long, white. *Style* dividing opposite apex of anthers, branches 1.2–2.0 mm long. *Capsules* ovoid, 3–5 mm long. *Flowering time*: late September to mid-November.

Distribution and ecology: mountains of Western Cape, South Africa, from Twenty Four Rivers Mtns in the north to Franschhoek in the south; usually in shaded sites in damp moss on rock outcrops and cliffs.

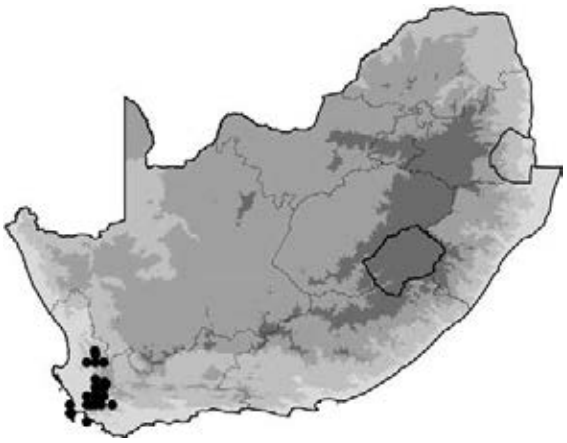
Diagnosis: the diminutive and small-flowered *Geissorhiza ovalifolia* is distinguished by the stem prostate at the base and erect distally, and four or five plane leaves, at least the lower three or four prostrate and ovate to oblong. Plants often produce a cormlet in the axils of the basal and even cauline leaves. The flowers are white with a pale yellow throat and have a perianth tube 2–3 mm long and tepals 6–8 mm long. It is often confused with the more widespread and common *G. bolusii*, which occurs in similar habitats in the Western Cape mountains. *Geissorhiza ovalifolia* is evidently sexually fertile, and capsules develop rapidly after blooming whereas the triploid *G. bolusii* is sexually sterile and reproduces by the production of cormlets in all basal and cauline leaf axils as well as in the axils of the floral bracts after flowering. The two can sometimes also be distinguished by the number of cauline sheathing leaves, one in *G. ovalifolia* but usually several in *G. bolusii*, however the difference does not always hold.

22. **Geissorhiza bolusii** *Baker*, Handbook of the Irideae: 158 (1892); Goldblatt: 330 (1985). Type: South Africa, [Western Cape], Du Toits Kloof, 2 300 ft [700 m], *H. Bolus s.n.* (*BOL 5247* in K, lecto., effectively designated by Foster: 57 (1941); BOL, isolecto.).

Geissorhiza rupestris Schltr.: 98 (1899). Type: South Africa, [Western Cape], mtns above Bain's Kloof, 2 400 ft [730 m], *Schlechter 9167* (B, lecto., designated by Foster: 139 (1941); B, BM, BOL, E, G, H, K, L, MO, PH, PRE, Z, isolecto.)

Geissorhiza dregei Baker: 158 (1892). Type: South Africa, [Western Cape], Paarl mtns, *Drège s.n.* '*G. secunda* fl. Ker a' (K, lecto., effectively designated by Foster: 139 (1941), K; BM, E, G, K, L, MO, isolecto.).

Plants 30–80(–110) mm high. *Corm* ± ellipsoid, 2–4 mm diam.; tunics brown, concentric, brittle-papery, notched below into sections, and drawn into points above. *Stem* usually prostrate at base, erect above, occasionally branched, bearing a small cormlet in each axil. *Leaves* mostly 3 to 5, basal, sword-shaped to lanceolate, acute, usually prostrate, plane, stem also bearing small, sheathing leaves. *Spike* 2- to 8-flowered, or flowers all aborted but floral bracts subtending cormlets; bracts 3–6(–10) mm long, inner ± as long or longer than outer when subtending flowers, smaller when flowers aborted, a cormlet produced in axil of each sterile bract and after flowering also in axils of floral bracts. *Flowers* actinomorphic, rotate, white (or not produced); perianth tube funnel-shaped, 3–4 mm long, reaching apex of bracts or shortly exserted; tepals spreading, ovate, 7–10 × 2–3 mm. *Filaments* erect, equal, 3–4 mm long; anthers 2–3 mm long, white. *Style* dividing near apex of anthers, branches ± 1.5 mm long. *Capsules* and *seeds* never developed. *Chromosome number* $2n = 39$. *Flowering time*: October to December (to January).



Distribution of ***Geissorhiza bolusii***.

Distribution and ecology: mountains of Western Cape, South Africa, from the northern Cederberg to the Cape Peninsula and east to the western end of the Riviersonderend Mtns; on shady south-facing slopes, cliffs and damp rocks, often in moss pads.

Diagnosis: diminutive, white-flowered *Geissorhiza bolusii* is unusual in the genus mainly in the several plane, more-or-less sword-shaped leaves usually prostrate or arching toward the ground, the several, small cauline, sheathing leaves, and the presence of two kinds of stems. Some produce no flowers but develop a cormlet in the axil of each flower bract, while others bear small white flowers but no capsules, and a cormlet later develops in place of each aborted bloom. Most populations comprise plants of both kinds, including the type collections of *G. bolusii* and its synonym, *G. rupestris*. The species is also cytologically unusual, being triploid, $2n = 39$ (counts from five populations from different parts of its range), and it never reproduces by seed. Reproduction is exclusively by the small axillary cormlets. *Geissorhiza bolusii* is probably most closely related to *G. ovalifolia*, which grows in similar habitats and also has small, white flowers but usually has none or only one cauline leaf or bract and produces one or few cormlets in its leaf axils. Fruit development is evidently fairly rapid and immature capsules can be seen in some collections in which fading blooms are present at the tips of spikes.

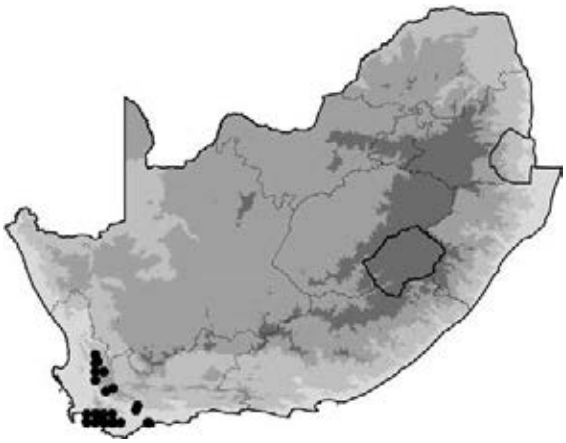
23. **Geissorhiza parva** *Baker* in Bulletin of Miscellaneous Information, Kew 1906: 26 (1906); Goldblatt: 331 (1985). Type: South Africa, [Western Cape], Houw Hoek, *Penther 723* (K, holo.).

[*Geissorhiza dregei* sensu Baker: 158 (1892) & :74 (1896), in part (excluding type but including *G. bolusii* Baker).]

Plants small, 40–70(–120) mm high. *Corm* ovoid-conic, asymmetric, obliquely flattened toward base, flat part extending downward, 3–5 mm diam.; tunics dark brown, concentric, firm-woody, fragmenting irregularly. *Stem* smooth, often prostrate at base, erect above, simple or rarely branched, flexed above cauline leaf. *Leaves* 3 or 4, all basal or uppermost cauline, 15–20(–45) mm long, prostrate or inclined, much shorter than stem, sword-shaped to oblong, sometimes ± ovate, rarely linear, usually minutely dotted or streaked with red, acute or obtuse, margins occasionally ciliate to papillose toward apex. *Spike* (1)2- to 6-flowered; bracts usually red on margins, 4–6(–8) mm long, inner slightly shorter than outer. *Flowers* actinomorphic, rotate, creamy white to pale yellow; perianth tube 3–4 mm long, included or just exserted from bracts, gradually widening from base; tepals spreading, ± ovate, 6–8 × 2.5–3.5 mm. *Filaments* erect, equal, ± 2 mm long; anthers 2.0–2.5 mm long; creamy white; pollen yellow. *Style* dividing opposite apex of anthers, branches 1.5–2.0 mm long. *Capsules* globose to oblong, 3–7 mm long. *Flowering time*: mid-August to October (to early December at high elevations).

Distribution and ecology: endemic to the Western Cape, South Africa, extending from the Cederberg in the north to the Langeberg near Swellendam in the east; mainly montane at middle to upper elevations but occasionally at low elevations near the coast in the Caledon District, either in open ground or more often on wet rocky pavement in sand or damp moss pads.

Diagnosis: a small plant, *Geissorhiza parva* is recognised by the creamy white to pale yellow flowers with a perianth tube 3–4 mm long, tepals 6–8 mm long and by the three or four, short, inclined to prostrate leaves mostly up to 20 mm long (but occasionally up to 45 mm). Populations occurring north of the Hex River Mtns can often be distinguished by having four leaves, in contrast to the southern populations, which normally have only three, but the difference is not without exception. Some northern populations of *G. parva* can be difficult to distinguish from the related *G. ovalifolia*, but this species has white flowers, softer-textured leaves and usually an axillary cormlet in one or more of the lower leaf axils. Hybrids have been recorded between *G. parva* and the taller and larger-flowered *G. ovata* near Caledon, and are intermediate between the two species.



Distribution of ***Geissorhiza parva***.

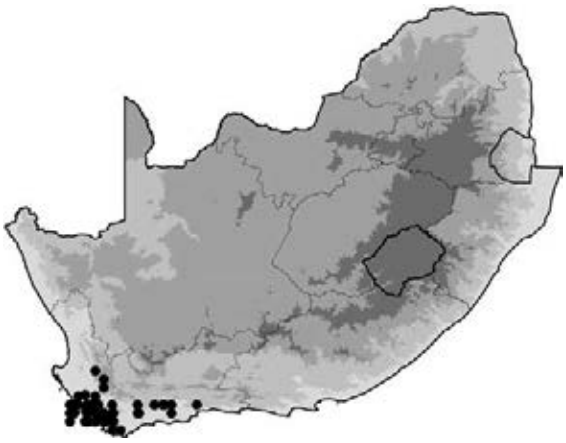
24. **Geissorhiza ovata** *(Burm.f.) Aschers. & Graebn.*, Synopsis der Mitteleuropäischen Flora 3: 540 (1906). *Ixia ovata* Burm.f.: 1 (1768); Goldblatt: 333 (1985). Type: South Africa, precise locality not known, *Burman s.n.* (G: Herb. Burman, holo.).

Ixia excisa L.f.: 92 (1782). *Geissorhiza excisa* (L.f.) Ker Gawl.: 224 (1804). *Anomaza excisa* (L.f.) Laws. ex Salisb.: 323 (1812). *Weihea excisa* (L.f.) Eckl.: 22 (1827) illegitimate name, genus invalid. Type: South Africa, precise locality unknown, *Thunberg s.n.* (UPS–THUNB 951 '*Ixia excisa* α', lecto., effectively designated by Brown (1928); S: Herb. Montin, S: Herb. Castrom, S: Herb. Swartz, isolecto.).

[*Weihea elatior* Eckl.: 22 (1827), invalid name without description.]

Plants 60–150 mm high. *Corm* ± ovoid, asymmetric, obliquely flattened below; tunics brown, concentric, drawn into points above. *Stem* often prostrate for a short distance at base, erect above, rarely branched. *Leaves* 2 or 3, lower 2 basal, prostrate or inclined, much shorter than stem (10–)15–30(–60) mm long, 5–12(–14) mm wide, ovate-oblong, acute or obtuse, sometimes ciliate-pubescent on veins (rarely throughout), frequently minutely brown-pellucid dotted, margins thickened, usually ciliate, often reddish, uppermost inserted on upper part of stem, often entirely sheathing. *Spike* (1)2- to 6-flowered; bracts firm, often brown dotted, 7–10(–12) mm long, inner slightly shorter than outer. *Flowers* actinomorphic, salver-shaped, white or pale pink above with red marks at tepal bases, dark red (to brown) outside; perianth tube cylindric, 10–18(–30) mm long, well exserted from bracts; tepals spreading, ± elliptic, (7–)10–13 × (3.5–)5.0–7.0 mm. *Filaments* erect, equal, 5–7 mm long; anthers 2–4 mm long, white; pollen white. *Style* dividing at or near apex of anthers, branches 1.5–2.5 mm long. *Capsules* globose, 6–8 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: (late July) August to October.

Distribution and ecology: extending from the Cape Peninsula north to the Olifants River Mtns and east to the Langeberg at Garcia's Pass in Western Cape, South Africa; mainly montane at middle to upper elevations but also at low elevations near the coast, in stony sandstone soils, usually very common after fires.



Distribution of ***Geissorhiza ovata***.

Diagnosis: easily recognised by the pair of ovate or oblong basal leaves, prostrate or nearly so, and the stem prostrate near base, *Geissorhiza ovata* has long-tubed white flowers marked with red in the centre and red to brown on the reverse of the tepals. The perianth tube, mostly 10–18 (rarely up to 30) mm, is well exserted from the bracts and the spreading tepals are typically 10–13 mm long. It is allied to *G. parva*, a smaller species with a similar habit with short, prostrate or semi-prostrate leaves but smaller yellow to creamy-white flowers, with a perianth tube 3–4 mm long. *Geissorhiza ovata* is quite variable as to height and flower size, and although the perianth tube is typically 10–18 mm long it is up to 30 mm long in plants from the Klein River Mtns. Plants from near the eastern end of its range near Swellendam have the smallest flowers with tepals ± 7 mm long, although the perianth tube is of normal length. None of these variants seems worth taxonomic recognition.

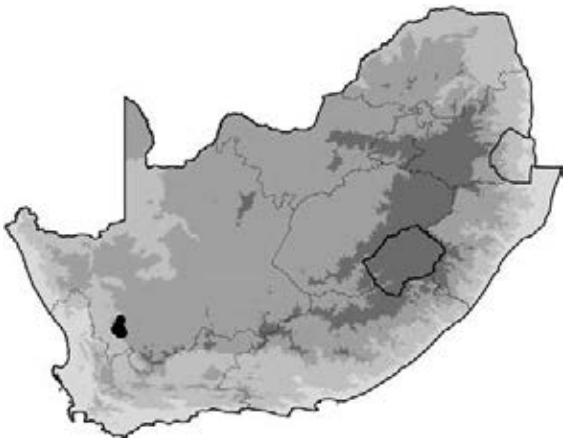
Sect. 2. **Tortuosae** *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 69 (1941). Type: *Geissorhiza corrugata* Klatt

Leaves linear to subterete, all basal, straight or twisted; stem smooth, short; spike 1(2)-flowered; flowers actinomorphic or zygomorphic with stamens and style declinate (*G. karooica*), the style shorter than or reaching to the apex of the anthers.

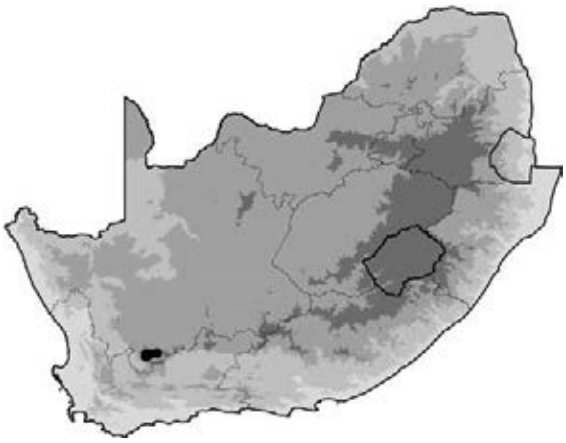
Species 3: western Karoo, South Africa.

25. **Geissorhiza corrugata** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 391 (1882); Goldblatt: 336 (1985). Type: South Africa, [Northern Cape], Hantam Mtns, *Meyer 24* (B, holo.).

Plants small, up to 50 mm high, including flowers. *Corm* asymmetric, ovoid with an oblique flat side extending downward as a prominent ridge, 5–7 mm diam.; tunics brown, concentric. *Stem* single or 2 or 3 produced from base. *Leaves* 3 or 4, all basal, ± 30 mm long, 1–2 mm wide, laxly twisted spirally, margins lightly thickened, the uppermost sheathing the stem below and ± straight. *Spike* 1(2)-flowered; bracts green to ± membranous, 12–15 mm long, pale or flushed red and spreading distally, inner slightly shorter than outer. *Flowers* actinomorphic, ± rotate, yellow; perianth tube funnel-shaped, ± 3 mm long; tepals ovate, 12–15 × 4–6 mm, outer wider



Distribution of ***Geissorhiza corrugata***.



Distribution of ***Geissorhiza spiralis***.

than inner. *Filaments* erect, equal, 4–5 mm long; anthers ± 5 mm long, yellow; pollen yellow. *Style* 6–7 mm, dividing ± opposite base of anthers, branches up to 6 mm long, ± spreading to laxly recurved. *Capsules* globose to ovoid, 8–10 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: mainly August to mid-September.

Distribution and ecology: a local endemic of the Calvinia District of the western Karoo in Northern Cape, South Africa; on seasonally wet, poorly drained clay flats.

Diagnosis: *Geissorhiza corrugata* stands out in its small size, up to 50 mm tall, including the flowers, and in its loosely spirally coiled leaves. The bright yellow flowers and borne singly on the stems, and have a short perianth tube up to 3 mm long, spreading tepals, and a style dividing ± opposite the bases of the anthers. It shares these distinctive leaf and style features with *G. spiralis*, which has purple to deep pink flowers with a longer perianth tube. Greenhouse-grown plants have shown that flowers of *G. corrugata* are self-compatible and autogamous. The short style and spreading branches facilitate self-fertilization. Plants are often exceedingly common locally and can make a striking display, the yellow blooms visible from a considerable distance.

26. **Geissorhiza spiralis** *(Burch.) M.P.de Vos ex Goldblatt* in Annals of the Missouri Botanical Garden 72: 337 (1985). *Trichonema spirale* Burch.: 260 (1822). *Romulea spiralis* (Burch.) Baker: 90 (1877). *Bulbocodium spirale* (Burch.) Kuntze: 700 (1891). Type: South Africa, [Northern Cape], Roggeveld, Jakkalsfontein–Renosterrivier, *Burchell 1356* (K, holo.).

Plants 25–45 mm high, including flowers. *Corm* ovoid, asymmetric with an oblique flat side below, extending downward shortly, 4–7 mm diam.; tunics brown, concentric. *Stem* single or 2 or 3 produced from base, partly or entirely concealed by leaf bases. *Leaves* usually 4, basal, coiled or twisted distally, uppermost sometimes straight and usually sheathing part or all of stem, 0.5–2.0 mm wide, margins and main vein lightly thickened. *Spike* 1-flowered; bracts 10–13 mm long, membranous, pale green flushed purple above, inner slightly shorter than outer. *Flowers* actinomorphic, shallowly cup-shaped, purple to deep pink with white heart-shaped markings at tepal bases edged with dark red-purple, throat and tube pale yellow; perianth tube funnel-shaped, 4–5 mm long; tepals broadly ovate, 13–15 × 8–10 mm, outer wider than inner. *Filaments* erect, equal, ± 4 mm long; anthers 5–6 mm long, yellow. *Style* 6–7 mm long, dividing near base of anthers; branches ± 5 mm long, laxly spreading. *Flowering time*: September.

Distribution and ecology: a rare species, evidently restricted to the southern Roggeveld near Sutherland in Northern Cape, South Africa; on rocky slopes in sandy ground.

Diagnosis: *Geissorhiza spiralis* is distinguished by its four (rarely three) twisted leaves, solitary-flowered spikes, and style dividing opposite the base of the anthers. These features are also characteristic of *G. corrugata*, which has bright yellow flowers with a perisanth tube ± 3 mm long whereas *G. spiralis* has purple to deep pink flowers marked white and red-purple at the base of the tepals and a perianth tube 4–5 mm long.

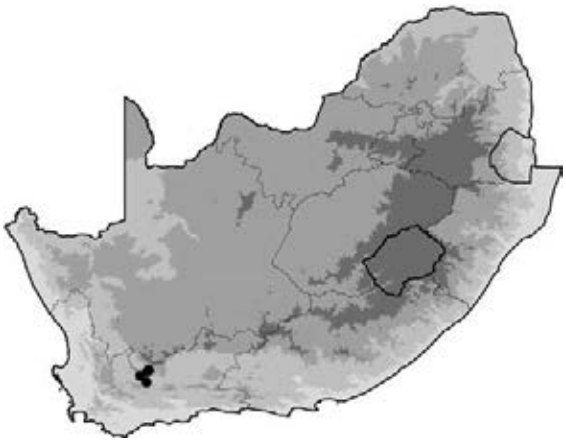
27. **Geissorhiza karooica** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 338 (1985). Type: South Africa, [Western Cape], near Matjiesfontein, foot of Ghaap Kop, *Goldblatt 6371* (MO, holo.; BOL, K, NBG, PRE, S, UC, US, WAG, iso.).

Plants 30–60 mm high. *Corm* globose, ± 5 mm diam.; tunics light brown, concentric, outer layers fragmenting into unequal vertical sections. *Stem* simple or 2- or 3-branched from base. *Leaves* 4 to 6, all basal, linear, 1.0–1.8 mm wide, ± as long as stem, upper 2 or 3 sheathing stem below, erect or becoming falcate, plane, margins not thickened. *Spike* 1-flowered; bracts 8–12 mm long, membranous, ± dry, brown above, inner ± as long or slightly shorter than outer. *Flowers* zygomorphic, salver-shaped, half nodding, dark violet-purple, yellow

at base of tepals and in throat; perianth tube 5–8 mm long, ± cylindric, exserted from bracts; tepals subequal, lanceolate, obtuse, 12–15 × 4–5 mm, spreading at right angles to tube. *Filaments* unilateral, declinate, equal, 8–10 mm long; anthers 2.5–3.3 mm long, white; pollen white. *Style* dividing between base and middle of anthers, branches 1.2–2.0 mm long. *Capsules* ± oblong, 8–11 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: August to September.

Distribution and ecology: margins of the western Karoo between Matjiesfontein and Whitehill in Western Cape, South Africa, and in the Klein Roggeveld in Northern Cape; on coarse, broken shale flats and slopes.

Diagnosis: a dwarf species, *Geissorhiza karooica* is distinctive in having half nodding flowers solitary on stems or branches, of which up to four may be produced on each plant. The glossy violet-purple flowers are large and attractive and unusual in being zygomorphic with unilateral, declinate stamens, while the tepals are subequal and symmetrically arranged. Plants have four to six narrow, linear leaves inserted at the base, up to 1.8 mm wide. *Geissorhiza karooica* appears to be allied to two western Karoo species, *G. corrugata* and *G. spiralis*, which have radially symmetric flowers also borne singly on each branch but with spirally coiled leaves, and are also distinctive in having the style dividing near the anther bases into unusually long branches.



Distribution of ***Geissorhiza karooica***.

Sect. 3. **Pusillae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 339 (1985) [as sect. *Pusilla*]. Type: *Geisshoriza pusilla* (Andrews) Klatt

Corm with woody tunics; leaves narrowly sword-shaped, ± plane, minutely hairy on margins and lower part of blade; stem smooth; spike few flowered, bracts green below, dry and ferrugineous in upper half; flowers actinomorphic, rotate; perianth tube very short.

Species 1: southwestern Western Cape, South Africa.

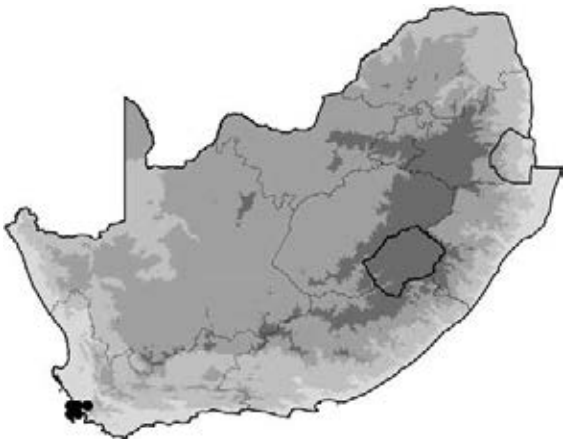
28. **Geissorhiza pusilla** *(Andrews) Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 392 (1882); Goldblatt: 339 (1985). *Ixia pusilla* Andrews: t. 245 (1802). *G. secunda* var. *pusilla* (Andrews) Baker: 155 (1892). Type: South Africa, [Western Cape], exact locality unknown, illustration in Andrews: t. 245 (1802).

Geissorhiza pubescens Wolley-Dod: 171 (1900). Type: South Africa, [Western Cape], Signal Hill, *Wolley-Dod 1602* (K, lecto. effectively designated by Foster: 50 (1941); B, BM, BOL, iso.).

[*Geissorhiza nigromontana* Eckl., unpublished manuscript name.]

Plants small, (70–)120–300 mm high. *Corm* globose, evidently asymmetric with a down-pointing ridge on one side, 4–10 mm diam.; tunics light brown, concentric. *Stem* simple or 1- or 2-branched. *Leaves* 2 to 4, lower 2 or 3, or all basal, reaching to ± base of spike, lanceolate, erect or falcate, 3–8 mm wide, margins and often sheaths and lower parts of blades softly long-hairy, margins often ciliate, upper leaves smaller, usually mostly sheathing stem, uppermost shortest and often entirely sheathing. *Spike* (1)2- to 6-flowered; bracts below, brown and dry and spreading in upper half, 5–8 mm long, inner shorter than outer. *Flowers* actinomorphic, rotate, pale to deep blue or blue-mauve; perianth tube funnel-shaped, 1–2 mm long; tepals elliptic, 7–10 × 3–4 mm. *Filaments* erect, equal, ± 2 mm long; anthers ± 3 mm long, yellow. *Style* 4–5 mm long, branches ± 1 mm long. *Capsules* obovoid to subglobose, 5–7 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: (late August) September to early October.

Distribution and ecology: a narrow endemic of the Cape Peninsula and nearby hills in Western Cape, South



Distribution of ***Geissorhiza pusilla***.

Africa, possibly extending to Caledon; damp, often shady places, mainly montane at low to middle elevations, usually on shale or granite-derived soils.

Diagnosis: evidently taxonomically isolated, *Geissorhiza pusilla* stands out in subg. *Weihea* in its plane, softly hairy leaves with ciliate margins and small blue to blue-mauve flowers. It closely resembles the common *G. aspera*, which has ± black, imbricate corm tunics characteristic of subg. *Geissorhiza*, a puberulous stem and usually unequal stamens with one shorter filament. *Geissorhiza pusilla* has light brown concentric corm tunics, a hairless stem, and the stamens are equal in length.

Sect. 4. **Includantherae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 340 (1985) [as sect. *Includanthera*]. Type: *Geisshoriza cedarmontana* Goldblatt

Corm with tunics woody, concentric; leaves linear, plane or with margins and midrib thickened; spike few flowered; flowers salver-shaped; perianth tube elongate, exserted from bracts; stamens and style short, included in lower half of tube.

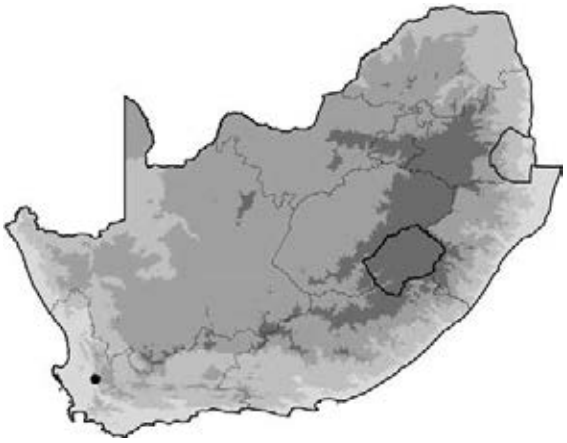
Species 2: mountains of the West Coast, South Africa.

29. **Geissorhiza esterhuyseniae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 341 (1985). Type: South Africa, [Eastern Cape], Great Winterhoek Mtns, crevices in cliffs and rocky ledges, *Esterhuysen 28519A* (BOL, holo.).

Plants 70–180 mm high. *Corm* unknown. *Stem* apparently inclined to trailing from sloping to inclined rocks. *Leaves* (3)4, plane, (2)3 basal or third inserted in lower part of stem, ± falcate, ± half as long as stem, 3–5 mm wide, ± plane, obtuse, margins lightly thickened, uppermost inserted on upper half of stem, entirely sheathing. *Spike* 1- to 3-flowered; bracts green, becoming pale and membranous above, 12–14 mm long, inner ± as long or shorter than outer. *Flowers* actinomorphic, salver-shaped, white, fragrant; perianth tube cylindric, 10–16 mm long, including stamens and style, well-exserted from bracts; tepals obovate 13–15 ± 7 mm. *Filaments* included, ± 3 mm long, inserted 2.5 mm above base of tube; anthers ± 4.5 mm long, not reaching top of tube. *Style* ± 0.5 mm long, dividing below base of filaments, branches 2 mm long. *Flowering time*: October.

Distribution and ecology: known only from a single collection from high elevations in the Groot Winterhoek Mtns of Western Cape, South Africa; trailing from cliffs and steep slopes.

Diagnosis: one of the most remarkable species in the genus, *Geissorhiza esterhuyseniae* has both stamens and style included within a relatively long perianth tube up to 16 mm long. This set of characters is known elsewhere in *Geissorhiza* in the northern Cederberg species, *G. cedarmontana*, and in *G. adriaanii* (sect. *Engysiphon*) from Piketberg. Corms are not known for *G. esterhuyseniae* and it is included in subg. *Weihea* because of its morphological similarity to *G. cedarmontana*. This species has a perianth tube 13–15 mm long, comparable with that of *G. esterhuyseniae*, but shorter filaments 1 mm long and the white flowers have red at the tepal bases, whereas *G. esterhuyseniae* has uniformly white flowers with filaments ± 3 mm long. Both species grow in similar sheltered, south-facing rocky situations.



Distribution of ***Geissorhiza esterhuyseniae***.

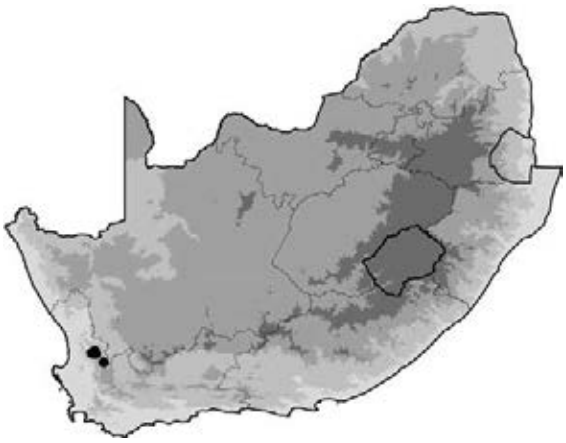
30. **Geissorhiza cedarmontana** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 341 (1985). Type: South Africa, [Western Cape], Cederberg, Middelberg, *Goldblatt 5145* (MO, holo.; K, NBG, PRE, S, WAG, iso.).

Plants (70–)120–350 mm high. *Corm* globose, symmetric, ± 10 mm diam., tunics concentric, pale brown, notched below into segments and drawn into bristles above. *Stem* erect or inclined, unbranched. *Leaves* 2 or 3, usually lower 2 well developed, basal, upper of these sheathing stem for some distance, linear, shorter or ± as long as stem, 1–2 mm wide, margins and midrib heavily thickened, thus with 2 longitudinal grooves on each surface, uppermost leaf cauline, sometimes entirely sheathing. *Spike* flexuose (1)2- to 5-flowered; bracts 7–11 mm long, green, margins hyaline, outer obtuse, inner membranous, slightly shorter than outer. *Flowers* actinomorphic, salver-shaped, pale to deep pink, with red spot at base of each tepal; perianth tube cylindric, 13–15 mm long, well-exserted from bracts, including stamens and style; tepals ovate, spreading, 12–14 × 6–7 mm, outer wider than inner. *Filaments* included, ± 1 mm long, inserted ± 1.8 mm above base of perianth tube; anthers ± 3 mm long, reaching to middle of tube. *Style* short, < 1 mm long, dividing below base

of filaments, branches short, ± 1 mm long. *Capsules* obovoid, 5–6 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: mid-October to November.

Distribution and ecology: restricted to the northern Cederberg in Western Cape, South Africa; on south-facing slopes, in rock outcrops or under boulders at ± 1 200 m elevation.

Diagnosis: *Geissorhiza cedarmontana* and the poorly known *G. esterhuyseniae* stand out in the genus in having stamens and style branches included within the relatively long perianth tube. *Geissorhiza cedarmontana* is recognised by its very short filaments, ± 1 mm long, inserted ± 2 mm above the base of the perianth tube, and a similarly short style less than 1 mm long, with three short poorly defined branches. The pink to almost white flowers have a red mark at the base of each of the spreading tepals. The leaves are also modified, having much thickened margins and main veins, thus with two longitudinal grooves running the length of each leaf surface. In contrast, *G. esterhuyseniae* has uniformly white flowers with filaments ± 3 mm long, inserted ± 2.5 mm above the base of the perianth tube, and better developed style branches some 2 mm long. The leaves of *G. esterhuyseniae* are flat, with only slightly raised margins and main veins.



Distribution of ***Geissorhiza cedarmontana***.

Sect. 5. **Angustifoliae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 343 (1985) [as sect. *Angustifolia*]. Type: *Geisshoriza humilis* (Thunb.) Ker Gawl.

Geissorhiza subsect. *Filiformes* Foster: 18 (1941). Type: *G. juncea* (Link) A.Dietr.

Corm tunics mostly hard and woody, occasionally soft and papery; leaves with margins and main vein heavily thickened, narrowly sword-shaped to linear, sometimes terete; bracts green, often membranous and dry above; flowers usually rotate, actinomorphic; perianth tube short, reaching to apex of bracts, or elongate, exceeding bracts.

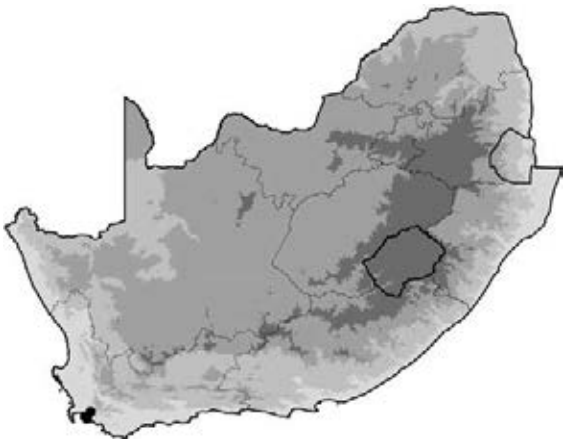
Species 12: southwestern Western Cape, South Africa.

31. **Geissorhiza lithicola** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 343 (1985). Type: South Africa, [Western Cape], between Kogelberg and Steenbras, *Esterhuysen 35262* (BOL, holo.; K, MO, PRE, S, WAG, iso.).

Plants 150–300 mm high. *Corm* ± globose, flattened obliquely below, 6–10 mm diam.; tunics hard, woody, light brown, splitting into vertical sections, drawn into points above. *Stem* smooth, unbranched. *Leaves* usually 3, lower 2 basal and longest, ± half as long to as long as stem, ± 2 mm wide, sheaths sticky, with sand adhering, margins and main veins much thickened, with edges ciliate, upper leaf cauline and sheathing in lower half. *Spike* flexuose, mostly 2- to 4-flowered; bracts becoming dry and membranous near tips, inner shorter and narrower than outer. *Flowers* actinomorphic, rotate, purple; perianth tube funnel-shaped, 7–8 mm long; tepals ellipsoid, 15–20 × 7–9 mm. *Filaments* erect, equal, 6–7 mm long; anthers ± 5 mm long, yellow; pollen yellow. *Style* dividing opposite anther tips, branches 2–3 mm long. *Flowering time*: October.

Distribution and ecology: a poorly documented, narrow endemic of the Kogelberg in Western Cape, South Africa; in stony, sandstone ground, seen only after fire.

Diagnosis: *Geissorhiza lithicola* is distinguished by the hard woody corm tunics, and large, violet-purple flowers with tepals 15–20 mm long and relatively short perianth tube 7–8 mm long. The anthers are yellow. Plants typically have three leaves, the lower two basal and with linear blades with the margins and main veins heavily thickened.



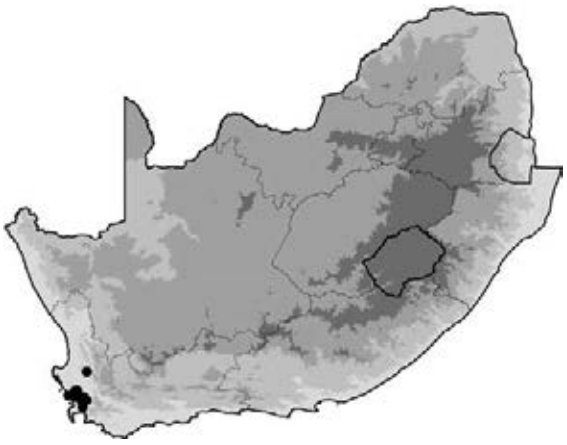
Distribution of ***Geissorhiza lithicola***.

32. **Geissorhiza purpurascens** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 345 (1985). Type: South Africa, [Western Cape], Mamre road, *Barker 808* (NBG, holo.).

Plants (140–)180–300 mm high. *Corm* asymmetric, globose, with one side flattened below and extending downward, 6–8 mm diam.; tunics concentric, light brown, fragmenting irregularly, drawn into points above. *Stem* simple or 1-branched, flexed above sheathing part of leaves. *Leaves* 3, lower two basal, lowermost longest, ± half as long as stem, sometimes longer, 2–3(–5) mm wide, sticky and with adhering sand, linear, margins and main vein thickened, broadly 2-channelled on each surface, margins and edges of main vein ciliate, second leaf shorter, sheathing stem below, upper leaf inserted in middle of stem, partly to entirely sheathing. *Spike* flexed at base, flexuose, inclined to horizontal with flowers on upper side, 4- to 10-flowered; bracts 6–9 mm long, margins hyaline, becoming pale and dry above, inner shorter than outer. *Flowers* actinomorphic, rotate, pale to deep mauve (darker when dry); perianth tube funnel-shaped, 3–4(–6) mm long; tepals elliptic, 0–16 × 6–8 mm. *Filaments* erect, equal, 4–6 mm long; anthers 3.5–4.5 mm long, yellow; pollen yellow. *Style* dividing near apex of anthers, branches ± 2.5 mm long. *Flowering time*: September to early October.

Distribution and ecology: rare and local in southwestern Western Cape, South Africa, between Paarl Mtn and the coast near Mamre and Darling but with an isolated population on the south slopes of the Piketberg; in deep quartzitic sands, often in seasonally wet sites.

Diagnosis: *Geissorhiza purpurascens* is distinguished by the hard, woody, concentric corm tunics, three narrow leaves, the lower two with thickened margins and main vein, and ciliate edges, and light to dark purple flowers borne on an inclined, flexuose spike. The leaves are ± oblong in cross section with two broad channels on each surface between the margins and main vein. It is perhaps most closely related to *G. juncea*, but that species has somewhat smaller, white to yellow flowers and terete leaves. Plants from well-drained, stony, south-trending slopes of the Piketberg appear to belong here but are unusual in having broader leaves, up to 5 mm wide, and flowers with a somewhat longer perianth tube, ± 6 mm long, compared to populations to the south and west, which have leaves only 2–3 mm wide and a perianth tube 3–4 mm long.



Distribution of ***Geissorhiza purpurascens***.

33. **Geissorhiza humilis** *(Thunb.) Ker Gawl.* in König & Sims, Annals of Botany 1: 242 (1804); Goldblatt: 346 (1985). *Ixia humilis* Thunb.: 8 (1783). Type: South Africa, [Western Cape], hills around Cape Town, *Thunberg s.n.* (UPS–THUNB 959 '*I. humilis* α', lecto., effectively designated by Brown: 47 (1928); S: Herb. Montin, S: Herb. Casstrom, isolecto.).

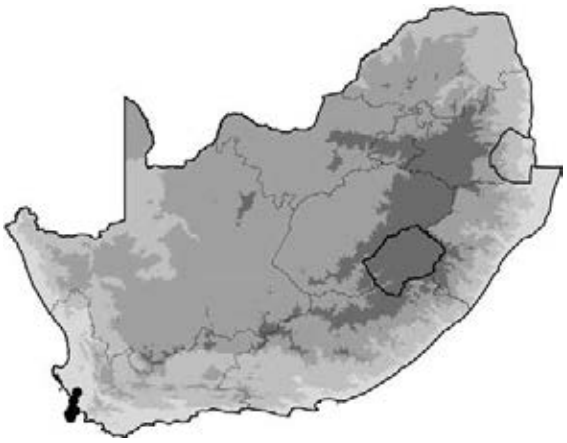
Geissorhiza humilis var. *grandiflora* Baker: 153 (1892). Type: South Africa, [Western Cape], fields near Claremont, *H. Bolus 4602* (K, lecto., designated by Goldblatt: 346 (1985); BM, BOL, SAM, isolecto.).

[*Trichonema humile* Ker Gawl. ex Steud.: 702 (1841), invalid name only in synonymy.]

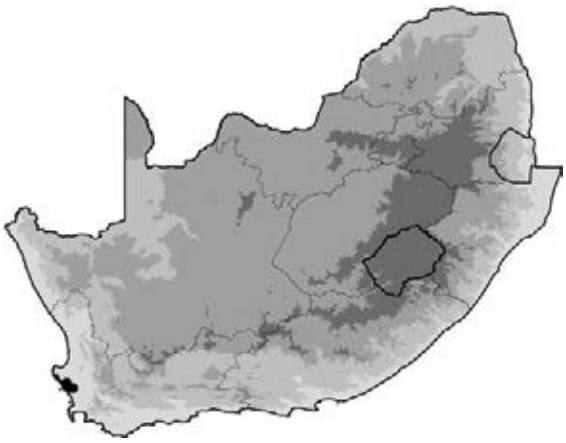
Plants short, 80–140 mm high. *Corm* ± ovoid, asymmetric, obliquely flattened below; tunics light brown, concentric, fragmenting irregularly, drawn into bristles above. *Stem* inclined, flexed above base, rarely with a single branch. *Leaves* 2 or 3, lowermost basal, longest, falcate, exceeding stem, 1–3 mm wide, margins and midrib thickened and with 2 narrow grooves on each surface, second leaf smaller, uppermost usually cauline, sheathing below, ribbed, sometimes much reduced mostly to entirely sheathing, sticky, with sand adhering. *Spike* 2- to 8-flowered, flexuose; bracts 8–12 mm long, lightly ribbed, truncate, margins hyaline, inner as long but narrower than outer, sticky. *Flowers* actinomorphic, rotate, tepals spreading, bright or pale yellow, rarely with dark tube; perianth tube ± narrowly funnel-shaped, 5–8 mm long, barely to shortly exserted from bracts; tepals obovate-ellipsoid, 16–22 × 12–14 mm. *Filaments* erect, equal, 5–8 mm long; anthers ± 5 mm long, yellow. *Style* dividing opposite upper third of anthers, branches 3–4 mm long. *Capsules* oblong-cylindric, (8–)10–12 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: late August to October.

Distribution and ecology: a narrow endemic of Western Cape, South Africa, extending from the Cape Peninsula to Stellenbosch and Riverlands near Mamre Road; on coarse sandy ground, flowering well only after fire.

Diagnosis: *Geissorhiza humilis* is recognised by the relatively large, bright or pale yellow flowers with tepals 16–22 mm long, and three leaves, the blades with thickened margins and midribs, thus narrowly 2-grooved on each surface. Both the leaves and the floral bracts are sticky and usually have grains of sand adhering to them. Populations on the Cape Peninsula always have



Distribution of ***Geissorhiza humilis***.



Distribution of ***Geissorhiza darlingensis***.

bright, golden yellow flowers but elsewhere the species may have pale yellow flowers, with or without a green or dark tube.

Geissorhiza humilis and the related but smaller flowered *G. hispidula* grow together at several sites on the Cape Peninsula, and often flower at the same time, when it is clear that they are quite different species although vegetatively they are almost identical. Not surprisingly, they have often been confused and their taxonomic history is intertwined. *Geissorhiza hispidula* can be distinguished by the smaller, creamy white flowers with short perianth tube 3–4 mm long and tepals 10–15 mm long, the outer marked red on the reverse, and spikes usually with 2 to 5 flowers, often fewer than in *G. humilis*. *Geissorhiza darlingensis*, restricted to the Darling area to the north of Cape Town, is closely allied to *G. humilis* and also vegetatively almost identical but has somewhat larger flowers with tepals 23–26 mm long, a tube 9–11 mm long vs. 5–8 mm in *G. humilis*, and longer filaments 8–9 mm long. The flowers also have a conspicuous dark centre.

34. **Geissorhiza darlingensis** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 348 (1985). Type: South Africa, [Western Cape], Tienie Versfeld Flower Reserve, Darling, ex hort. Kirstenbosch, *Roux s.n.* (NBG, holo.; MO, iso.).

Plants 70–150 mm high. *Corm* ± ovoid, nearly symmetric, 5–8 mm diam.; tunics pale brown, breaking irregularly into vertical sections, drawn into points above. *Stem* flexed above sheath of cauline leaf and inclined, simple or with 1 or 2 branches. *Leaves* 3, lower 2 basal, linear, 2–3 mm wide, lowermost exceeding spike, second leaf shorter, margins and main vein much enlarged, ciliate along edges, with 2 wide grooves on each surface, sticky, often with sand adhering, uppermost leaf cauline, with inflated sheath, shorter than basal. *Spike* flexed at base, 2- to 5-flowered; bracts green, 10–15 mm long, ± truncate, inner smaller. *Flowers* actinomorphic, ± cupped, pale yellow with dark purple-black centre; perianth tube ± cylindric, 9–11 mm long, usually shortly exserted from bracts; tepals 23–26 × ± 12 mm. *Filaments* erect, equal, 8–9 mm long; anthers ± 5 mm long, yellow. *Style* dividing opposite upper third to shortly beyond anthers, branches ± 3 mm long. *Capsules* oblong-ellipsoid, truncate, 10–12 mm long. *Flowering time*: late September to mid-October.

Distribution and ecology: restricted to the immediate vicinity of Darling, north of Cape Town in Western Cape, South Africa; on damp sandy ground.

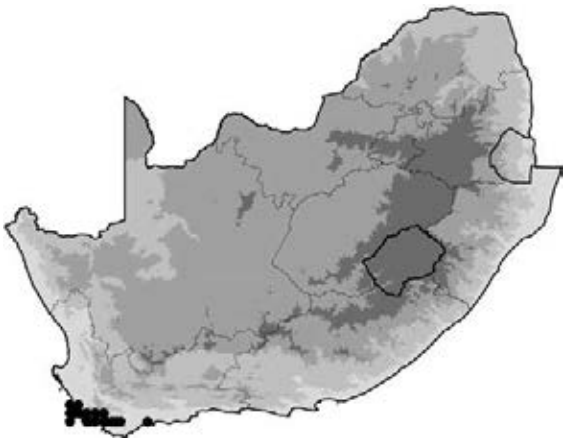
Diagnosis: a striking species, *Geissorhiza darlingensis* has large pale yellow flowers with a purple-black centre. Allied to *G. humilis* of the Cape Peninsula and adjacent West Coast, it has a longer perianth tube 9–11 mm long and tepals 23–26 mm long vs. perianth tube 5–8 mm long and tepals mostly 16–22 mm long in *G. humilis*. Both species have linear leaves with thickened margins and midribs and are sticky, usually with sand adhering to the surface. The ciliate edges of the leaf margins and main vein of *G. darlingensis* are evidently lacking in *G. humilis*. The distinction between the two species is not always clear where their ranges approach.

35. **Geissorhiza hispidula** *(R.C.Foster) Goldblatt* in Annals of the Missouri Botanical Garden 72: 349 (1985). *G. humilis* var. *hispidula* Foster: 19 (1941). Type: South Africa, [Western Cape], Cape Flats, *Zeyher 1599* (K, holo.; B, G, K, SAM, iso.).

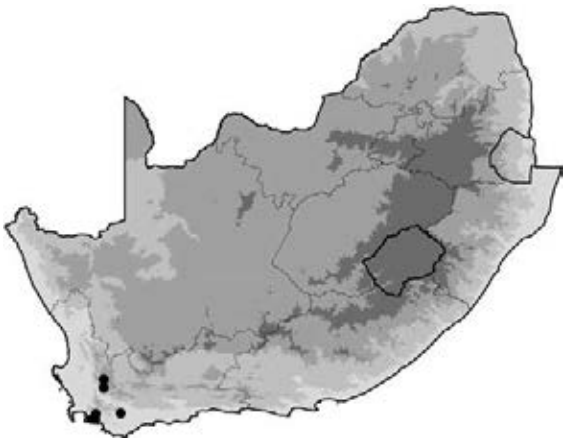
Geissorhiza humilis var. *bicolor* Baker: 153 (1892). Type: South Africa, [Western Cape], Muizenberg, *MacOwan in Herb. Norm. Austr. Afr. 257* (K, lecto., designated by Goldblatt: 349 (1985); B, BOL, G, SAM, isolecto.).

[*Geissorhiza striata* Eckl.: 21 (1827), invalid name without description.]

Plants small, 70–150(–250) mm high. *Corm* ± ovoid, asymmetric, obliquely flattened on one side, 5–7 mm diam.; tunics concentric, woody, brown. *Stem* ± erect or inclined, smooth, rarely branched. *Leaves* 3, lower 2 basal, longest,



Distribution of ***Geissorhiza hispidula***.



Distribution of ***Geissorhiza pappei***.

linear, erect to falcate, 1–2 mm wide, slightly longer than stem, margins and midrib much enlarged, with 2 narrow grooves on each surface, edges of margin and main vein smooth or minutely ciliate, usually sticky, with sand adhering, uppermost leaf cauline, short and sheathing below or entirely, sheath ribbed. *Spike* 2- to 5-flowered, flexuose; bracts with hyaline or reddish margins, 7–9 mm long, sticky, inner shorter than outer. *Flowers* actinomorphic, rotate, white to creamy white, often with outer tepals pink to red outside, tepals spreading; perianth tube 3–4 mm long, not or barely exceeding bracts; tepals narrowly elliptic, 10–15 × 5–8 mm. *Filaments* erect, equal, 3–4 mm long; anthers ± 3 mm long, yellow. *Style* dividing ± opposite apex of anthers, branches ± 2.5 mm long. *Capsules* ± obovoid-oblong, 5–8 mm long, exserted from bracts. *Chromosome number* 2*n* = 26. *Flowering time*: August to September.

Distribution and ecology: widespread in southern Western Cape, South Africa, extending from the Cape Peninsula eastward to Albertinia; in sandy ground, usually on flats or mountain plateaus and flowering only after fire.

Diagnosis: *Geissorhiza hispidula* has small corms with concentric tunics, just three leaves, these with a sticky surface and thickened margins and main veins, and relatively small, creamy white flowers with a narrow perianth tube 3–4 mm long and narrowly elliptic tepals 10–15 × 5–8 mm. It has often been confused with *G. humilis*, with which it sometimes grows and flowers and then their differences are quite evident. *Geissorhiza humilis* has bright yellow flowers with broader tepals, 16–22 × 12–14 mm and a perianth tube 5–6 mm long.

36. **Geissorhiza pappei** *Baker*, Handbook of the Irideae: 154 (1892); Goldblatt: 351 (1985). Type: South Africa, [Western Cape], Zonder Einde Mtns [Riviersonderend Mtns], *Zeyher 3965* (K, lecto., designated by Foster: 20–21 (1941); B, SAM, isolecto.).

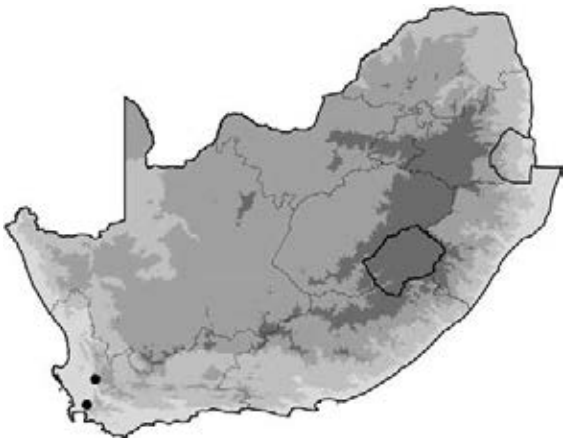
Plants small, 50–100 mm high. *Corm* ovoid, asymmetric, with base obliquely flattened on one side, 5–7 mm diam.; tunics concentric, soft and papery, light brown. *Stem* suberect, rarely branched. *Leaves* 3, lower 2 basal, linear and erect to falcate, lowermost longest, shortly exceeding stem, 0.5–1.3 mm wide, margins and main vein somewhat to much enlarged, then with 2 narrow grooves on each surface, edges of margins and main vein evidently smooth, often sticky and with sand adhering; uppermost cauline, short and sheathing below or entirely, sheath ribbed. *Spike* flexuose, 1- to 4-flowered; bracts green, hyaline above, 3–6 mm long, inner shorter than outer. *Flowers* actinomorphic, rotate, white to creamy white, tepals spreading; perianth tube 2.5–3.5 mm long, not or barely exceeding bracts; tepals narrowly obovate-elliptic, 6–9 × 2.5–4.0 mm. *Filaments* erect, equal, ± 2 mm long; anthers ± 2 mm long, yellow. *Style* dividing opposite apex of anthers, branches up to 0.7 mm long. *Flowering time*: September to early October.

Distribution and ecology: a rare and local endemic of southwestern Western Cape, South Africa, known from near Ceres, Highlands near Caledon and the Riviersonderend Mtns in the east; in sandy ground.

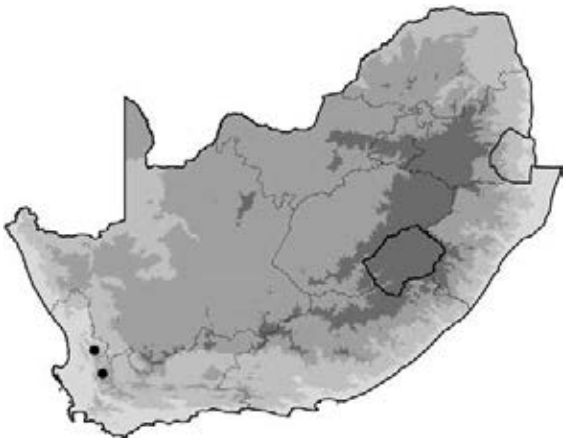
Diagnosis: evidently closely allied to *Geissorhiza hispidula* and very similar in leaf morphology, *G. pappei* is a smaller plant with smaller, white flowers with a perianth tube 2.5–3.5 mm long and tepals 6–9 mm long. The larger, usually creamy white flowers of *G. hispidula* have a perianth tube 3–4 mm long and tepals 10–15 long. *Geissorhiza pappei* is poorly known and requires additional study.

37. **Geissorhiza intermedia** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 352 (1985). Type: South Africa, [Western Cape], Banhoek, Spitzkop, 4 000 ft [1 200 m], *Esterhuysen 11887* (BOL, holo.).

Plants small, 50–120 mm high. *Corm* ovoid, 5–7 mm diam.; tunics concentric, firm textured, light brown. *Stem* ± erect, minutely and densely ciliate above uppermost leaf, rarely branched. *Leaves* 3, lower 2 basal, erect, sword-shaped to falcate, lowermost ± as long as



Distribution of ***Geissorhiza intermedia***.



Distribution of ***Geissorhiza unifolia***.

stem, 1.5–3.5 mm wide, often slightly sticky below and on sheath, with sand adhering, margins and midrib enlarged; with 2 broad grooves on each surface, margins and edges of main vein evidently smooth (rarely sparsely and minutely ciliate), uppermost leaf cauline, smallest. *Spike* flexuose, 1- to 3-flowered; bracts green, membranous above, 6–9 mm long, inner 1–2 mm shorter than outer. *Flowers* actinomorphic, rotate, white; perianth tube 2–3 mm long, not reaching apex of bracts; tepals narrowly obovate-elliptic, 8–10 × ± 4 mm. *Filaments* equal, erect, ± 4 mm long; anthers 2–3 mm long, yellow. *Style* dividing opposite apex of anthers, branches ± 2 mm long. *Flowering time*: September to October.

Distribution and ecology: a rare and local endemic of the southwestern mountains of Western Cape, South Africa, recorded from the Twenty Four Rivers Mtns, Banhoek and Simonsberg; in sandy ground.

Diagnosis: a small, inconspicuous plant, *Geissorhiza intermedia* stands out in its densely ciliate stem, an unusual character in subg. *Weihea* and is otherwise undistinguished in its white flowers with a short perianth tube 2–3 mm long and narrow leaves with strongly raised margins and main vein. It can easily be mistaken for the similar and probably closely related *G. hispidula*, which has a largely lowland distribution, and has narrower, sticky leaves and bracts and invariably a smooth stem. *Geissorhiza intermedia* may also be confused with *G. similis*, which is alike in general appearance but has imbricate corm tunics, a longer perianth tube, and also has smooth stems.

38. **Geissorhiza unifolia** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 353 (1985). Type: South Africa, [Western Cape], N Cederberg, peak at Koupoort, *Esterhuysen 12159* (BOL, holo.; MO, iso.).

Plants small, 50–100 mm high. *Corm* globose, ± 5 mm diam.; tunics brown, brittle papery, ± concentric, notched below, drawn into bristles above. *Stem* erect, flexed above leaf sheath, minutely papillate-ciliate especially below, unbranched. *Leaves* 2(3), lower basal, sheathing stem below, ± falcate, 0.5–1.3 mm wide, margins and main vein thickened, uppermost leaf entirely sheathing. *Spike* flexuose, 1- to 5-flowered; bracts 3.5–5.0 mm long, green below, dry and transparent to light brown above. *Flowers* actinomorphic, rotate, tiny, white, outer tepals purple-pink outside; perianth tube ± cylindric, 1.5–2.0 mm long; tepals ± elliptic, 3.5–5.0 × ± 2 mm. *Filaments* equal, erect, ± 2 mm long; anthers 1.0–1.8 mm long. *Style* dividing ± opposite middle of anthers, branches ± 1 mm long. *Capsules* globose, ± 4 mm long, shorter than bracts. *Flowering time*: October.

Distribution and ecology: a rare endemic of the Cederberg and Cold Bokkeveld Mtns of Western Cape, South Africa; at high elevations, 5 500–6 000 m, on thin soils over damp, rocky pavement, mostly on south-facing slopes.

Diagnosis: *Geissorhiza unifolia* is easily recognised by its single basal foliage leaf, minutely ciliate stem 50–100 mm high, and tiny flowers with tepals up to 5 mm long. The remaining one or two leaves are short and largely to entirely sheathing. The leaf sheath and cataphyll are sticky and have sand adhering to them. The papery, rather than woody corm tunics are concentric and fairly typical of subg. *Weihea*. The relationships of *G. unifolia* are uncertain but the ciliate stem recalls *G. intermedia*.

39. **Geissorhiza juncea** *(Link) A.Dietr.*, Species plantarum 2: 587 (1833); Goldblatt: 353 (1985). *Ixia juncea* Link: 50 (1821). *G. humilis* var. *juncea* (Link) Baker: 153 (1892). Type: South Africa, locality unknown: cultivated in Berlin, *Link 1205* [B, lecto.; effectively designated by Foster: 21 (1941)].

Geissorhiza secunda var. *setifolia* Eckl. ex Baker: 155 (1892). Type: South Africa, [Western Cape], between Paarl and Pont, *Drège 8460* [K, lecto., designated by Goldblatt: 354 (1985)].

Geissorhiza filifolia Baker: 238 (1876). Type: South Africa, [Western Cape], precise locality unknown, *Prior s.n.* (BM, holo. [GH, photo.]).

Geissorhiza pallidiflora Schltr.: 98 (1899). *G. juncea* var. *pallidiflora* (Schltr.) R.C.Foster: 23 (1941). Type: South Africa, [Western Cape], flats between Bain's Kloof and Wolseley (Ceres Road), *Schlechter 9088* (B, lecto., designated by Goldblatt: 354 (1985); B, BM, BOL, isolecto.).

Hesperantha subulata Baker: 864 (1901). Type: South Africa, [Western Cape], Cape Flats, *Rehmann 1850* (Z, lecto., designated by Goldblatt: 354 (1985); BM, BR, isolecto.).

[*Geissorhiza setifolia* Eckl.: 22 (1827), invalid name without description.]

Plants slender, mostly 150–350 mm high. *Corm* globose, 5–9 mm diam., tunics light brown, concentric, woody, outer layers breaking irregularly, drawn into bristles above. *Stem* slightly inclined, flexed at base of spike, and sometimes above sheath of cauline leaf, rarely 1-branched. *Leaves* 3, lower 2 basal, terete, ± erect, reaching to ± middle of spike, with 4 narrow longitudinal grooves, uppermost leaf cauline, sheathing stem for ± half its length, 20–40 mm long, sheaths of lower leaves usually sticky. *Spike* inclined, 3- to 8(–13)-flowered; bracts 5–8 mm long, pale green to brown below, membranous above, curving outward in upper half, inner shorter than outer. *Flowers* actinomorphic, rotate, white to pale yellow, outer tepals often reddish or brown outside; perianth tube funnel-shaped, 2–3 mm long; tepals elliptic, mostly 8–12 × 3.0–5.5 mm. *Filaments* erect, equal, 2–3(–5) mm long; anthers 2–4 mm long, white or pale yellow. *Style* 6–12 mm long, dividing above apex of anthers, branches 1.2–2.5 mm long. *Capsules* ± globose, 3.3–4.5 mm long. *Chromosome number* $2n = 26$. *Flowering time*: August to October (to November at high elevations).

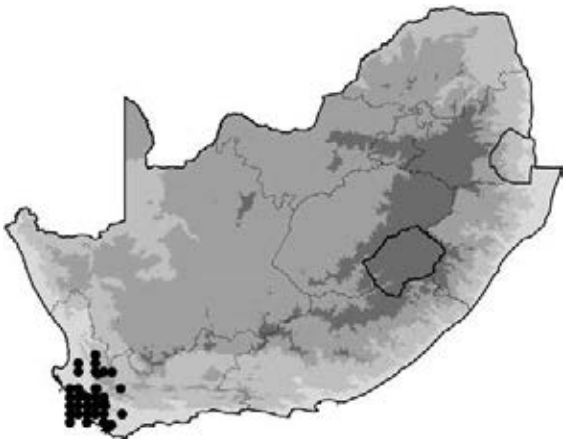
Distribution and ecology: extending throughout the western half of Western Cape, South Africa, from the northern Cederberg at Pakhuis Pass to the Cape Peninsula and Caledon; mostly in stony sandstone ground, also on loamy clay or granite-derived soils, often in seasonally wet and even marshy sites.

Diagnosis: the fairly common *Geissorhiza juncea* is recognised by its slender habit, with two basal leaves, the blades terete but with thickened margins and main vein and four narrow grooves between them, and small, white to pale yellow, star-like flowers with a perianth tube 2–3 mm long and tepals typically 8–12 mm long. It is is allied to a group of species including *G. humilis* and *G. hispidula* which have small corms with hard concentric tunics and narrow leaves with raised and thickened margins and midribs but can be readily distinguished from these species by its terete leaves and particularly short perianth tube. It is perhaps most closely allied to *G. furva*, with similar narrow, terete leaves but larger, deep yellow flowers with tepals 15–22(–28) mm long. This is also typically a shorter plant than *G. juncea*, mostly 60–120(rarely to 180) mm high, and the flowers are distinctive when dry as they turn an unusual blackish colour with age.

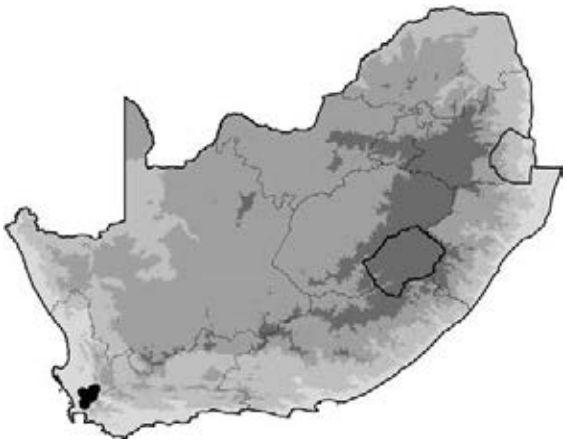
40. **Geissorhiza furva** *Ker Gawl. ex Baker*, Handbook of the Irideae: 155 (1892); Goldblatt: 356 (1985). Type: South Africa, [Western Cape], between Paarl and Pont, *Drège 8478* (K, lecto., designated by Goldblatt: 305 (1985); G, L, iso.).

[*Ixia furva* Banks ex Ker Gawl.: 224 (1804), invalid name without description.]

Plants small to medium, 70–120(–180) mm high. *Corm* globose, ± symmetric, obliquely flattened below, 7–9 mm diam.; tunics light brown, concentric, layers fragmenting irregularly, drawn into bristles above. *Stem* ± erect below, flexed above leaf sheaths and at base of spike, smooth. *Leaves* (2)3, lower 2 basal, terete and narrowly 4-grooved, usually sticky on sheaths and with sand adhering, lowermost longest, usually shortly exceeding stem, uppermost cauline, sheathing stem below, terete above, sometimes entirely sheathing. *Spike* inclined with flowers in upper side, flexuose, mostly 2- to 6-flowered; bracts 6–12 mm long, dry and papery above, inner slightly smaller than outer, sometimes longer. *Flowers* actinomorphic, rotate, deep yellow (becoming blackish when dry); perianth tube funnel-shaped, 3–5 mm long; tepals ± elliptic, 15–22(–28) × 10–2 mm.



Distribution of ***Geissorhiza juncea***.



Distribution of ***Geissorhiza furva***.

Filaments erect, equal, 7–13 mm long; anthers 5–6 mm long, yellow. *Style* dividing near or shortly beyond anther tips, 4–5 mm long. *Flowering time*: September to mid-October.

Distribution and ecology: restricted to the western coastal lowlands of Western Cape, South Africa, extending from Mulder's Vlei near Stellenbosch to Elandsberg Nature Reserve; on stony or sandy flats and slopes.

Diagnosis: *Geissorhiza furva* is a relatively short specuies, rarely exceeding 120 mm in height, with terete, 4-grooved leaves, and large deep, golden-yellow flowers. The flowers are unusual in turning a blackish colour on drying. The small corms, up to 9 mm diam., with concentric tunics that fragment vertically into irregular sections are typical of subg. *Weihea*. *Geissorhiza furva* is probably mostly closely related to the more common and widespread *G. juncea*, which has smaller, white to pale yellow flowers, the tepals mostly 8–12 × 3.0–5.5 mm.

41. **Geissorhiza sufflava** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 39: 133 (2009). Type: South Africa, [Western Cape], Piketberg, lower slopes of Versfeld Pass, light stony clay in renosterveld, 22 Sept. 1992, *Goldblatt & Manning 9468* (NBG, holo.; MO, PRE, iso.).

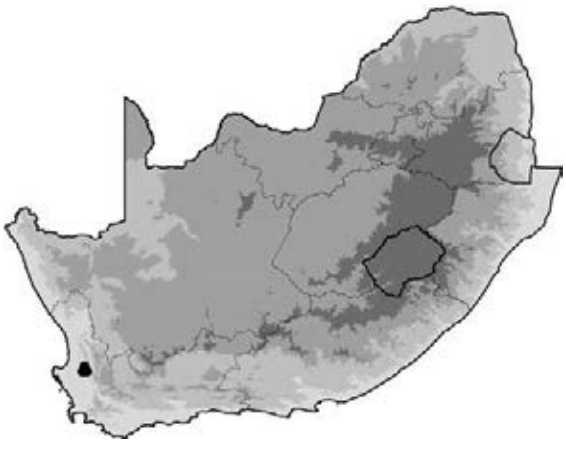
Plants 100–150 mm high excluding leaves. *Corm* globose-elliptic, ± 8 mm diam.; tunics light brown, concentric, splitting into vertical sections, drawn into short bristles above. *Stem* erect below, flexed outward above sheaths of upper 2 leaves, unbranched. *Leaves* 3, rarely 2, straight, terete with 4 narrow, longitudinal grooves, 0.5–1.0 mm diam., lowermost basal, longest, often exceeding spike, up to 300 mm long, uppermost leaf inserted in middle of stem. *Spike* flexuose, inclined with flowers on upper side, (1)2- or 3-flowered; bracts ± dry, light brown-translucent, 12–16 mm long, inner slightly shorter than outer, forked at apex. *Flowers* actinomorphic, cup-shaped, pale yellow, unscented; perianth tube funnel-shaped, 7–9 mm long; tepals narrowly ovate-elliptic, 18–25 × 6.0–8.5 mm. *Filaments* erect, equal, 12–14 mm long; anthers ± 5 mm long, yellow. *Style* dividing opposite upper ⅓ of anthers, branches ± 5 mm long. *Flowering time*: September.

Distribution and ecology: restricted to the lower eastern slopes and foot of the Piketberg in Western Cape, South Africa; on stony clay slopes in renosterveld or renosterveld–fynbos transition, flowering best after fire.

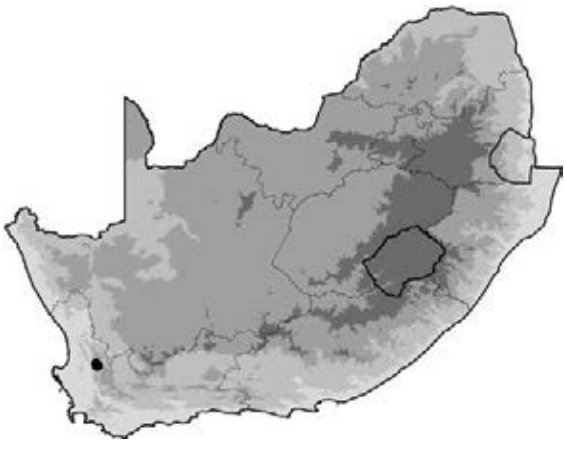
Diagnosis: spikes of 1 or 2, large, pale yellow, cup-shaped flowers and terete, four-grooved leaves set *Geissorhiza sufflava* apart in sect. *Angustifoliae*. It falls closest to the widespread, small-flowered *G. juncea* and the southwestern Cape endemic *G. furva*, both of which have similar foliage. *Geissorhiza furva* has deep yellow flowers with a perianth tube 3–5 mm long and tepals 15–22(–28) × 5–8(–9) mm, thus usually smaller than those of *G. sufflava*. The two species appear to differ in ecology and distribution, with *G. furva* from the Swartland south of the Piketberg, between Hermon and Paarl, occurring on stony, often seasonally waterlogged clay flats and slopes.

42. **Geissorhiza stenosiphon** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 358 (1985). Type: South Africa. [Western Cape], Cold Bokkeveld Mtns, Hexberg, SE slopes at ± 1 200 m, *Viviers 1300* (NBG, holo.; K, MO, NBG, S, WAG, iso.).

Plants slender, 100–300 mm high. *Corm* globose, 9–12 mm diam., tunics light brown, concentric to ± imbricate (?by distortion), regularly notched below, brittle-membranous to slightly woody, drawn into bristles above. *Stem* unbranched. *Leaves* 3, lower 2 basal, terete with 4 narrow longitudinal grooves, straight, reaching to ± middle of spike, second leaf cauline, sheathing stem below, uppermost leaf inserted on middle of stem, entirely sheathing, 15–22 mm long. *Spike* 1- or 2-flowered; bracts 15–20 mm long, outer pale green with upper margins membranous to dry, inner entirely



Distribution of ***Geissorhiza sufflava***.



Distribution of ***Geissorhiza stenosiphon***.

membranous, ½–⅔ as long as outer. *Flowers* actinomorphic, salver-shaped, white, outside of tube and tepals pale pink to ± purple; perianth tube 40–50 mm long, cylindric throughout; tepals lanceolate, 12–14 × ± 4 mm, inner somewhat larger but shorter than outer. *Filaments* erect, equal, 2 mm long; anthers 2–3 mm long, white. *Style* dividing between apex of perianth tube and base of anthers, branches 2.0–2.5 mm long. *Capsules* ovoid, ± 10 mm long. *Flowering time*: December.

Distribution and ecology: restricted to the upper slopes of Hexberg in upper Elandskloof in the Cold Bokkeveld Mtns of Western Cape, South Africa; on stony, south and east trending, sandstone slopes.

Diagnosis: a remarkably long and slender perianth tube 40–50 mm long and narrow terete leaves make *Geissorhiza stenosiphon* unmistakable. Another unusual feature of the species is the style that divides at or below the base of the anthers. The flowers are actinomorphic with relatively small white tepals, 12–14 mm long, spreading horizontally. The vegetative morphology, especially the terete, 4-grooved leaves and apically dry floral bracts, is consistent with sect. *Angustifoliae* in which the short style and elongate perianth tube are unique.

Sect. 6. **Ixiopsis** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 359 (1985). Type: *Geissorhiza hesperanthoides* Schltr.

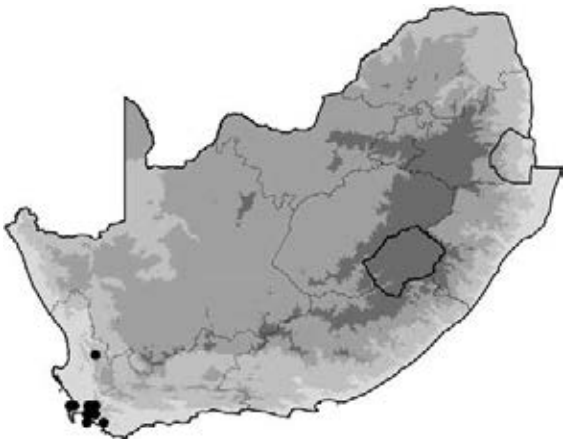
Corm tunics soft and membranous to fibrous and reticulate, leaves 3, the upper one or two sometimes bract-like and sheathing, the margins and midrib heavily thickened, linear, bracts herbaceous to membranous becoming dry above, flowers rotate to salver-shaped, actinomorphic, the tube either short, or reaching to the apex of, or well-exserted from the bracts, stamens equal.

Species 5: mountains of the southwestern Western Cape, South Africa.

43. **Geissorhiza umbrosa** *G.J.Lewis* in Journal of South African Botany 7: 46 (1941); Goldblatt: 359 (1985). Type: South Africa, [Western Cape], wet rocks on Table Mtn, *Lewis 662* (SAM 54288, lecto., designated by Goldblatt: 359 (1985); BOL, PRE, isolecto.).

Plants 120–300 mm high. *Corm* globose, 3.5–6.0 mm diam., remains of older corms sometimes persisting below; tunics either membranous to soft papery and usually hardly accumulating, or composed of medium to fine netted fibres. *Stem* erect or inclined, simple (rarely 1-branched). *Leaves* 3, lower 2 basal, lowermost longest, second leaf shorter and sheathing lower part of stem for a short distance, linear (to subterete) to falcate, ⅓ to as long as stem, 1–2 mm wide, oblong in section, margins and main vein thickened, 2-grooved on each surface uppermost leaf inserted on lower ⅓ of stem, sheathing for at least ⅔ to almost entirely. *Spike* lax, 2- to 4(–10)-flowered; bracts 6–8(–10) mm long, green or becoming dry in upper half. *Flowers* actinomorphic, rotate, white, outer tepals often pink or reddish outside especially with age; perianth tube 2.5–4.0 mm long; tepals ± elliptic, 10–13 × 5–7 mm. *Filaments* erect, equal, 4–5 mm long; anthers 3–4 mm long, pale yellow. *Style* branching opposite upper ⅓ of anthers, branches ± 1.5 mm long. *Capsules* globose, 5–6 mm long. *Flowering time*: late October to December.

Distribution and ecology: mountains of Western Cape, South Africa, from the Cederberg and the Cape Peninsula eastward to the Riviersonderend Mtns; in sheltered, damp sites on stony sandstone slopes.

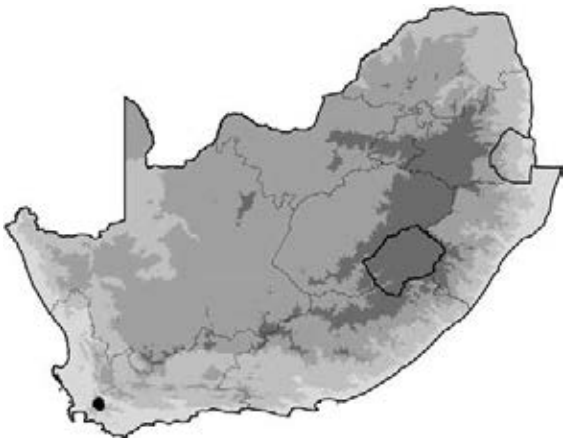


Distribution of ***Geissorhiza umbrosa***.

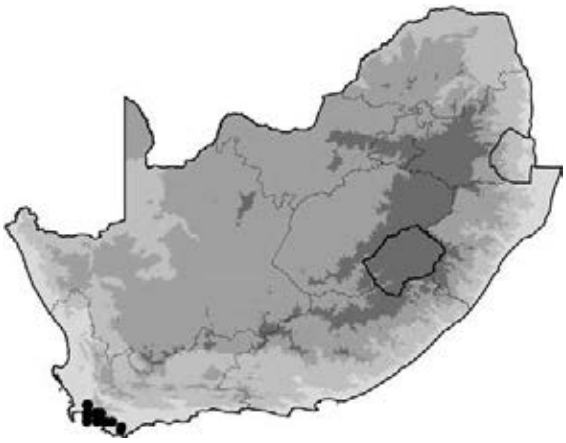
Diagnosis: an inconspicuous species, *Geissorhiza umbrosa* has small, white flowers with a perianth tube up to 4 mm long and tepals 10–13 mm long. The ± linear leaves have thickened margins and main vein and are 2-grooved on each surface, and the corm tunics range from soft and papery to fibrous. Its relationships are obscure.

44. **Geissorhiza alticola** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 361 (1985). Type: South Africa, [Western Cape], Louwshoek Peak, above Kaaimansgat, Villiersdorp, *Esterhuysen 35626* (MO, holo.; BOL, K, NBG, PRE, S, WAG, iso.).

Plants 200–300 mm high. *Corm* globose, symmetric 7–10 mm diam.; tunics papery, light brown, notched or torn below, not accumulating. *Stem* unbranched. *Leaves* (2)3, lowermost basal and longest, linear, 2–3 mm wide, with 2 narrow grooves on each surface, margins and midrib much thickened, second leaf



Distribution of ***Geissorhiza alticola***.



Distribution of ***Geissorhiza hesperanthoides***.

inserted near ground level, sheathing lower part of stem, with short free blade, uppermost leaf inserted in middle of stem, sheathing almost entirely. *Spike* flexuose, 3- to 5-flowered; bracts 7–10 mm long, dry and membranous above. *Flowers* actinomorphic, rotate, blue-violet; perianth tube funnel-shaped, 2–3 mm long; tepals obovate-elliptic, 11–13 × 5 mm, spreading. *Filaments* erect, equal, 4–5 mm long; anthers ± 4 mm long, yellow. *Style* dividing near apex of anthers. *Capsules* globose, 5–6 mm long. *Flowering time*: December to early February.

Distribution and ecology: a rare, high altitude endemic of the Du Toits Kloof–Wemmershoek–Stettynskloof Mtn complex of the Western Cape, South Africa; on stony sandstone ground above 1 500 m elevation.

Diagnosis: with a short perianth tube, ± 2.5 mm long but relatively long tepals, 11–13 mm long, *Geissorhiza alticola* appears to be allied to the *G. hesperanthoides* complex (including *G. nubigena* and *G. umbrosa* as well). It is similar to these species in general appearance and leaf morphology but has unbroken, papery rather than fibrous corm tunics. It can be distinguished from other high mountain species by its short, funnel-shaped perianth tube and fairly large blue-violet flower. Normally only the lowermost leaf is produced to any extent, while the two upper leaves sheath the stem for most or all of their length.

45. **Geissorhiza hesperanthoides** *Schltr.* in Botanische Jahrbücher für Systematik 27: 97 (1899); Goldblatt: 362 (1985). Type: South Africa, [Western Cape], summit of mtns near Vogelgat, *Schlechter 9555* (B, lecto., designated by Goldblatt: 362 (1985); B, BM, G, K, MO, PH, PRE, Z, isolecto.).

Plants 150–300 mm high. *Corm* globose, flattened on one side, 5–7 mm diam.; tunics of fine, pale reticulate fibres, sometimes with papery, fragmented layers between, fibres extending upward in a collar. *Stem* ± erect to inclined, smooth, rarely branched. *Leaves* (2)3, lowermost basal, longest, second inserted near ground level, sheathing lower part of stem, linear, 2–3 mm wide, margins and main vein much thickened, with 2 narrow grooves on each surface, occasionally sticky with adhering sand, uppermost leaf inserted in middle part of stem, sheathing or with short free apex. *Spike* flexuose, 1- to 3-flowered; outer bracts ± 10 mm long, reddish above, often with translucent apices, inner shorter and narrower. *Flowers* actinomorphic, rotate, tepals slightly cupped, blue to violet; perianth tube 5–8(–10) mm long, almost reaching apex of bracts, shortly exserted in old flowers; tepals oblanceolate, 12–18 × 6–8 mm. *Filaments* erect, equal, 7–10 mm long; anthers 4–5 mm long, yellow. *Style* dividing beyond anther apices, branches ± 3 mm long. *Capsules* globose, ± 6 mm long. *Flowering time*: late November to December (January at highest elevations).

Distribution and ecology: mountains of the Western Cape, South Africa, from Wellington Sneeukop and Victoria Peak south to the Bredasdorp Mtns; at middle to upper elevations, usually in damp, sometimes marshy sites and flowering in summer.

Diagnosis: *Geissorhiza hesperanthoides* is unusual in the genus in having fine, fibrous corm tunics, shared only with *G. nubigena* and *G. umbrosa* and evidently a specialised character in *Geissorhiza*, where hard woody concentric tunics are likely the ancestral state. Flowers of *G. hesperanthoides* have broad, somewhat cupped, violet-blue tepals and a perianth tube 5–8 mm long, extending to 7–10 mm in older flowers, and typically not or barely exserted from the bracts. *Geissorhiza nubigena*, with which *G. hesperanthoides* has been confused, has pink flowers with narrower tepals that extend at right angles to the longer tube, which is well exserted at anthesis and 10–18 mm long, becoming even longer in older flowers.

46. **Geissorhiza nubigena** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 366 (1985).

Type: South Africa, [Western Cape], southern slopes of Victoria Peak, *Goldblatt 6827* (MO, holo.; K, NBG, PRE, S, US, WAG, iso.).

Plants 150–300 mm high. *Corm* globose, slightly flattened on one side, 5–9 mm diam.; tunics of fine, pale, netted fibres, sometimes with papery, fragmented layers between, fibres usually extending upward in collar. *Stem* rarely branched. *Leaves* (2)3, lowermost basal, longest, linear, 2–3 mm wide, margins and main vein much thickened and with 2 narrow grooves on each surface, second leaf inserted near ground level, sheathing lower part of stem for a short distance, uppermost leaf short, inserted in middle of stem, partly to entirely sheathing. *Spike* flexuose, 1- to 5-flowered; bracts ± 10 mm long, green, reddish above, often with translucent tips, inner shorter and narrower than outer. *Flowers* actinomorphic, salver-shaped, nodding, tepals spreading at right angles to tube, rose-pink; perianth tube cylindric, mostly 12–18 mm long, well-exserted from bracts when fully open; tepals oblanceolate-elliptic, 17–22 × 8–9 mm. *Filaments* 8–12 mm long; anthers 5–6 mm long, yellow. *Style* dividing beyond anther tips, branches 3–4 mm long. *Flowering time*: January.

Distribution and ecology: restricted to the higher mountains in the southwestern corner of Western Cape, South Africa, from Victoria Peak south through the Hottentots Holland Mtns to the Kogelberg; on grassy slopes at middle to upper elevations above 1 050 m, usually in sheltered or marshy sites.

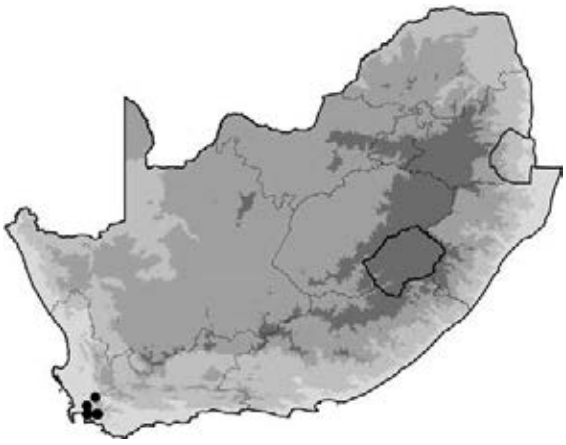
Diagnosis: unusual in flowering in the summer, *Geissorhiza nubigena* is distinguished by the fibrous corm tunics, rose-pink flowers with a relatively long perianth tube, typically 12–18 mm long, exserted from the bracts when fully open. The flowers are held nearly horizontally, thus almost nodding with the tepals spreading at right angles to the tube. It is allied to the vegetatively similar *G. hesperanthoides*, which has violet to blue-purple flowers held upright with somewhat cupped tepals and a shorter perianth tube 5–8(–10) mm long. Both species have corms with fibrous tunics, and three leaves, the lowermost of which is longest, and blades with heavily thickened margins and main vein.

47. **Geissorhiza cataractarum** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 364 (1985). Type: South Africa, [Western Cape], above Betty's Bay, dripping south-facing cliffs in moss, *Goldblatt 5355* (MO, holo.; BR, E, K, NBG, NSW, PRE, S, US, WAG, iso.).

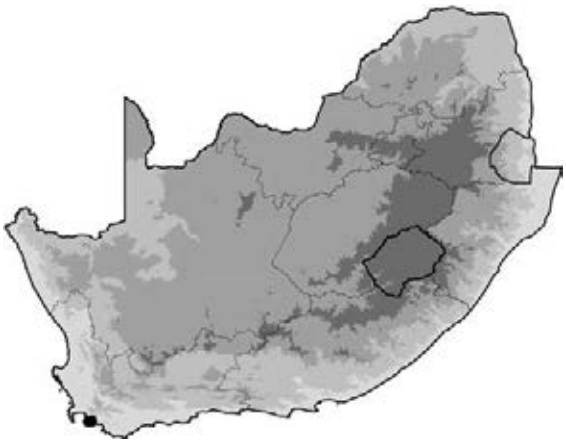
Plants 100–200(–300) mm high, often trailing. *Corm* ± ovoid, symmetric, 4–5 mm diam.; tunics light brown, firm to soft membranous, not normally accumulating. *Stem* suberect or trailing, unbranched. *Leaves* 3, lower 2 basal, up to 300 mm long, arching outward, trailing distally, linear, 1.0–1.5 mm wide, margins and main vein enlarged, thus 2-grooved on each surface, uppermost leaf inserted on lower ⅓ of stem, short, partly sheathing. *Spike* 1- to 5-flowered; bracts 6–9 mm long, membranous above. *Flowers* actinomorphic, rotate, pale blue-mauve, white in throat; perianth tube ± funnel-shaped, 4–6 mm long; tepals elliptic, 14–20 × 6–8 mm. *Filaments* erect, equal, ± 10 mm long; anthers 3(–4) mm long, white. *Style* dividing opposite upper ⅓ of anthers, branches ± 3 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: late November to mid-January.

Distribution and ecology: restricted to the mountains of southwestern Western Cape, South Africa between Betty's Bay and Hermanus; on wet, dripping, mossy south-facing cliffs and waterfalls.

Diagnosis: *Geissorhiza cataractarum* is unusual in its habitat and in its particularly delicate, almost membranous corm tunics that seldom accumulate, instead decaying entirely within a year. The flowers are unremarkable, and typical of the genus in their blue-mauve colour, perianth tube 4–6 mm long, and spreading tepals. Plants have three leaves, the lower two longest and with trailing blades with thickened margins and main vein, thus are shallowly two-grooved on each surface.



Distribution of ***Geissorhiza nubigena***.



Distribution of ***Geissorhiza cataractarum***.

Sect. 7. **Engysiphon** *(G.J.Lewis) Goldblatt* in Annals of the Missouri Botanical Garden 72: 367 (1985). *Engysiphon* G.J.Lewis: 19 (1941). Type: *Geissorhiza exscapa* (Thunb.) Goldblatt, lecto., designated by Goldblatt: 367 (1985).

Corm tunics concentric, hard, woody; leaves sword-shaped to linear, either with heavily thickened margins and main vein or with margins raised and winged and curving around poorly thickened main vein, then appearing terete; spike few–several-flowered; outer bract green, inner membranous and usually < half as long as outer; flowers zygomorphic (actinomorphic in *G. helmei*) with stamens and style declinate (erect and included in *G. adriaanii*) and ; perianth tube short to elongate; stamens equal or 1 anther longer (*G. melanthera*).

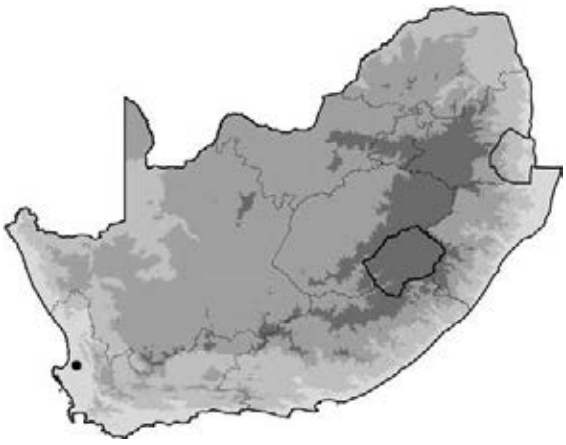
Species 10: southwestern western Cape, South Africa.

48. **Geissorhiza helmei** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 39: 135 (2009). Type: South Africa, Western Cape, Piketberg, Farm Kleigat, lower slopes SE of Melkhoutkop, above track to Farm Weltevrede, burned previous summer, 183 m, 26 Sept. 2006, *Helme 4200* (NBG, holo.).

Plants 80–150 mm high. *Corm* ovoid, 10–15 mm diam.; tunics concentric, light brown, fragmenting vertically into segments tapering above into short spines. *Stem* smooth, flexed above sheath of second leaf, suberect, usually 1-branched, flexed at base of spike. *Leaves* usually 3, lowermost basal, with long, linear blade, 10–15 × 3–4 mm, margins thickened and raised into wings extended at right angles and ciliate along edges, sticky outside with sand adhering, main vein also thickened with winged, ciliate edges, plane between margins and main vein, upper leaves smaller. *Spike* horizontal, lightly flexuose, with flowers borne on upper side, main spike 7- to 10-flowered; bracts suberect, held ± at right angles to axis, green with veins flushed red, margins membranous, outer ± 6 mm long, inner ± 1 mm shorter, forked apically. *Flowers* actinomorphic, pink, unscented; perianth tube funnel-shaped, ± 6 mm long; tepals subequal, oblong, ± 12 × 5 mm, spreading at right angles to tube. *Filaments* equal, erect, ± 6 mm long; anthers ± 4 mm long, forked at base, dark purple; pollen brown. *Style* dividing opposite middle ⅓ of anthers, branches ± 2 mm long. *Flowering time*: late August to mid-September.

Distribution and ecology: a narrow endemic of the lower northern slopes of the southern arm of the Piketberg Mtns in Western Cape, South Africa; in rocky ground in light sandy loam overlying clay, evidently flowering only after fire.

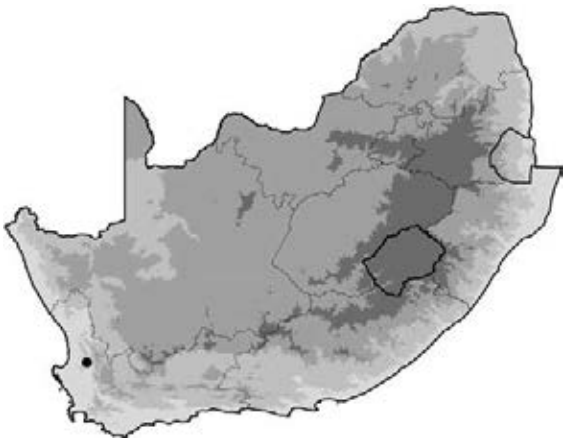
Diagnosis: in its general aspect *Geissorhiza helmei* recalls species of sect. *Engysiphon*, most members of which have fairly large corms with concentric tunics that fragment into sections that taper above into short bristles, and a single long basal leaf, always with thickened and winged margins and central vein, and with the surface of the margins glandular and with sand adhering to them. It and *G. adriaani* stand out in the section in having actinomorphic flowers, whereas other species have zygomorphic flowers with decumbent stamens and style. Most other members of the section also have flowers with a longer perianth tube although *G. brevituba* has a short tube, ± 8 mm long, thus comparable to the tube of *G. helmei*, ± 6 mm long. *Geissorhiza brevituba*, also endemic to the Piketberg, has larger flowers with tepals 25–30 mm long and spikes typically with only one to three flowers with the style dividing well beyond the anther tips. The main spikes of *G. helmei* have up to 10 flowers with tepals ± 10 mm long.



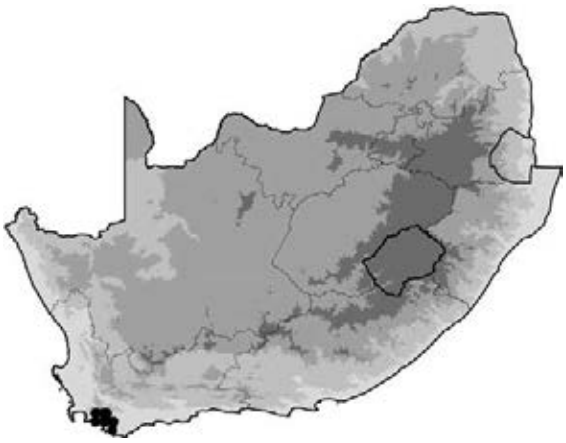
Distribution of ***Geissorhiza helmei***.

49. **Geissorhiza brevituba** *(G.J.Lewis) Goldblatt* in Annals of the Missouri Botanical Garden 72: 368 (1985). *Engysiphon brevitubus* G.J.Lewis: 24 (1941). Type: South Africa, [Western Cape], top of Piketberg Mtn, *H. Bolus 13651* (BOL, lecto., designated by Goldblatt: 368 (1985); BM, K, PRE, isolecto.).

Plants 12–200 mm high. *Corm* globose, 15–20 mm diam.; tunics woody, dark brown, concentric, breaking irregularly into sections, drawn into short points above. *Stem* usually inclined, flexed above sheath of uppermost leaf and at base of spike, usually unbranched. *Leaves* usually 3, lowermost ± basal, longest, as long or slightly exceeding spike, linear to narrowly sword-shaped, sticky and with sand adhering, margins expanded at right angles to blade, main vein also enlarged and winged, blade thus broadly 2-grooved on each surface, upper leaves shorter, uppermost inserted in middle of stem, sheathing for half its length. *Spike* flexuose, 1- to 3-flowered; outer bract 15–20 mm long, green, inner membranous, ± 12 mm long. *Flowers* zygomorphic, ± nodding, stamens and style declinate, pink with darker veins; perianth tube cylindric, ± 8 mm long, included in bracts; tepals obovate, 25–30 × 9–11(–13) mm, outer wider and shorter than inner. *Filaments* unilateral,



Distribution of ***Geissorhiza brevituba***.



Distribution of ***Geissorhiza schinzii***.

declinate, equal, ± 20 mm long; anthers unilateral, ± 6.5 mm long, dark purple; pollen brown. *Style* arching below filaments, dividing opposite upper ⅓ of anthers, branches ± 4 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: mainly September.

Distribution and ecology: endemic to the Piketberg Mtns of Western Cape, South Africa; on stony, sandstone slopes in low fynbos, especially abundant after fire.

Diagnosis: *Geissorhiza brevituba* is distinctive in sect. *Engysiphon* in the relatively short perianth tube, ± 8 mm long, substantially shorter than the floral bracts, these 15–20 mm long, relatively short for the section. Despite this the tepals are 25–30 mm long, in the normal range for the section. The leaves with thickened margins and main vein and large, more-or-less nodding, zygomorphic flower with declinate stamens and style are typical of sect. *Engysiphon.*

50. **Geissorhiza schinzii** *(Baker) Goldblatt* in Annals of the Missouri Botanical Garden 72: 368 (1985). *Acidanthera schinzii* Baker: 27 (1906). *Engysiphon schinzii* (Baker) G.J.Lewis: 22 (1941). Type: South Africa, [Western Cape], Houw Hoek, *Penther 587* (Z, lecto., designated by Goldblatt: 368 (1985), Z; K, isolecto.).

[*Gladiolus costatus* Eckl.: 38 (1827), invalid name without description.]

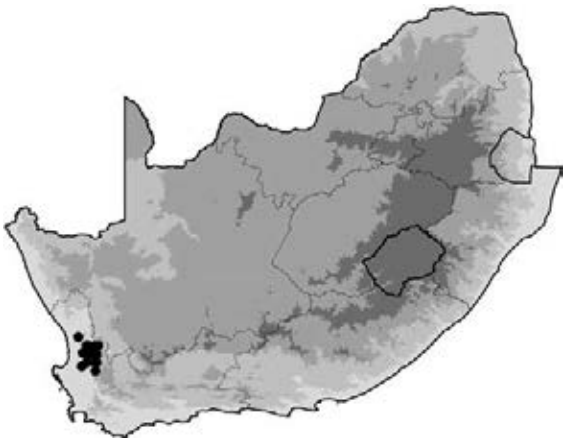
Plants (100–)150–200 mm high. *Corm* globose, asymmetric, flattened below on one side, 12–18 mm diam.; tunics concentric, woody, dark brown, breaking vertically into irregular sections, drawn into cusps ± 15 mm long above. *Stem* suberect, flexed above sheaths of upper 2 leaves, unbranched. *Leaves* usually 3, lowermost basal, longest, usually ± straight, lanceolate, usually slightly longer than stem, 4–6 mm wide, sticky below and on margins and midrib usually with sand adhering, margins enlarged and extending at right angles to blade, main vein also enlarged and winged, blade thus with 2 wide grooves on each surface, remaining leaves much shorter, uppermost inserted in middle of stem, sheathing for ± half their length. *Spike* flexuose, 1- to 4-flowered; outer bracts (20–)25–40 mm long, green, inner much shorter, concealed by outer. *Flowers* zygomorphic, with stamens and style declinate, tepals pale or deep pink with darker veins; perianth tube cylindric, 24–32 mm long, usually shortly exserted from bracts; tepals obovate, 35–40 × 9–15 mm, outer shorter and broader than inner. *Filaments* unilateral, declinate, equal, ± 20 mm long; anthers 6–7 mm long, purple; pollen brown. *Style* arching below filaments, dividing opposite or shortly beyond anther tips, branches ± 3.5 mm long. *Flowering time*: late August to early October.

Distribution and ecology: endemic to the southwestern corner of Western Cape, South Africa, extending from Houw Hoek near Grabouw to Napier and Baardscheerdersbos near Elim; mainly montane on stony sandstone slopes in fynbos, abundant after fire.

Diagnosis: fairly typical of sect. *Engysiphon, Geissorhiza schinzii* is distinguished by the relatively large, nodding flowers with a perianth tube of intermediate length, 24–32 mm long, and tepals 35–40 mm long, exceeding the length of the tube. The flowers are zygomorphic with unilateral, decumbent stamens and style. Like other species of the section, the leaves have thickened margins and main vein and are sticky, usually with sand adhering to the surface. The flowers are adapted for pollination by long-proboscid flies and the flower colour, perianth tube length, and brown pollen are all typical of that pollination strategy.

51. **Geissorhiza longifolia** *(G.J.Lewis) Goldblatt* in Annals of the Missouri Botanical Garden 72: 371 (1985). *Engysiphon longifolius* G.J.Lewis: 23 (1941). Type: South Africa, [Western Cape], Clanwilliam, Nieuwoudt Pass, *Leighton s.n.* (BOL 22558, holo.).

Plants 120–200 mm high. *Corm* ± globose, with oblique flattened base, 12–16 mm diam.; tunics woody, brown, concentric, breaking vertically into irregular section, drawn into points above. *Stem* inclined, flexed above



Distribution of ***Geissorhiza longifolia***.

sheath of uppermost leaf and at base of spike, occasionally with short branch. *Leaves* 2 or 3, lowermost basal, longest, up to 280 mm long, linear to narrowly sword-shaped, sticky on sheath, margins and main vein with sand adhering, margins expanded at right angles to blade, main vein also raised and winged, thus broadly 2-grooved on each surface, remaining leaves short, sheathing for half their length, uppermost inserted in middle of stem. *Spike* inclined to ± horizontal, flexuose, (2–)4- to 9-flowered; outer bracts (14–)16–25 mm long, green, inner membranous, ± half as long. *Flowers* zygomorphic, stamens and style unilateral and declinate, tepals white with pale pink veins, turning pink on fading; perianth tube cylindric, 14–20(–25) mm long, shortly exserted from bracts; tepals ± linear, 17–27 × (5–)7–9 mm, outer wider and shorter than inner. *Filaments* unilateral, declinate, equal, 10–15 mm long; anthers parallel, 4–6 mm long, dark purple. *Style* arching below filaments, dividing near apex of anthers, branches 2–3 mm long. *Capsules* ellipsoid to narrowly obovoid, 12–18 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: September to October.

Distribution and ecology: restricted to the interior mountains of the western half of Western Cape, South Africa, from the Gifberg in the north to Michell's Pass in the south; on stony sandstone or clay slopes, flowering mainly after fire.

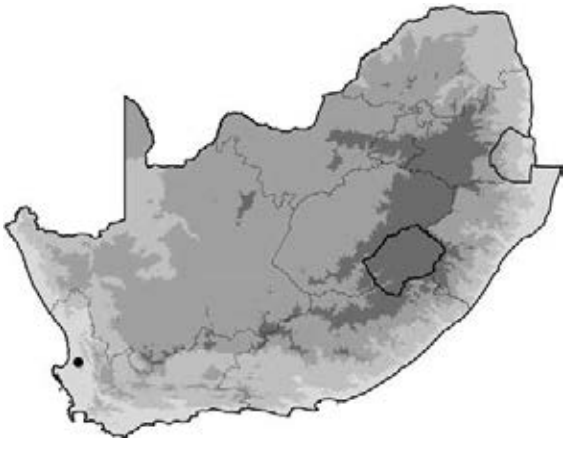
Diagnosis: *Geissorhiza longifolia* is distinctive in sect. *Engysiphon* in its moderate-sized, white or pale pink flowers with a relatively short perianth tube 14–20(–25) mm long and narrow, often almost linear tepals 17–27 × 5–9 mm. It is sometimes confused with *G. confusa*, which is similar in overall appearance but is usually taller in stature and has larger, creamy white to beige flowers with the tube 25–40 mm long and mostly broader tepals 28–40 × 7–10 mm.

52. **Geissorhiza adriaanii** *Goldblatt & J.C.Manning*, new species. Type: South Africa, Western Cape, Piketberg, Aurora Mtn, Farm Grootplaat, 570 m, 26 Oct. 2019, *J.A. Van der Walt s.n.* (NBG, holo.).

Plants 200–300 mm high. *Corm* globose, asymmetric, ± flattened on one side and extending downward, 10–20 mm diam.; tunics woody, brown, concentric, fragmenting irregularly, drawn into short cusps above, accumulating. *Stem* ± erect, slender, unbranched. *Leaves* 3, lowermost basal, longest up to 350 mm long, linear to narrowly sword-shaped, 3–4 mm wide, sticky on sheath, margins and main vein with sand adhering, margins expanded at right angles to blade, main vein also raised and winged, thus broadly 2-grooved on each surface, ciliolate-scabridulous along margins and angles of midrib, drying or dry at flowering, remaining leaves short, sheathing for half their length, uppermost inserted in middle of stem. *Spike* suberect or slightly inclined, weakly flexuose, 4- or 5-flowered; outer bracts 8–10 mm long, green below but membranous in upper half or almost entirely so, inner membranous, slightly shorter. *Flowers* actinomorphic, slaver-shaped, tepals creamy white flushed salmon-pink on the reverse and dark pink in throat; perianth tube cylindric, 8–10 mm long, including stamens and style, shortly exserted from bracts; tepals linear, 18–28 × 2.5–3.0 mm, outer slightly wider and shorter than inner. *Filaments* included, 2 mm long, inserted 2 mm above base of tube; anthers included, 4 mm long, yellow, reaching to middle of tube. *Style* erect, very short, 2 mm long, reaching to base of filaments, with short branches ± 1 mm long. *Capsules* unknown. *Flowering time*: October.

Distribution and ecology: evidently a narrow endemic of the western end of the Piketberg Mtns in Western Cape, South Africa, known only from the type collection from Aurora Mtn; on the summit plateau in gravelly loam among restioid fynbos.

Diagnosis: a surprising find for the well-botanised western half of Western Cape, *Geissorhiza adriaanii* is named for Adriaan van der Walt who discovered the species in October 2019 at the southwestern end of the Piketberg Mtns. It is typical for sect. *Engysiphon* in its white to cream to pale pink perianth, relatively large, asymmetric corm, and somewhat sticky leaves to which sand adheres but is distinctive in its actinomorphic flower with the stamens



Distribution of ***Geissorhiza adriaanii***.

deeply included in the perianth tube, with the short filaments inserted 2 mm above the tube base. The relatively long, yellow anthers reach only to about the middle of the tube and the style is unusually short, reaching only to the base of the filaments. In general appearance *G. adriaanii* resembles *G. longifolia*, a species that extends from the Gifberg south to Michell's Pass, but that species has zygomorphic flowers with long, unilateral stamens with exserted filaments 10–15 mm long and purple anthers with brown pollen. The included stamens of *G. adriaanii* recall *G. esterhyuseniae* and *G. cedarmontana*, both subg. *Weihea* but not members of sect. *Engysiphon* and only distantly related to *G. adriaanii*.

Of the 10 species in sect. *Engysiphon*, four are narrow endemics restricted to the Piketberg, viz. *G. adriaanii*, *brevituba, G. helmei* and *G. melanthera.*

53. **Geissorhiza confusa** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 373 (1985). Type: South Africa, [Western Cape], Bain's Kloof, *Schlechter 9162* (MO, holo.; G, K, iso.).

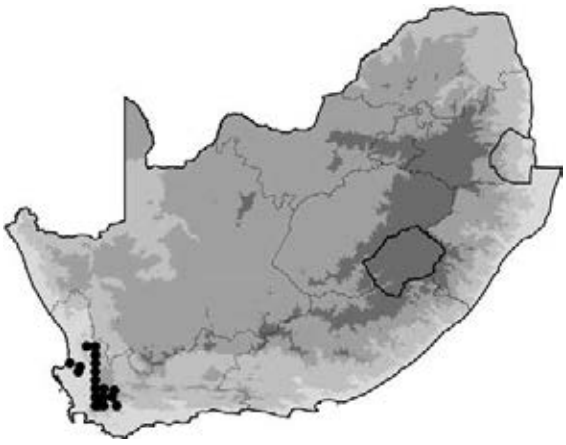
Plants 120–300 mm high. *Corm* globose, with oblique flattened base, 12–18 mm diam., tunics woody, brown, concentric, breaking vertically into irregular sections, drawn into points above. *Stem* ± erect, smooth, flexed at base of spike, rarely with a short branch. *Leaves* 2 or 3, lowermost basal, largest, usually shortly exceeding spike, up to 300 mm long, ± linear, straight or falcate, 3–7 mm wide, sticky on sheath, margins and main vein, with sand adhering, margins and main vein heavily thickened, blade thus broadly 2-grooved on each surface, remaining leaves short, sheathing for at least half their length, uppermost inserted in middle of stem. *Spike* inclined, flexuose, 1- to 4(–8)-flowered; outer bracts 30–60 mm long, green, inner membranous, ± half as long. *Flowers* zygomorphic, stamens and style declinate, creamy white to beige with pink veins, turning pink on fading; perianth tube cylindric, 25–40(–50) mm long, usually exserted up to 15 mm from bracts, curved near apex; tepals obovoid-elliptic, 28–40 × 7–10 mm, outer wider and shorter than inner. *Filaments* unilateral, declinate, equal, 20–22 mm long; anthers 6–8 mm long, dark purple; pollen brown. *Style* arching below filaments, dividing opposite or beyond anther tips, branches 3–4 mm long. *Capsules* ± cylindric, 15–23(–28) mm long. *Chromosome number* 2*n* = 26. *Flowering time*: October to December (to mid-January).

Distribution and ecology: extending through the interior mountains of the western half of Western Cape, South Africa, from the Gifberg in the north to Jonaskop in the Riviersonderend Mtns in the south; on stony sandstone slopes, most frequent after fire.

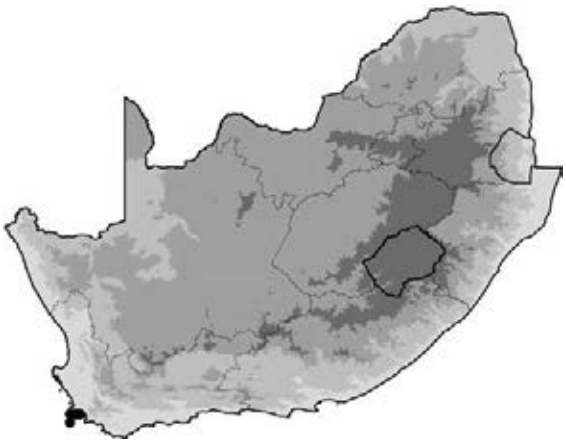
Diagnosis: with large creamy white or beige to almost yellow flowers, *Geissorhiza confusa* is one of the most conspicuous species in the genus. Vegetatively, the long basal leaf with thick margins and main vein and the large corm with woody tunics are typical of sect. *Engysiphon* but the perianth tube, mostly 35–50 mm long, is one of the longest in the section. The species has been much confused historically with *G. exscapa*, which has a comparably long perianth tube but usually pink flowers and different leaf morphology, the blades appearing terete but actually ± H-shaped in section with margins raised into wings that curve inward over the main vein, which is only slightly thickened.

54. **Geissorhiza bonaspei** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 375 (1985) [as *G. bonae-spei*]. Type: South Africa, [Western Cape], between Fish Hoek and Sun Valley, north-facing slopes after fire, *Goldblatt 5917* (MO, holo.; K, PRE, S, iso.).

Plants 120–200 mm high. *Corm* ± globose, asymmetric, one side obliquely flattened below; ± 8 mm diam.; tunics woody, brown, concentric, breaking vertically into irregular sections, drawn into points above. *Stem* ± erect, flexed above sheaths of upper 2 leaves, unbranched. *Leaves* 3, rarely 2, lowermost basal, longest, usually reaching to the apex of spike, linear, margins raised into wings held at right angles to blade and curving inward, thus blade evidently terete with 2 narrow longitudinal



Distribution of ***Geissorhiza confusa***.



Distribution of ***Geissorhiza bonaspei***.

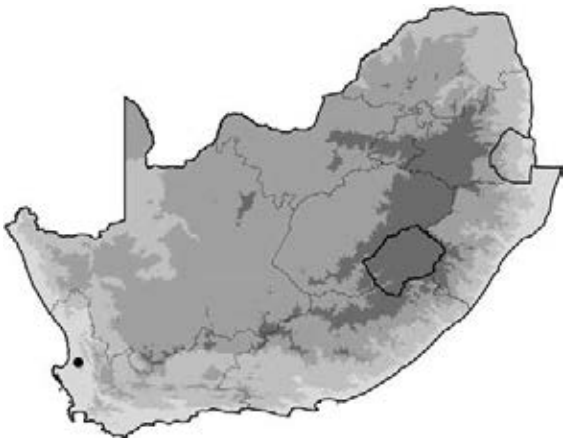
grooves, main vein hardly thickened, sticky on sheath and blade and often covered with sand, remaining leaves much shorter, uppermost leaf inserted in middle of stem, sheathing for ½–⅔ its length, sometimes entirely. *Spike* flexuose, 1- to 5-flowered; outer bract green, 25–37 mm long, often dry toward apices, inner membranous, shorter than outer. *Flowers* zygomorphic with stamens and style declinate, pale pink, deeper pink outside and on veins; perianth tube cylindric, 20–30 mm long, reaching apex of bracts or shortly exserted; tepals narrowly obovate, obtuse, 24–27 × 5–7 mm, inner somewhat narrower and longer than outer. *Filaments* unilateral, declinate, equal, 14–16 mm long; anthers 4–5 mm long, dark purple; pollen brown. *Style* arching below filaments, dividing opposite middle ⅓ of anthers, branches 2–3 mm long. *Capsule* ± cylindric, 15–20 mm long, enclosed in bracts. *Chromosome number* 2*n* = 26. *Flowering time*: late September to mid-November.

Distribution and ecology: restricted to the southern Cape Peninsula in Western Cape, South Africa; on stony, sandstone soils on slopes and flats from Silvermine Plateau to Cape Point, blooming mainly after fire.

Diagnosis: *Geissorhiza bonaspei* is distinguished by the unusual leaf morphology and relatively large, pink flowers with a perianth tube 20–30 mm long and tepals 24–27 mm long and up to 7 mm wide. It is sometimes difficult to separate from closely allied to *G. tenella*, but that species has flowers white or faintly flushed pink, with a perianth tube 30–40 mm long and narrow tepals 14–22 × 3.0–4.5 mm. The leaves of both species are H-shaped in cross section with the margins raised into wings at right angles to the blade surface, the wings curving inward.

55. **Geissorhiza melanthera** *Goldblatt & J.C.Manning* in South African Journal of Botany 87: 22 (2013). Type: Western Cape, Piketberg, south-trending sandy slope northeast of Farm Kanariefontein [Barkatsfontein], 2 Oct. 2012, *Goldblatt & Porter 13850A* (NBG, holo.; MO, PRE, iso.).

Plants 140–185 mm high. *Corm* ± ovoid, 5–8 mm diam.; tunics concentric, woody, light brown, fragmenting vertically into elliptic segments, not accumulating. *Stem* suberect, flexed outward above sheaths of upper 2 leaves and at base of spike, suberect, simple or 1- or 2-branched from cauline leaf axils. *Leaves* usually (2)3, lowermost basal, suberect, 140–180 × ± 1.3 mm, blades ± square in outline, margins raised into wings extended at 90° to blade surface, sparsely ciliolate on edges, sticky outside with sand adhering, main vein hardly thickened, plane and paler green between margins and main vein, upper leaves smaller than basal. *Spike* inclined to ± horizontal, flexuose, with flowers borne on upper side, main spike 6- to 12-flowered; outer bract (12–)16–22 mm long, inner slightly shorter to ± ½ as long as inner, 2-keeled and forked apically. *Flowers* zygomorphic, nodding, unscented, pale beige-yellow, red at tepal bases and in tube, outside of tepals sometimes flushed red, anthers black; perianth tube ± cylindric, 10–14 mm long, constricted in lower



Distribution of ***Geissorhiza melanthera***.

8–9 mm, wider distally; tepals narrowly obovoid-oblong, ± 24–26 × 7–8 mm, ultimately spreading at right angles to tube, inner slightly wider than outer. *Filaments* unequal, unilateral, declinate, ± horizontally, ± 5 mm long, red; anthers unequal, laterals 5–6 mm long, central 6.5–7.0 mm long, forked at base, ± black, remaining straight and rigid after dehiscence with white connective exposed; pollen dark purple. *Style* arching below filaments, dividing opposite upper ⅓ of anthers, ± 2.7 mm long. *Flowering time*: late September to mid-October.

Distribution and ecology: a narrow endemic of the western end of the Piketberg Mtns in Western Cape, South Africa; on gentle, south-trending slopes in deep sand, flowering best after fire.

Diagnosis: *Geissorhiza melanthera* is a particularly striking member of sect. *Engysiphon*. Its moderate-sized flowers recall smaller-flowered *G. helmei* (also a narrow endemic of the Piketberg) but *G. melanthera* has larger, beige-yellow flowers with perianth tube 10–14 mm long and spreading tepals 24–26 mm long. The flowers are zygomorphic with declinate stamens and style typical of the section but the anthers are black and slightly elliptic with the central anther slightly longer than the laterals. It has the smallest corms in sect. *Engysiphon*, only 5–8 mm in diameter.

The leaves are H-shaped in cross section, the margins bearing wings as wide as the leaf axis and held at right angles to the blade whereas the midrib is only slightly raised. This leaf type is characteristic of *G. exscapa*, which has larger flowers, and also pink-flowered *G. bonaspei* and white-flowered *G. tenella*. It is to these species that *G. melanthera* is immediately allied, all of which have a somewhat to significantly longer perianth tube at least 20 mm long and 40–80 mm in *G. exscapa*.

The anthers of *G. melanthera* are its most striking feature, unusual for the genus not only in their black colour but in retaining their elliptical shape after releasing their pollen, with a portion of the connective exposed and showing white between the thecae. In other species of the section the anthers lose their

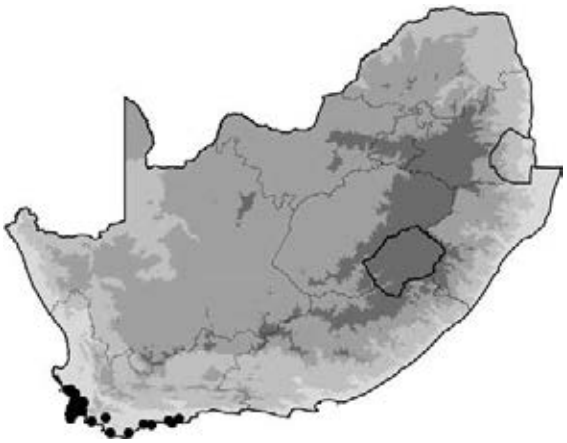
shape, shrinking and becoming deformed after releasing pollen. The flowers are adapted for pollination by the bee-fly, *Magapalpus capensis*, a frequent pollinator of white-flowered *Pelargonium* species, but not known to pollinate other species of Iridaceae.

56. **Geissorhiza tenella** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 377 (1985), as new name for *Acidanthera rosea* Schinz: 222 (1894) [not *G. rosea* (Klatt) R.C.Foster (1941) = *G. heterostyla*]. *Engysiphon roseus* (Schinz) G.J.Lewis: 21 (1941). Type: South Africa, [Western Cape], 'Spitze des Teufelberges bei Capstadt,' ('montis Diaboli' on label), 3 300 ft [1 000 m], *Schlechter 75* (G, lecto., designated by Goldblatt: 377 (1985); B, K, isolecto.).

Acidanthera sabulosa Schltr.: 101 (1899) [not *G. sabulosa* Klatt (1885) = *G. imbricata* subsp. *imbricata*] Type: South Africa, [Western Cape], sand dunes near Eerste Rivier, *Schlechter 9025* (B, lecto., designated by Goldblatt: 377 (1985); BM, G, K, MO, isolecto.).

[*Gladiolus tenellus* Eckl.: 41 (1827), invalid name without description.]

Plants (100–)150–300 mm high. *Corm* globose, asymmetric, ± flattened on one side and extending downward, 7–10 mm diam.; tunics woody, brown, concentric, fragmenting irregularly, drawn into short cusps above. *Stem* ± erect, slender, usually unbranched. *Leaves* usually 3, ± terete, sticky on sheaths and sometimes on blades, margins expanded into wings raised at right angles to blade and curving inward (appearing terete with 2 narrow grooves on each surface), main vein hardly thickened, lowermost leaf longest, basal, reaching to base of spike, second leaf also basal, sheathing lower ⅓ of stem, uppermost leaf inserted on upper ⅓ of stem, sheathing for ± ⅔ of its length, often entirely sheathing. *Spike* (1)2- to 5-flowered; outer bract green, (20–)30–40(–50) mm long, inner membranous, half as long as outer. *Flowers* zygomorphic with stamens and style declinate, white to pale pink, flushed pink outside; perianth tube cylindric, (20–)30–40(–50) mm long, reaching to apex of bracts or exserted up to 15(–25) mm; tepals oblong to ± linear, acute, 13–23 × 2.0–4.5 mm. *Filaments* unilateral, declinate, equal, ± 14 mm long; anthers (2.5–)3.5–4.5 mm long, purple; pollen yellow. *Style* arching below filaments, dividing near apex of anthers, branches ± 3 mm long. *Capsules* ± cylindric, 12–20 mm long, enclosed in bracts. *Chromosome number* 2*n* = 26. *Flowering time*: October to November (to mid-December).



Distribution of ***Geissorhiza tenella***.

Distribution and ecology: restricted to coastal Western Cape, South Africa, extending from Yzerfontein in the north to Still Bay in the southeast; on sandy, seasonally wet flats and dunes, flowering well after fire.

Diagnosis: distinguished by the white or pale pink flowers with unusually narrow tepals 13–23 × 2.0–4.5 mm, *Geissorhiza tenella* has a perianth tube remarkably variable in length, mostly 30–40 mm long but as short as 20 mm and occasionally as long as 50 mm. The leaf blades are H-shaped in cross section with the margins raised into broad wings held at right angles to the blade. It is allied to the long-tubed Atlantic Coast species *G. exscapa* and to the Cape Peninsula endemic *G. bonaspei*, with which it shares the distinctive leaf with winged margins and H-shaped in cross section. *Geissorhiza bonaspei* has slightly larger, deep pink flowers with relatively broad tepals mostly 24–27 × 5–7 mm.

Flower size is unusually variable in *G. tenella*. Plants from the east of its range, in the Caledon and Bredasdorp Districts as far east as Still Bay (as well as some from the Cape Flats), have a relatively short perianth tube, some 24–30 mm long and tepals 12–15 mm long. In contrast, most populations from the Cape Flats and along the Atlantic Coast usually have much larger flowers with a perianth tube 40–50 mm long and tepals up to 23 mm long. Such specimens approach *G. exscapa* in their flower size and this is probably related to their pollination biology. Both are pollinated by long-proboscid flies, which have particularly long mouth parts along the Atlantic Coast and comparatively short mouth parts on the south coast of Western Cape.

57. **Geissorhiza exscapa** *(Thunb.) Goldblatt* in Annals of the Missouri Botanical Garden 72: 378 (1985). *Gladiolus exscapus* Thunb.: 184 (1800). *Sphaerospora exscapa* (Thunb.) Klatt: 725 (1864). *Acidanthera exscapa* (Thunb.) Baker ex C.D.Bouché & Wittm.: 15 (1876). *Engysiphon exscapus* (Thunb.) G.J.Lewis: 23 (1941) [misapplied to *G. confusa*]. Type: South Africa, locality unknown, *Thunberg s.n.* '*Gladiolus exscapus* a' [UPS–THUNB 1022, lecto., designated by Goldblatt: 378 (1985)].

Gladiolus thunbergii F.Dietr.: 494 (1817), illegitimate superfluous name for *G. exscapus* Thunb. (1800). Type: uncertain, probably as for *G. exscapus* Thunb.

Acidanthera tubulosa Baker: 160 (1877), as a new name for *Ixia tubulosa* Houtt. (1780), not *I.*

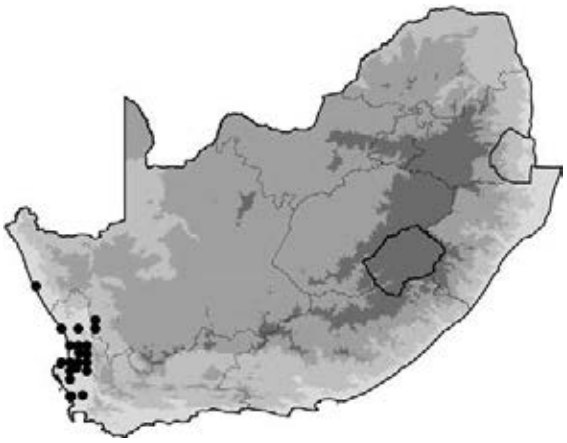
tubulosa Burm.f. (1768). *Acidanthera tubulosa* N.E.Br.: 137 (1929), illegitimate homonym, not *A. tubulosa* Baker (1877). Type: South Africa, without precise locality or collector [G: Herb. Burman, specimen matching illustration in Houtt. (1780), lecto., designated by N.E.Br.: 137 (1929)].

Acidanthera picta R.C.Foster: 43 (1936). *Engysiphon pictus* (R.C.Foster) G.J.Lewis: 21 (1941) [misapplied to *G. bonaspei*]. Type: South Africa, without precise locality, or collector [G: Herb. Burman, lecto., designated by Goldblatt: 378 (1985)].

Engysiphon longitubus G.J.Lewis: 24 (1941). Type: South Africa, [Western Cape], Warm Baths, Clanwilliam, *Leipoldt s.n.* (BOL 20840, holo.).

[*Freesia costata* Eckl. ex Baker: 160 (1877), invalid name only in synonymy.]

Plants 180–320 mm high. *Corm* ovoid, 10–15 mm diam.; tunics brown, concentric, fragmenting irregularly, segments drawn into short cusps above. *Stem* sometimes very short, then sheathed almost entirely by leaves, flexed above sheath of second leaf and near base of spike, usually unbranched. *Leaves* 3, linear or appearing nearly terete, sticky on sheaths and blades, often with adhering sand, margins expanded into wings held at right angles to blade and curving inward (appearing nearly terete with 2 longitudinal grooves), midrib not or barely raised, lowermost leaf basal, largest, reaching to ± base of spike, upper leaves shorter, uppermost often largely sheathing, inserted in middle of stem. *Spike* inclined to horizontal, (1–)3- to 9-flowered, flexuose; outer bracts (30–)45–65 mm long, green, inner membranous, up to 20 mm long. *Flowers* zygomorphic, stamens and style declinate, tepals cream- to ivory-coloured or pink with darker veins, reddish outside, fading deep pink to ± red; perianth tube 40–80 mm long, usually well exserted from bracts, occasionally reaching only to apex of bracts, curved near throat; tepals narrowly obovate, 26–35 × 4.5–6.0 mm wide, outer wider and shorter than inner. *Filaments* unilateral, declinate, equal, held above lower tepal; anthers ± horizontal, 6–7 mm long, brown. *Style* arching below filaments, dividing near apex of anthers, branches ± 3 mm long. *Capsules* oblong-ellipsoid, up to 20 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: September to October.



Distribution of ***Geissorhiza exscapa***.

Distribution and ecology: extending along the Atlantic Coast of South Africa from near Hondeklipbaai in Northern Cape south to Blouberg near Cape Town in Western Cape, and inland in the Bokkeveld and Pakhuis Mtns; usually in deep alluvial coastal sands in sandveld vegetation, or inland in fynbos.

Diagnosis: *Geissorhiza exscapa* is recognised by the leaves with winged margins held at right angles to the blade but the main vein hardly raised, the leaf thus H-shaped in cross section, and by the large, cream-coloured to pink flowers with perianth tube 40–80 mm long, usually well exserted from the bracts, and narrowly obovate tepals, 26–35 × 4.5–6.0 mm. The stems are sometimes short and entirely sheathed by leaf bases. *Geissorhiza tenella* has a similar leaf morphology but usually smaller flowers with a perianth tube 20–40(–50) mm long and slightly shorter, narrower tepals 13–23 × 2.0–4.5 mm.

Plants from the Bokkeveld Mtns stand out in having bracts rather shorter than elsewhere, 30–35 mm long and matching those of *Geissorhiza confusa* but the leaves in these populations are quite typical of *G. exscapa*. Populations from the Pakhuis Mtns and some from the Piketberg have the perianth tube shortly exserted from the bracts, giving the specimens an unusual appearance. Again, the leaves are typical of the species and there seems no reason to treat them as separate taxa. In the absence of leaves, however, these plants can barely be distinguished from *G. confusa*, in which the tube may occasionally be up to 50 mm long.

Subg. 2. **Geissorhiza**

Corms with imbricate light to dark brown or blackish tunics, leaves lanceolate to sword-shaped or linear, plane, or with the margins and midrib and sometimes other veins thickened, or winged and ciliate-pubescent, stem smooth or ciliate-puberulous, spike few to several flowered, bracts herbaceous, often becoming dry above, rust-coloured in upper half (sects. *Ciliatae* and *Planifoliae*); flowers actinomorphic, rotate or salver-shaped or zygomorphic; tube shorter or as long as bracts; stamens equal or unequal with one filament somewhat to much shorter than other two.

Species 57.

Sect. 8. **Intermedieae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 382 (1985) [as sect. *Intermedia*]. Type: *Geissorhiza scillaris* A.Dietr.

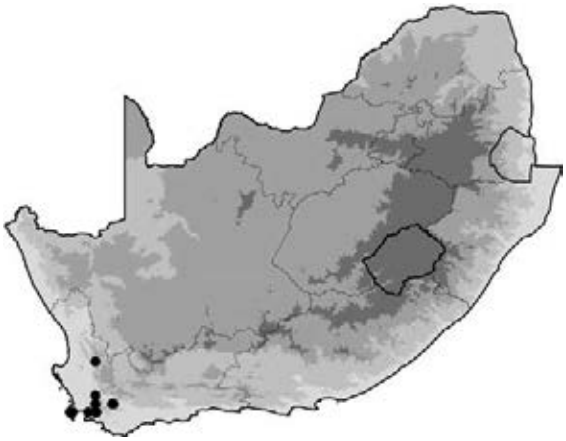
Corm tunics usually light brown; stem smooth; leaves with thickened margins and main veins; spike several flowered; bracts dry and membranous above; flowers actinomorphic, rotate; perianth tube short; stamens equal.

Species 2: southwestern Western Cape, South Africa.

58. **Geissorhiza similis** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 382 (1985). Type: South Africa, [Western Cape], W slopes of Redhill, near the top, *Lewis 2493* (SAM, holo.; NBG., PRE, iso.).

Plants 120–250(–350) mm high. *Corm* ± symmetric, globose, 8–11 mm diam.; tunics imbricate, woody, light brown, incised below into triangular, acute to truncate sections. *Stem* ± erect, rarely branched. *Leaves* (2)3, lower 2 basal, lowermost longest, reaching to ± base of spike, occasionally exceeding stem, linear to falcate, 1–2 mm wide, margins and main vein thickened, 2-grooved on each surface, edges of margin and main vein often minutely ciliate to hispid, remaining leaves much shorter, uppermost leaf inserted in middle of stem, usually short and sheathing below, occasionally entirely sheathing, sheath ribbed, lower two leaves often sticky below especially on margins, with sand adhering even when dry. *Spike* slightly flexuose, (2)3- to 8-flowered; bracts green, translucent above, sometimes red-flushed, 4.5–7.0 mm long, inner shorter than outer. *Flowers* actinomorphic, rotate, white, outer tepals flushed pink outside, tepals spreading when fully open; perianth tube 2.5–3.0 mm long, shorter than bracts; tepals obovate-elliptic, 9–12 × 5–6 mm. *Filaments* erect, equal, 2–3 mm long; anthers 2–3 mm long, yellow. *Style* dividing opposite apex of anthers, branches up to 2 mm long. *Chromosome number* $2n = 26$. *Flowering time*: late August to October.

Distribution and ecology: occurring in the western half of Western Cape, South Africa, from Bain's Kloof to the Cape Peninsula and eastward to Jonas Kop in the Riviersonderend Mtns and with an isolated record from the Cederberg; in sandy mountain soil.



Distribution of ***Geissorhiza similis***.

Diagnosis: *Geissorhiza similis* is distinguished by the imbricate corm tunics that are brown rather than almost black as more typical of subg. *Geissorhiza*, white to creamy white flowers, and long basal leaf with thickened hispid margins and main vein, the remaining two leaves much shorter and largely sheathing. The leaf sheath and basal blade are sticky, and in this, as well as the white flowers, *G. similis* resembles the apparently unrelated *G. hispidula*, which has different corms with concentric tunics. Without corms it is difficult to separate the two species, although *G. hispidula* has well-developed blades on the cauline leaves and sticky floral bracts. Taller and more slender specimens of *G. similis* may also be confused with *G. umbrosa* (subg. *Weihea*) in the absence of corms, but that species normally has somewhat larger flowers and the leaves are smooth, without the ciliate to hispid and sticky margins.

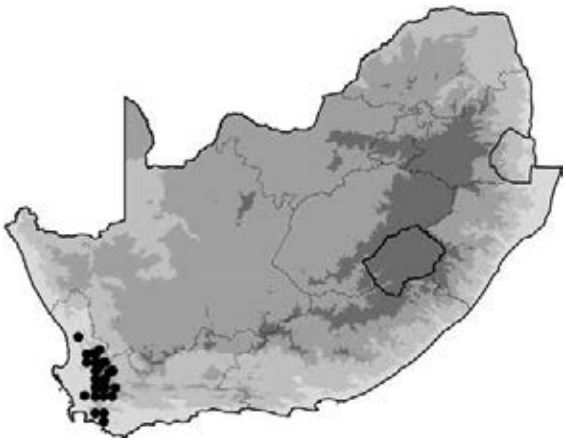
59. **Geissorhiza scillaris** *A.Dietr.*, Species Plantarum 2: 587 (1833); Goldblatt: 384 (1985). *Ixia ramosa* Ker Gawl.: sub t. 549 (1802b), new name for *Ixia scillaris* Thunb.: 13 (1783), illegitimate homonym, not *I. scillaris* L. (1762) [not *G. ramosa* Ker Gawl. ex Klatt (1866)]. *Ixia phalangioides* Roem. & Schult.: 385 (1817), superfluous name for *Ixia ramosa* Ker Gawl. Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* [UPS–THUNB 992 in part, lecto., designated by Goldblatt: 441 (1983)].

Plants slender, 120–350 mm high. *Corm* ± ovoid, 8–12 mm diam. (larger when old tunic layers accumulated); tunics woody, rarely papery, brown, imbricate, outer layers notched below into truncate segments, drawn into bristles above. *Stem* erect, flexed at base of spike, with membranous, green to white bract 7–12 mm long in upper ⅓, simple or rarely with short branch in axil of stem bract. *Leaves* 2, basal, lowermost free from base, straight to falcate, cross-shaped section, with strongly raised margins and midrib, thus with 4 grooves, sticky, often with adhering sand especially below, upper leaf sheathing almost entirely, enclosing stem in lower half or nearly to base of spike, free part 10–30 mm long. *Spike* 4- to 10(–20)-flowered; bracts green, becoming dry, transparent and pale or rarely brownish above, spreading distally, 6–8 mm long, inner shorter than outer. *Flowers* actinomorphic, rotate, white, pale grey-blue or blue with white centre; perianth tube funnel-shaped, 1.0–1.5 mm long; tepals elliptic, 7–9 × 3–4 mm wide. *Filaments* erect, equal, 2–3 mm long; anthers 2.5–3.5 mm, white; pollen creamy white. *Style* 5–6 mm long, dividing nearly opposite anther tips, branches ± 1 mm long. *Capsules* globose, 3–4 mm long, surrounded by bracts. *Chromosome*

number 2*n* = 26. *Flowering time*: mid-August to October (to December at high altitudes).

Distribution and ecology: a montane species, extending through the mountains of Western Cape, South Africa, from Pakhuis Pass and the Cederberg in the north to Shaw's Mtns in the Caledon District in the south; on stony sandstone slopes and plateaus, occasionally in seasonally wet sites, usually at elevations above 500 m.

Diagnosis: the distinctive *Geissorhiza scillaris* has imbricate corm tunics, small white to blue flowers, and just two foliage leaves, the lower with a long free blade and the upper sheathing the stem for most of its length. Plants usually have an inconspicuous green or transparent, sheathing bract a short distance below the spike. The blade of the lowermost leaf is terete with heavily thickened margins and main vein, thus cross-shaped in section and with 4 longitudinal grooves. Both the sheath and blade are sticky and usually have sand adhering to the surface. The star-like flowers are small, with a tube up to 1.5 mm long, spreading tepals 7–9 mm long, and usually white or pale grey-blue but some populations in the Cederberg and Cold Bokkeveld have clear blue flowers with a white centre. *Geissorhiza scillaris* has often been confused with *G. juncea*, which is broadly similar in appearance but with three foliage leaves, the lower two basal, slender and terete, and corm tunics of the concentric type. The two are not closely related.



Distribution of ***Geissorhiza scillaris***.

Sect. 9. Geissorhiza

Geissorhiza subsect. *Ventricosae* R.C.Foster: 27 (1941). Type: *G. imbricata* (D.Delaroche) Ker Gawl.

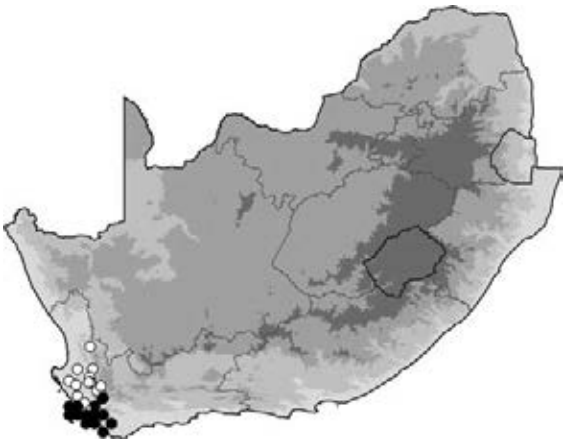
Corm tunics hard and woody, imbricate; stems smooth; leaves with margins and midrib and often other veins strongly thickened, sword-shaped to linear or terete; bracts green below, becoming dry above; flowers actinomorphic, rotate to salver-shaped, or zygomorphic; tube short or reaching to apex of bracts; stamens equal or unequal, unilateral and declinate in some species.

Species 10: southwestern Western Cape, South Africa.

60. **Geissorhiza imbricata** *(D.Delaroche) Ker Gawl.* in König & Sims, Annals of Botany 1: 224 (1804); Goldblatt: 387 (1985). *Ixia imbricata* D.Delaroche: 17 (1766). Type: South Africa, [Western Cape], Cape Peninsula, Lakeside, *Salter 7034* [BOL, neo., designated by Goldblatt & Barnard: 301 (1970)].

Plants 65–250(–300) mm high. *Corm* globose, 5–10 mm diam.; tunics blackish, imbricate, outer layers accumulating above, regularly notched below into segments. *Stem* simple or 1-branched, flexed above uppermost leaf sheath and at base of spike. *Leaves* 3, lower 2 basal, longest, reaching ± middle to apex of spike, sometimes longer, sword-shaped to ± linear, ribbed with (2–)4– several longitudinal grooves along entire length, 2–6(–10) mm wide, uppermost leaf inserted shortly above stem base, sheathing for ½ its length, sheath strongly ribbed and inflated. *Spike* flexuose, inclined, (2–)6- to 8(–14)-flowered; bracts green below, often becoming dry above, 6–12(–15) mm long, sometimes red above, inner narrower than outer. *Flowers* actinomorphic, rotate or tepals cupped, white to pale yellow, often red on outside of outer tepals, sometimes dark in centre; perianth tube ± funnel-shaped, 2–8 mm long, enclosed to shortly exserted from bracts; tepals elliptic, (9–)11–25(–30) × (4.5–)6.5–12.0 mm. *Filaments* erect, equal, 3–8(–10) mm long; anthers 3–7 mm long, pale yellow. *Style* dividing opposite upper ⅓ of anthers, branches 3–4 mm long. *Capsules* oblong-globose, 7–10 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: (August) September to October.

Distribution and ecology: extending from the Olifants River Valley in the north to Bredasdorp in Western Cape,



Distribution of ***Geissorhiza imbricata*** subsp. ***imbricata***, ●; subsp. ***bicolor***, ○.

South Africa; mainly on damp poorly drained, sandy or peaty flats, along streams or shallow marshes.

Diagnosis: *Geissorhiza imbricata* is distinguished mainly by the ribbed leaves, the uppermost with an inflated, ribbed sheath and actinomorphic flowers, usually white to creamy white but occasionally yellow and in some populations with a dark centre. Shorter-tubed populations are regarded as subsp. *imbricata* and those with longer tubes are segregated as subsp. *bicolor*.

Key to subspecies

1a Flowers white to cream-coloured without a dark centre, outer tepals often red or pink outside; perianth tube 2–4(–6) mm long; tepals 9–15(–17) mm long. . . . . 59a. subsp. *imbricata*
1b Flowers creamy white to pale yellow, occasionally with a dark centre, outer tepals sometimes red outside; perianth tube (4–)5–8 mm long; tepals (16–)20–30 mm long . . . . . .59b. subsp. *bicolor*

60a. subsp. **imbricata**

Geissorhiza wrightii Baker: 238 (1876). Type: South Africa, [Western Cape], Simons Bay, *Wright 243* (K, lecto., designated by Foster: 36 (1941); G, L, isolecto.).

Geissorhiza sabulosa Klatt: 203 (1885). Type: South Africa, [Western Cape], near Camps Bay, *Templeman sub MacOwan 2273* (S, lecto., designated by Goldblatt: 389 (1985); K, SAM, isolecto.).

Geissorhiza sulphurea var. *arenicola* R.C.Foster: 37 (1941). Type: South Africa, [Western Cape], Ceres Road (Wolseley), *Schlechter 8992* (B, holo.; BM, BOL, BR, E, G, H, K, L, MO, PRE, S, Z, iso.).

Spike mostly 6- to 8(–14)-flowered; bracts 6–8(–11) mm long: *Flowers* white to cream-coloured, with tepals spreading, outer tepals usually red outside; perianth tube 2–4(–6) mm long, enclosed in bracts; tepals 10–15(–17) × 4.5–7.0 mm wide, obtuse. *Filaments* (3–)4–5 mm long; anthers 3–5 mm long. *Capsule* oblong-globose, up to 10 mm long. *Flowering time*: (August to) September to October.

Distribution and ecology: fairly common in southern Western Cape, extending from the Cape Peninsula eastward to Caledon, Bredasdorp and north to the Tulbagh Valley and Worcester; on wet sandy flats, marshes and streambanks.

Diagnosis: subsp. *imbricata* is distinguished by the somewhat smaller flowers, either white or creamy white to pale yellow and always uniformly coloured. The tepals are mostly 10–15 mm long and the perianth tube 2– 4, rarely up to 6 mm long vs. mostly 5–8 mm long in subsp. *bicolor*. A certain amount of overlap in the flower features is to be expected between subspecies.

60b. subsp. **bicolor** (*N.E.Br.*) *Goldblatt* in Annals of the Missouri Botanical Garden 72: 390 (1985) [as (Thunb.) Goldblatt]. *Ixia bicolor* Thunb.: 3 (1803), illegitimate homonym, not *I. bicolor* (Thunb.) Ker Gawl. (1802a). *Geissorhiza bicolor* N.E.Br.: 44 (1928). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* (UPS–THUNB 921 '*Ixia bicolor* α', holo.).

Geissorhiza obtusata Soland. ex Ker Gawl.: t. 672 (1803). *G. imbricata* var. *obtusata* (Ker Gawl.) Baker: 157 (1892). Type: South Africa, without precise locality, cultivated in England, *Niven s.n.*, illustration in Ker Gawl.: t. 672 (1803).

Geissorhiza secunda var. *bicolor* Baker: 155 (1892). *G. imbricata* var. *concolor* Baker: 72 (1896). Type: South Africa, [Western Cape], near Somerset West, *H. Bolus 5567* (K, lecto., designated by Foster: 38 (1941); BOL, isolecto.).

Geissorhiza rubicunda R.C.Foster: 35 (1941). Type: South Africa, [Western Cape], Michell's Pass, *Schlechter 8931* (B, holo.; BM, BOL, BR, E, G, H, K, L, MO, P, PH, S, Z, iso.).

Geissorhiza bicolor var. *macowanii* R.C.Foster: 33 (1941). Type: South Africa, [Western Cape], near Malmesbury, *MacOwan s.n. sub Herb. Norm. Austr. Afr. 1568* (G, holo.; B, G, K, Z, iso.).

[*Ixia obtusata* Soland. ex Ker Gawl.: t. 549 (1802b), invalid name only in synonymy.]

[*Geissorhiza aurea* Eckl.: 21 (1827), invalid name, without description.]

Spike 2- to 4(–9)-flowered; bracts 10–12(–15) mm long. *Flowers* creamy to pale yellow, outer tepals often red to purple-flushed outside, with tepals somewhat cupped, occasionally dark in throat and tube usually also dark; perianth tube (4–)5–8 mm long, slightly shorter than, or reaching the apex of bracts, rarely exserted; tepals (16–)20–30 × 10–12 mm wide. *Filaments* 7–10 mm long; anthers 5–7 mm long. *Flowering time*: September to early October.

Distribution and ecology: Western Cape, South Africa, extending from the Olifants River Valley and Porterville to the Cape Flats.

Diagnosis: subsp. *bicolor* is distinguished from subsp. *imbricata* mainly by the larger flowers, the tepals (16–)20–30 mm long with a somewhat longer perianth tube, (4–)5–8 mm long and reaching nearly to the apex of or slightly exceeding the bracts. Plants usually have three fairly broad, several ribbed leaves and spikes of up to 9, but usually only 3 to 5 flowers.

The subspecies includes plants with pure yellow flowers as well as those with a dark centre, populations of the latter corresponding closely to the type collection of *Geissorhiza bicolor* and relatively rare, although recorded from Malmesbury to Stellenbosch in the south central part of the range of the subspecies. Such plants evidently differ in no other character from the type and similar collections of *G. rubicunda*, which was poorly

known when first described but has now been collected at many sites in the Tulbagh and Porterville Districts as well as in the Olifants River Valley to the north.

Subsp. *bicolor* may be confused with the southwestern Cape species *G. brehmii* and the two taxa can only be distinguished by their vegetative characteristics. The semi-aquatic *G. brehmii* has terete, somewhat succulent and inflated leaf blades with four narrow longitudinal grooves along their length. Often its lowermost leaf is much reduced, vestigial or even absent, while the uppermost leaf is largest and ribbed on the inflated sheath as in *G. imbricata*. Such specimens are especially difficult to separate from narrow-leaved individuals of subsp. *bicolor*. The white to creamy yellow flowers of *G. brehmii* also occasionally have a dark centre. Forms of subsp. *bicolor* with flowers with a dark centre may also be confused with *G. purpureolutea*, which has narrow two-grooved leaves, usually about 1.5 mm wide, and a smaller flower with tepals 10–17(–22) mm long and a short perianth tube, 2–4 mm long. The plants are also usually short, 60–120 mm high, although they may reach 170 mm. The two species grow in the same habitat and occasionally close to one another.

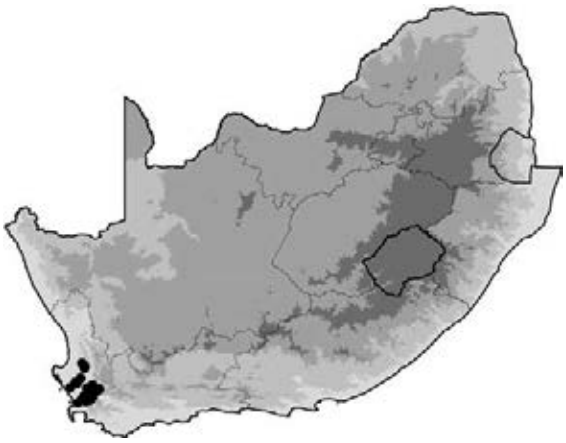
61. **Geissorhiza purpureolutea** *Baker* in Journal of Botany, British and foreign 14: 238 (1876); Goldblatt: 392 (1985). Type: South Africa, [Western Cape], between Paarl and Pont, *Drège 8476* (K, lecto., effectively designated by Foster: 33 (1941); G, L, isolecto.).

Geissorhiza sulphurea Schltr.: 99 (1899). Type: South Africa, [Western Cape], damp places near Ceres Road [Wolseley], *Schlechter 8981* (B, lecto., effectively designated by Foster: 36 (1941); BM, BOL, BR, E, G, H, K, MO, P, PH, PRE, S, Z, isolecto.).

Plants 50–120(–170) mm high. *Corm* globose, ± symmetric, 5–7 mm diam.; tunics ± black, imbricate, notched below into sections. *Stem* usually unbranched. *Leaves* 3, linear to narrowly sword-shaped, 2- to 4-ribbed, margins thickened, lower 2 basal, uppermost cauline and largest, half as long to ± as long as spike, with inflated, strongly ridged sheath. *Spike* inclined, flexuose, (1–)3- to 5-flowered; bracts green, sometimes dry distally, 7–8 mm long. *Flowers* actinomorphic, rotate, pale yellow with dark brown or purple centre, tepals spreading, often flushed red outside; perianth tube funnel-shaped, 2–4 mm long; tepals ± elliptic, 10–17(22) × 7–8 mm. *Filaments* erect, equal, 5–6 mm long, often dark coloured in lower ½; anthers 4–6 mm long, yellow. *Style* dividing opposite apex of anthers, branches ± 2.5 mm long. *Flowering time*: mid-August to mid-September.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, extending from Piketberg south to Tulbagh and Paarl; on wet sandy flats.

Diagnosis: relatively rare today, *Geissorhiza purpureolutea* has ribbed leaves with the uppermost leaf cauline and largest, and relatively small, pale to deep yellow flowers with a dark brown to purple centre. The perianth tube is 2–4 mm long and the tepals mostly 10–17 mm long. It is closely related to *G. imbricata* and almost identical with that species vegetatively but *G. imbricata* has larger flowers with a perianth tube 2–8 mm long and white to pale yellow tepals only occasionally with a dark centre.

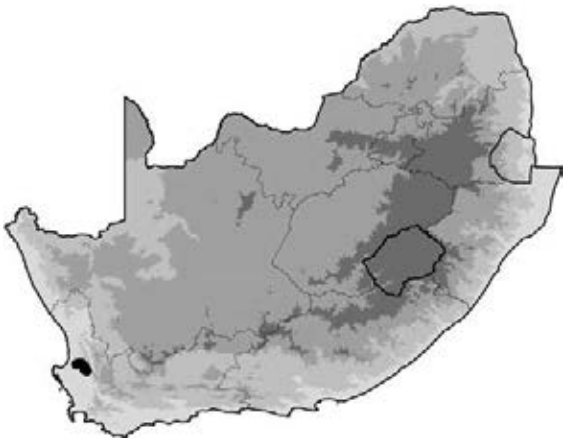


Distribution of ***Geissorhiza purpureolutea***.

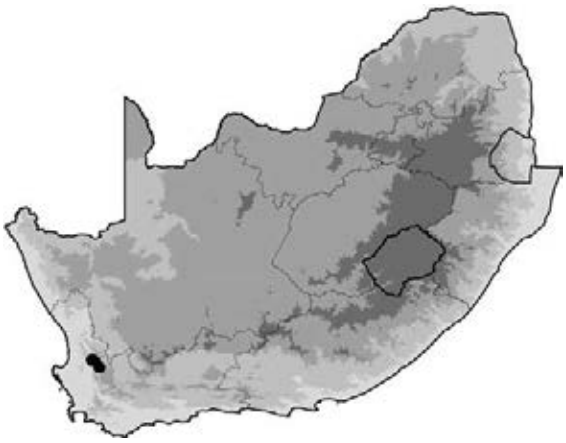
62. **Geissorhiza barkerae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 393 (1985). Type: South Africa, [Western Cape], N of Piketberg, wet sites at the foot of Zebrakop, *Goldblatt 6391* (MO, holo.; K, NBG, PRE, S, WAG, iso.).

Plants 100–200 mm high. *Corm* ± ovoid-globose, ± symmetric, 7–11 mm diam.; tunics blackish, imbricate, regularly notched below into segments. *Stem* ± erect below, usually 1-branched, flexed above sheath of upper leaf and at base of spike. *Leaves* 3, linear-sword-shaped, 2–4 mm wide, (2–)4–several ribbed, ± as long as stem, lower 2 basal, uppermost largest, inserted near base or in lower part of stem, sheathing for half its length, sheath inflated and strongly ribbed. *Spike* inclined to ± horizontal, flexuose, (2–)4- to 10-flowered; bracts green, upper margins translucent, becoming dry and often red-flushed near apex, sometimes dry above at flowering, 10–13 mm long. *Flowers* zygomorphic, style and stamens declinate, held above ± deflexed lower tepal, pale yellow marked with purple to black in lower ⅓ of outer or all tepals, yellow in throat and tube, outer tepals often reddish outside; perianth tube funnel-shaped, 7–8 mm long; tepals lanceolate, 22–30 × 8–9 mm. *Filaments* unilateral, declinate, unequal, two longer, 15–20 mm long, one shorter, 10–14 mm long; anthers 5–6 mm long, yellow; pollen yellow. *Style* dividing opposite upper ⅓ of anthers, branches ± 5 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: mid-September to mid-October.

Distribution and ecology: endemic to the Piketberg area of Western Cape, South Africa, on the lower slopes and flats east and west of the range and on the lower slopes



Distribution of ***Geissorhiza barkerae***.



Distribution of ***Geissorhiza louisabolusiae***.

of the Olifants River Mtns; on seasonally wet to marshy flats, mainly on sandy ground.

Diagnosis: *Geissorhiza barkerae* is immediately recognised by the zygomorphic flowers borne on inclined to nearly horizontal spikes, the tepals remaining somewhat cupped even when the nodding flowers are fully open. The pale yellow flowers have large purple-black markings on the lower third of the outer or all tepals, a perianth tube 7–8 mm long, and tepals 22–30 mm long. The unilateral stamens are decumbent, thus held above the lowermost tepal and the filaments are unequal, one ± 5 mm shorter than the other two. It is evidently allied to and almost identical vegetatively to the more widespread *G. imbricate*, which has smaller, radially symmetric flowers.

63. **Geissorhiza louisabolusiae** *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 34 (1941) [as *louisabolusae*]; Goldblatt: 395 (1985). Type: South Africa, [Western Cape], 6 miles [± 9 km] E of Graafwater, *Salter 2790* (K, holo.; BM, BOL, iso.).

Plants (100–)150–200 mm high. *Corm* ovoid, 7–9 mm diam.; tunics blackish, imbricate, notched into regular segments below. *Stem* flexed at base of spike, sheathed for ½–⅔ its length, occasionally 1-branched. *Leaves* 3, linear to nearly terete, reaching to ± base of spike, 1–2 mm wide, narrowly 4- to 6(–8)-grooved, lower 2 basal, uppermost basal or inserted shortly above ground, largest, sheathing stem below, sheath ribbed and inflated. *Spike* flexuose, inclined, 2- to 7-flowered; bracts green, margin often lined red above, usually becoming dry and membranous near apex, 8–10 mm long, inner shorter than outer. *Flower* actinomorphic, rotate, tepals somewhat cupped, bright yellow; perianth tube funnel-shaped, 4–6 mm long, nearly reaching apex of bracts; tepals elliptic, 18–28 × 7–9 mm. *Filaments* erect, unequal, two longer 7–9 mm long, shorter one 5–7 mm long; anthers 4.5–6.0 mm long, yellow; pollen yellow. *Style* dividing near apex of anthers, branches ± 2 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: late August to September.

Distribution and ecology: restricted to the Olifants River Valley and adjacent valleys to the west in Western Cape, South Africa; on seasonally wet, often waterlogged sandy flats or shallow marshy sites.

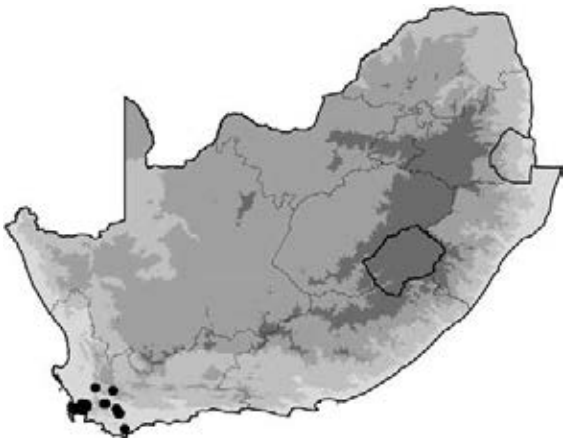
Diagnosis: a member of the *Geissorhiza imbricata* group, *G. louisabolusiae* has narrow, often almost terete, several ribbed and grooved leaves, the uppermost largest and with an inflated, strongly ribbed sheath. The flowers are uniformly bright yellow, have a short perianth tube 4–6 mm long, and usually slightly unequal stamens, two filaments ± 2 mm longer than the third.

64. **Geissorhiza brehmii** *Eckl. ex Klatt* in Linnaea 34: 653 (1866); Goldblatt: 396 (1985). *G. imbricata* var. *brehmii* (Eckl. ex Klatt) R.C.Foster: 38 (1941). Type: South Africa, [Western Cape], Hottentots Holland, near Somerset West, *Ecklon & Zeyher Irid. 295* (B, lecto., effectively designated by Foster: 38 (1941); FI, GH, isolecto.).

Geissorhiza teretifolia G.J.Lewis: 48 (1941). Type: South Africa, [Western Cape], Kenilworth Race Course, *Lewis 97* (SAM, holo.).

Geissorhiza louisabolusiae [as *louisabolusae*] var. *longifolia* R.C.Foster: 34 (1941). Type: South Africa, [Western Cape], road to Moorreesburg, Malmesbury [District], *Bachmann 1091* (B, holo.; Z, iso.).

Plants 140–300 mm high. *Corm* ± globose, obliquely flattened below, 8–12 mm diam.; tunics blackish, imbricate, outer layers accumulating above, regularly notched below into angular segments, drawn into short bristles above. *Stem* often branched from uppermost leaf axil, and sometimes from base, flexed at base of spike. *Leaves* 2 or 3, lower 1 or 2 basal, lowermost small, often broken, or vestigial (occasionally lacking), second leaf ± as long as stem, usually terete (rarely few-ribbed), inflated or ± succulent with 4 very narrow longitudinal grooves, uppermost leaf usually cauline, inserted shortly above ground, with sheath ribbed and inflated, blade often as long as basal leaf (or leaves), ± 1.5 mm



Distribution of ***Geissorhiza brehmii***.

diam., terete or several-ribbed. *Spike* inclined, flexuose, 2- to 6-flowered; bracts often red distally, becoming dry and membranous near apex, 7–10(–15) mm long, inner ± 2 mm shorter, forked near apex. *Flowers* actinomorphic, ± cupped when fully open, white to creamy yellow, outer tepals sometimes flushed red to purple outside, occasionally dark coloured in throat and tube; perianth tube (3–)5–7(9) mm long, slightly shorter than, or reaching apex of bracts; tepals elliptic, 15–20(–26) × 6–9 mm, spreading. *Filaments* erect, equal, 5–9 mm long; anthers ± 5 mm long, creamy white or yellow. *Style* dividing opposite upper ⅓ to near apex of anthers, branches 2–4 mm long. *Capsules* globose, up to 6 mm long. *Flowering time*: (August to) September to October.

Distribution and ecology: extending in southern Western Cape, South Africa, from near Gouda to Malmesbury and the Cape Peninsula east to Caledon and Bredasdorp; in sandy ground, either marshy or seasonally flooded, or at edges of pools.

Diagnosis: the semi-aquatic *Geissorhiza brehmii* is recognised by the two or three leaves, all with terete, usually 4-grooved blades, the uppermost with an inflated and prominently ribbed sheath, a corm with imbricate tunics, and white to creamy yellow flowers, occasionally with a dark centre. The perianth tube is 5–9 mm long and the tepals 15–26 mm long. The leaf blades are typically slightly succulent and usually somewhat inflated and possibly hollow, and in most plants are terete but occasionally flattened and few-ribbed, these difficult to distinguish from narrow-leaved individuals of *G. imbricata*.

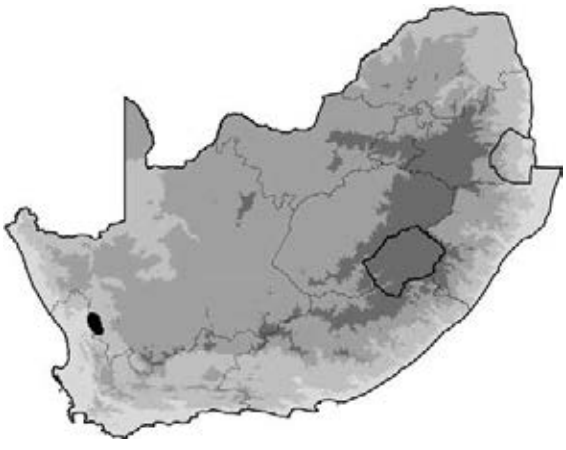
Gessirohiza brehmii has been confused at times with *G. hispidula* and with *G. geminata* but both these species have corms with concentric tunics. Also an aquatic species, *G. geminata* has two to four, well-developed basal leaves, plane when dry but possibly terete when alive, with a slightly thickened and raised main vein but without thickened margins. Capsules of *G. brehmii* appear to be unusually small, globose in shape and ± 6 mm long. Although poorly documented, capsules of *G. geminata* are obovoid and longer, mostly ± 8 mm long in dry specimens.

65. **Geissorhiza sulphurascens** *Schltr. ex R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 39 (1941); Goldblatt: 398 (1985). Type: South Africa, [Northern Cape], Bokkeveld W of Nieuwoudtville, *Marloth 7658* (B, holo.; PRE, iso.).

Plants 120–200 mm high. *Corm* ovoid, symmetric, 6–8 mm diam.; tunics blackish, imbricate, notched into regular segments below. *Stem* sheathed ± ⅔ its length, flexed above sheath of uppermost leaf, occasionally with 1 branch. *Leaves* 3, lower 2 basal, uppermost basal or inserted shortly above ground, largest, blades linear, ± 1 mm wide, reaching to between middle of stem and base of spike, margins and main vein thickened, 2-grooved on each surface, uppermost sheathing stem in lower ⅔, sheath inflated and several ribbed. *Spike* flexuose, inclined, 4- to 8(–10)-flowered; bracts green, upper margins often red, sometimes dry and brownish near apex with age, 7–9 mm long, inner shorter than outer. *Flowers* actinomorphic, rotate, tepals usually shallowly cupped, creamy white; perianth tube funnel-shaped, 3–4 mm long, enclosed in bracts; tepals ovate-elliptic, 13–18 × 5–7 mm. *Filaments* erect, equal, 5–8 mm long; anthers ± 6 mm long, pale yellow. *Style* dividing opposite apex of anthers, branches ± 2 mm long. *Capsules* ± globose, ± 5 mm long. *Flowering time*: late August and September.

Distribution and ecology: restricted to the Bokkeveld Mtns in southwestern Northern Cape, South Africa; in poorly drained, damp sandy ground, often waterlogged in winter.

Diagnosis: evidently somewhat isolated taxonomically, *Geissorhiza sulphurascens* has relatively small, creamy white to almost yellow flowers borne on relatively crowded spikes, the perianth tube 3–4 mm long and tepals 13–18 mm long. The leaves are linear with thickened margins and main vein, thus 2-grooved on each surface. The uppermost of the three leaves is usually largest and sheaths the lower ⅔ of the stem, the sheath



Distribution of ***Geissorhiza sulphurascens***.

somewhat inflated and several ribbed as are the upper leaves of all members of sect. *Geissorhiza*.

66. **Geissorhiza minuta** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 399 (1985). Type: South Africa, [Western Cape], Pakhuis Pass, *Esterhuysen 3193* (BOL, holo.; K, MO, iso.).

Plants 30–80(–120) mm high. *Corm* globose, symmetric, 5–6 mm diam.; tunics blackish, imbricate, notched into regular segments below. *Stem* flexed above sheath of uppermost leaf and at base of spike, occasionally with 1 branch from base. *Leaves* 3, lower 2 basal, uppermost basal or inserted shortly above ground, longer or shorter than lower leaves, blades, linear, ± as long as spike, ± 1 mm wide, margins and main vein thickened, thus 2-grooved on each surface, uppermost leaf sheathing lower ⅔ of stem, sheath ribbed and slightly inflated. *Spike* flexuose, inclined, 2- to 6-flowered; bracts green, upper margins often red, becoming dry and brownish from the apex with age, 4–5 mm long, inner ± as long as outer. *Flowers* actinomorphic, rotate, white, outer tepals flushed light to dark purple outside; perianth tube funnel-shaped, ± 1 mm long, enclosed in bracts; tepals elliptic, 7–8 × ± 2.5 mm. *Filaments* erect, equal, 2–3 mm long; anthers 2–3 mm long, pale yellow. *Style* dividing shortly beyond apex of anthers, branches ± 1.5 mm long. *Flowering time*: September to early October.

Distribution and ecology: restricted to the northwestern mountains of Western Cape, South Africa, on the Gifberg, Matsikamma and Pakhuis mtns; on wet sandstone pavement in shallow sandy ground, especially common after fire.

Diagnosis: the dwarf *Geissorhiza minuta* stands up to 120 mm high although is more often shorter than that. The white flowers are among the smallest in the genus, with a perianth tube ± 1 mm long and tepals 7–8 mm long. Although poorly documented, it is often common locally in suitable habitats in years of ample rainfall.

67. **Geissorhiza eurystigma** *L.Bolus* in South African Gardening and Country Life 21: 281 (1931); Goldblatt: 400 (1985). *G. mathewsii* var. *eurystigma* (L.Bolus) R.C.Foster: 27 (1941). Type: South Africa, [Western Cape], near Mamre, *L. Bolus s. n.* (BOL 19876, lecto., designated by Goldblatt: 400 (1985); K, isolecto.).

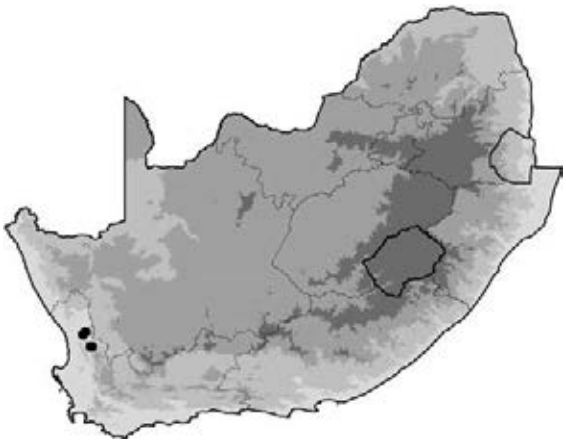
Ixia secunda D.Delaroche: 17 (1766). Type: South Africa, without precise locality or collector (L, holo.).

Ixia rocheana [as *rochensis*] var. *spithamaea* Ker Gawl.: t. 598 (1802c). Type: South Africa, [Western Cape], without precise locality, '*Ixia violacea*' *Masson s.n.* [BM, lecto., designated by Goldblatt: 400 (1985)].

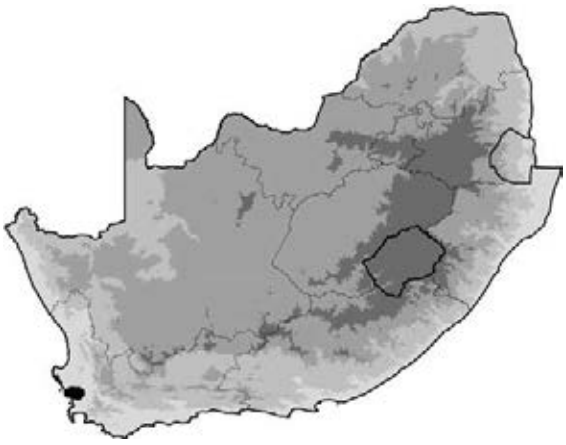
[*Ixia violacea* Herb. Banks ex Ker Gawl.: t. 598 (1802c), invalid name only in synonymy.]

Plants 80–150(–200) mm high. *Corm* ovoid, ± symmetric, 8–11 mm diam., truncate at base; tunics imbricate, blackish, notched below into regular segments. *Stem* simple or 1- or 2-branched, flexed above sheath of upper leaf and at base of spike, rarely with a bract-like leaf in the upper half. *Leaves* 3, ± sword-shaped, several ribbed, reaching to base or middle of spike, 3–6 mm wide, lower 2 basal, uppermost inserted at base or in lower part of stem, sheath inflated, often as long and wider than lower leaves. *Spike* inclined, flexuose 2- to 5(–7)-flowered; bracts green, becoming dry and membranous from apex, often reddish on upper margins, 9–13 mm long, inner ± as long as outer. *Flowers* actinomorphic, tepals widely cupped, dark blue with red centre; perianth tube ± funnel-shaped, 6–9 mm long, exserted from bracts; tepals broadly elliptic, 16–24 × 9–13 mm. *Filaments* erect, equal, up to 9 mm long; anthers 4.5–5.5 mm long, yellow. *Style* dividing near apex of anthers, branches ± 4 mm long, broad, densely hairy. *Capsules* ovoid-oblong, ± up to 12 mm long. *Flowering time*: September to early October.

Distribution and ecology: restricted to southwestern Western Cape, South Africa, centred around Darling



Distribution of ***Geissorhiza minuta***.



Distribution of ***Geissorhiza eurystigma***.

and Mamre, and extending south to Kalabaskraal and Malmesbury; in gravelly sand.

Diagnosis: *Geissorhiza eurystigma* is recognised by the strikingly coloured flowers, dark blue with a deep red centre, and with broad, conspicuously hairy stigmas. The leaves are relatively broad and strongly multi-ribbed. *Geissorhiza radians*, which has similarly coloured flowers but with the red centre edged with a narrow white band, is immediately distinguished by its narrower leaves.

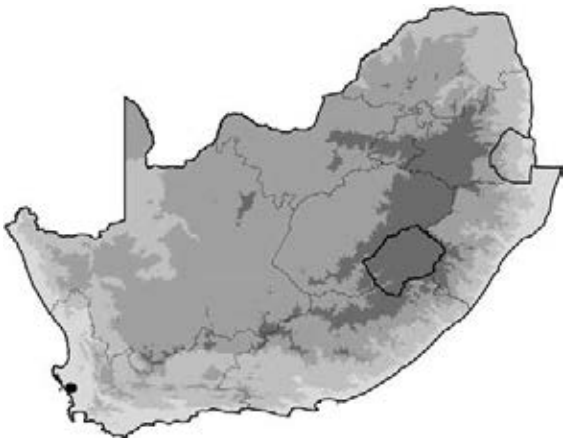
Geissorhiza eurystigma was confused in the past with *G. mathewsii* and was treated for a time as *G. eurystigma* subsp. *mathewsii.* The latter has similar blue flowers with a red centre and broad style branches but differs in its much shorter perianth tube, only ± 2.5 mm long, and anthers held above the style branches.

68. **Geissorhiza mathewsii** *L.Bolus* in Annals of the Bolus Herbarium 4: 42 (1926); Goldblatt: 402 (1985). Type: South Africa, [Western Cape], damp marshy places near Darling, in 1923 *Mathews s.n.* [BOL 18502, lecto., designated by Goldblatt: 402 (1985)].

Plants 80–180 mm high. *Corm* globose, ± symmetric, 7–10 mm diam., truncate at base; tunics imbricate, blackish, layers notched below into regular segments. *Stem* flexed above sheath of upper leaf and at base of spike, rarely with a bract-like leaf in upper half, simple or 1- to 3-branched. *Leaves* 3, lower two basal, reaching to base or middle of spike, 2–4 mm wide, sword-shaped, conspicuously several ribbed, lowermost smallest, uppermost leaf inserted at base or in lower part of stem, sheathing and inflated below, also several ribbed, longer than lower leaves. *Spike* secund, flexuose, 2- to 6-flowered; bracts green, becoming dry and membranous from apex, often reddish on upper margin, 6–12(–15) mm long, inner ± as long but narrower. *Flowers* actinomorphic, ± rotate when fully open, deep blue with a red centre sometimes edged with narrow white band; perianth tube funnel-shaped, 2–3 mm long, included in bracts; tepals obovate, 14–16 × 9–10 mm. *Filaments* erect, equal, 6.5–8.0 mm long; anthers ± 4.5 mm long, articulated and horizontal, lying over style branches, purple; pollen brown. *Style* dividing near anther bases, branches 2.0–3.5 mm long, broad, flat, evidently smooth, concealed by anthers. *Capsules* globose, up to 16 mm long. *Flowering time*: mid- to late September.

Distribution and ecology: a rare local endemic of the Darling area in southwestern Western Cape, South Africa; in seasonally wet, low lying ground.

Diagnosis: *Geissorhiza mathewsii* has been confused in the past with *G. eurystigma*, both of them with similarly coloured deep blue flowers with a red centre and broad style branches, and multi-ribbed leaves, but the structure of the flowers is quite different. Those of *G. mathewsii* have a short perianth tube 2–3 mm long, and anthers articulated on the filaments so that they lie almost horizontally and are held above the broad flat style branches.



Distribution of ***Geissorhiza mathewsii***.

Geissorhiza eurystigma has flowers with a perianth tube 6–9 mm long and a long style with the broad style branches held above upright anthers. The style branches of *G. eurystigma* are conspicuously hairy, whereas those of *G. mathewsii* are evidently smooth, at least to the naked eye. The distinctive flower colouring of *G. eurystigma* is also found in *G. radians*, but that species is easily distinguished by the pitted markings on the tepals, narrower leaves up to 1.5 mm wide with 2-grooved blades, and a longer perianth tube 6–8 mm long.

69. **Geissorhiza radians** *(Thunb.) Goldblatt* in Nordic Journal of Botany 3: 441 (1983); Goldblatt: 404 (1985). *Ixia radians* Thunb.: 3 (1803). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* [UPS–THUNB 982, lecto., designated by Goldblatt: 441 (1983)].

Ixia rocheana [as *rochensis*] Ker Gawl.: t. 598 (1802c), superfluous name for *I. secunda* D.Delaroche (1766). *Geissorhiza rocheana* Ker Gawl.: 224 (1804) [as *rochensis*], as a new name for *I. rocheana. Rochea venusta* Salisb.: 322 (1812), as new name for *I. rocheana* Ker Gawl. *G. larochei* Loudon: 16 (1830), as new name for *I. larochei* Roem. & Schult.: 379 (1817), superfluous name for *I. secunda* D.Delaroche [= *G. eurystigma* L. Bolus]. Type: South Africa, without locality or collector, illustration in Ker Gawl.: t. 598 (1802c).

Geissorhiza monantha Sweet: 503 (1830), illegitimate homonym, not *G. monanthos* Eckl. [intended as new name for *Ixia secunda* Houtt.: 33 (1780), illegitimate homonym, not *I. secunda* D.Delaroche (1766)]. *G. rocheana* [as *rochensis*] var. *monantha* (Sweet) Baker: 156 (1892) [misapplied to *G. monanthos* Eckl.]. Type: South Africa, without locality, illustration in Houtt. t. 78, f. 1 (1780).

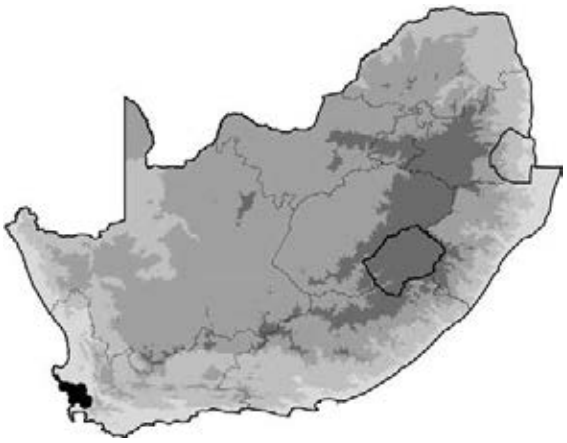
Geissorhiza tulipifera Klatt: 390 (1882). Type: South Africa, [Western Cape], near Paarl, *Drège 8486* (B: Herb. Lubeck, holo.; G, K, L, MO, P, S, iso.).

[*Ixia azurea* Herb. Banks ex Ker Gawl.: t. 598 (1802c), invalid name only in synonymy.]

[*Geissorhiza cyanea* Eckl.: 20 (1827), invalid name without description.]

Plants 80–160 mm high. *Corm* ovoid, symmetric, truncate below, 6–9 mm diam.; tunics blackish, imbricate, notched below into regular sections. *Stem* erect, flexed above sheath of upper leaf and at base of spike, simple or 1-branched. *Leaves* 3, lower 2 basal, uppermost inserted on lower part of stem, slightly longer or shorter than stem, linear, 0.5–1.5 mm wide, margins and main vein slightly thickened, thus narrowly 2-grooved on each surface, uppermost leaf with large, inflated, multi-ribbed sheath. *Spike* inclined, flexuose, 2- to 4(–6)-flowered; bracts green, 8–13(–16) mm long, inner shorter than outer. *Flowers* zygomorphic with stamens unilateral and declinate, tepals widely cupped, deep blue with glossy red centre edged with narrow white band, each tepal with a dark pit in midline; perianth tube funnel-shaped, usually exceeding bracts, 6–8 mm long; tepals obovate, 15–22 × 12–15 mm. *Filaments* unilateral, declinate, equal, ± 10 mm long, held above lowermost tepal, curving upward distally; anthers erect, ± parallel, 5–6 mm long, dark purple; pollen red-brown. *Style* arching beneath stamens, ± 2 mm long, branches 4 mm long. *Flowering time*: September to early October.

Distribution and ecology: restricted to low hills and flats along the West Coast of Western Cape, South Africa, extending from Yzerfontein and Darling south to Paarl and in the past to Somerset West; in seasonally damp sites in gravelly sand, often of decomposed granite.



Distribution of ***Geissorhiza radians***.

Diagnosis: one of the most striking species in the genus, *Geissorhiza radians* is immediately recognised by the large flowers with deeply cupped tepals, deep blue with red in the lower third edged with a narrow white band and each with a dark pit-like depression in the middle. The leaves are linear (sometimes almost terete) with thickened margins and main vein. The flowers are zygomorphic with the stamens unilateral and declinate, the style lying beneath them above the lowermost tepals. *Geissorhiza eurystigma* and *G. mathewsii* have similarly coloured flowers but lack the pitted tepal markings, and have unusual, broad style branches, and broader, ribbed leaves.

Sect. 10. **Monticolae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 406 (1985) [as sect. *Monticola*]. Type: *Geissorhiza burchellii* R.C.Foster

Corm tunics hard and woody to fairly soft in texture; leaves sword-shaped to linear or terete, ± plane or with margins and main vein variously thickened; bracts green below, becoming dry above; flowers rotate to salver-shaped, actinomorphic or zygomorphic, perianth tube short or reaching to apex of bracts; stamens equal or more often strongly unequal, unilateral and declinate.

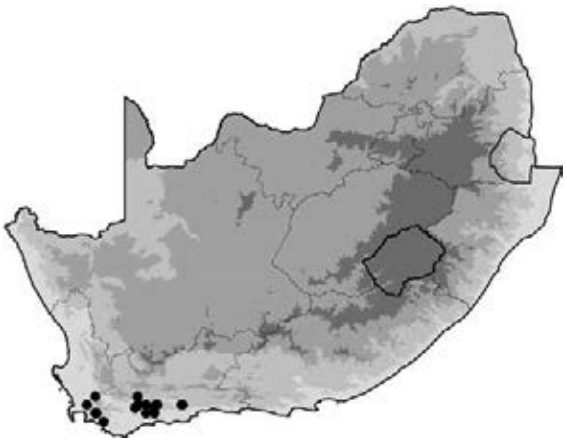
Species 10: southwestern Western Cape, South Africa.

70. **Geissorhiza burchellii** *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 25 (1941); Goldblatt: 406 (1985). Type: South Africa, [Western Cape], Langeberg near Zuurbraak, *Schlechter 2160* (B, holo.; B, BM, BOL, BR, PRE, Z, iso.)

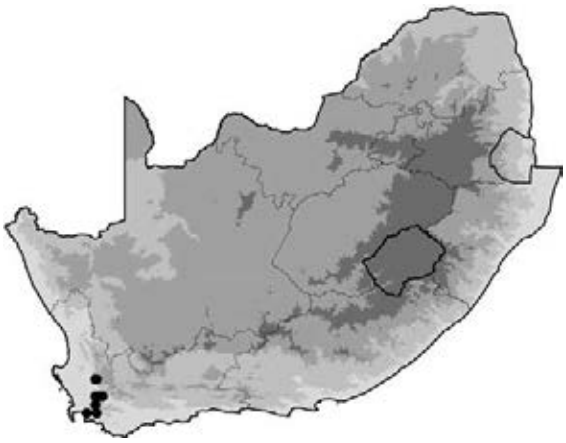
Plants 120–200 mm high. *Corm* ± ovoid, 7 mm diam.; tunics light brown, ± imbricate, papery, notched below into narrow sections, drawn into points above. *Stem* simple or 1- to 3-branched, with 1 to 3 short, sheathing, scale-like bracts, flexed at base of spike, dropping in bud. *Leaves* 2 to 4, lowermost basal, remaining inserted above base and sheathing stem for some distance, uppermost leaf sheathing for half its length, ± ½ to ± as long as stem, 1.5–3.0 mm wide, margins and main vein thickened, blade thus 2-grooved on each surface, often sticky below and with soil adhering. *Spike* flexuose, mostly 3- to 9-flowered; bracts flushed red above, outer (6–)8–10 mm long, inner slightly shorter. *Flowers* actinomorphic, ± rotate, tepals spreading when fully open, tepals sometimes reflexed with age, pale to deep purple or violet, pale yellow in throat and tube; perianth tube cylindric, 4–6 mm long; tepals elliptic, 12–18(–22) × 5–6 mm. *Filaments* erect, unequal; two longer 10–14 mm long, shorter one 6–10 mm long; anthers, 4.0–5.5 mm long, purple; pollen yellow. *Style* dividing opposite upper ⅓ of anthers, branches ± 4 mm long. *Capsules* ± globose, 5–7 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: December to January.

Distribution and ecology: a montane species of Western Cape, South Africa, extending from the Slanghoek Mtns south and east though the Hottentots Holland Mtns to the Langeberg; in stony, sandstone ground, mostly on south-facing slopes, blooming well only after fire.

Diagnosis: striking when in flower, *Geissorhiza burchellii* has relatively large deep purple to violet flowers with a short perianth tube, only 4–6 mm long and about one



Distribution of ***Geissorhiza burchellii***.



Distribution of ***Geissorhiza grandiflora***.

third as long as the spreading to slightly reflexed tepals. The stamens are unequal, typical of the section, and the corm tunics are of the imbricate type but are of soft, papery rather than woody texture. The stems are hairless and usually branched and the leaves have the margins and main vein thickened, rendering the leaf surfaces two-grooved.

A collection from Grassy Dome in the Du Toit's Kloof Mtns is tentatively included in *G. burchellii.* The single specimen lacks leaves and corm and although the flowers match those of *G. burchellii* well, collection notes indicate that the flowers had white and dark red markings at the base of the tepals.

71. **Geissorhiza grandiflora** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 408 (1985). Type: South Africa, [Western Cape], N end of Limietberg, Bain's Kloof, ± 4 000 ft [1 200 m], *Esterhuysen 35832* (BOL, holo.; C, E, K, MO, NBG, PRE, S, US, WAG, iso.).

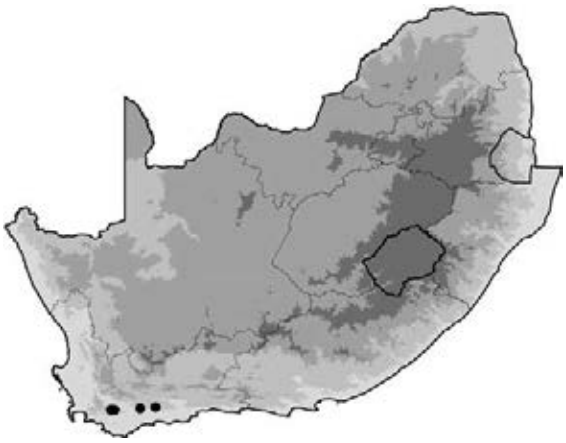
Plants mostly 200–350 mm high. *Corm* globose, 10–12 mm diam.; tunics brown, ± imbricate, papery, notched below into sections and drawn into short points above. *Stem* simple or 1- to 3-branched, flexed at base of spike, bearing in addition to cauline leaf, 1 or 2 short sheathing scale-like bracts. *Leaves* (2)3, lower 1 or 2 basal, reaching to ± base of spike, uppermost inserted on lower part of stem, sheathing for some distance, linear, 1.5–4.0 mm wide, margins and main vein thickened, surfaces thus 2-grooved, sometimes sticky below and with sand adhering. *Spike* flexuose, mostly 3- to 8-flowered; bracts green flushed red above, outer 13–16 mm long, inner slightly shorter. *Flowers* zygomorphic, ± salver-shaped, stamens and style declinate, pink with dark markings at bases of tepals, pale in tube; perianth tube cylindric, 15–18 mm long, slightly exceeding bracts; tepals ellipsoid, 22–30 × 6.5–9.0 mm. *Filaments* unequal, unilateral, declinate, two longer 11–18 mm long, shorter one 7–12 mm long; anthers 5–6 mm long, yellow; pollen yellow. *Style* dividing opposite upper ⅓ to apex of anthers, branches 4–5 mm long. *Capsules* obovoid to globose, 5–8 mm long, enclosed in bracts. *Chromosome number* 2*n* = 26. *Flowering time*: late November to early January.

Distribution and ecology: endemic to Western Cape, South Africa, extending from the Grootwinterhoek Mtns to the Hottentots Holland Mtns; in rocky, sandy ground at mid- to upper elevations, 900–1 500 m, flowering mainly after fire.

Diagnosis: *Geissorhiza grandiflora* has one of the largest flowers in the genus, comparable in size with those of some species of sect. *Engysiphon* (subg. *Weihea*). The flowers are deep pink and zygomorphic with stamens and style both unilateral and lying above the lowermost tepal. The light brown, imbricate corm tunics are papery in texture but otherwise match those of subg. *Geissorhiza* and are regularly notched along the lower margin. The unequal stamens and branched stems are characteristic of the sect. *Monticolae*, in which it most closely resembles *G. burchellii*, a generally smaller species with leaves with heavily thickened margins and midrib, and dark purple, radially symmetric flowers with a shorter perianth tube 4–6 mm long. The two species are occasionally sympatric or nearly so and both have been collected on the Cossacks and Slanghoek Mtns. A collection from the Grootwinterhoek mtns, provisionally assigned to *G. grandiflora*, has somewhat smaller flowers than are typical and their colour is uncertain.

72. **Geissorhiza callista** *Goldblatt* in Flowering Plants of Africa 50: t. 1996 (1989). Type: South Africa, [Western Cape], Riviersonderend Mtns above Greyton, *Goldblatt 8680* (NBG, holo.; E, K, MO, PRE, S, US, WAG, iso.).

Plants 150–350 mm high. *Corm* ± ovoid, 4–7 mm diam.; tunics ± membranous, not accumulating, light to middle brown, probably imbricate. *Stem* suberect or inclined, simple or 1- or 2-branched, bearing a sheathing, bract-like leaf in upper ⅓. *Leaves* 3 or 4(5), lower 2 or 3 ± basal, reaching to ± base of spike, linear to falcate, with thickened margins and main vein, thus 2-grooved on



Distribution of ***Geissorhiza callista***.

each surface, uppermost leaf cauline, shorter than basal. *Spike* inclined, flexuose, mostly 3- to 5-flowered, bracts green below, flushed red to purple above, outer 10–13 mm long, inner slightly shorter. *Flowers* zygomorphic, nodding, with unilateral, declinate stamens and style, deep pink turning dark red-purple at tepal bases, pale in throat; perianth tube ± cylindric, widening near mouth, 22–25 mm long, well exserted from bracts; tepals oblanceolate, 24–26 × 9–12 mm, outer slightly longer than inner. *Filaments* unequal, unilateral, declinate; two longer 16–20 mm long, shorter one 13–17 mm long; anthers ± erect, ± 4.7 mm long, purple; pollen pale pink. *Style* arching below filaments, dividing ± 6 mm beyond anthers, branches ± 3 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: November and early December.

Distribution and ecology: restricted to the Riviersonderend Mtns and Langeberg in Western Cape, South Africa; on rocky sandstone slopes and cliffs often in wet mossy places, flowering well only after fire and evidently rare.

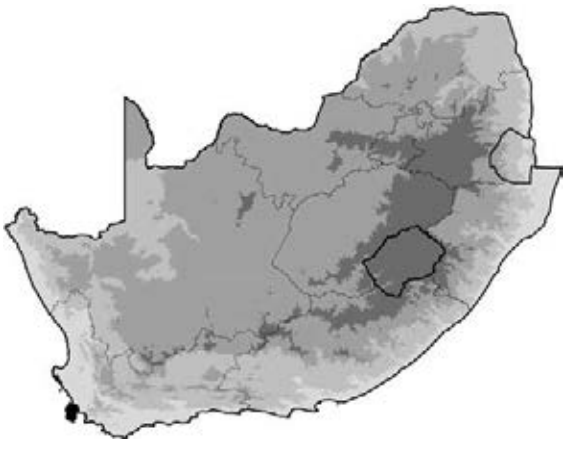
Diagnosis: with relatively large, pink flowers that are darker at the base of the tepals, *Geissorhiza callista* is recognised also by the elongate perianth tube 22–25 mm long and unilateral stamens and style. The stamens extend well beyond the mouth of the perianth tube, and the particularly long style divides up to 6 mm beyond the anther tips. The stem is usually inclined and the leaves falcate to trailing from steeply sloping ground. Like most members of sect. *Monticolae*, the leaves have thickened margins and main vein and are thus shallowly 2-grooved or channelled on each surface. The species was previously included in *G. grandiflora*, but that species differs in its erect stems and smaller flowers, the perianth tube up to 18 mm long and the tepals 20–22 mm long, a shorter style dividing opposite the upper third to apex of the anthers, and slightly longer style branches 4–5 mm long, contrasting with the longer style and shorter style branches, ± 3 mm long, in *G. callista*.

733. **Geissorhiza tabularis** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 410 (1985). Type: South Africa, [Western Cape], Table Mtn, between Skeleton and Window Gorges, *Goldblatt 6726* (MO, holo.; K, NBG, PRE, S, US, WAG, iso.).

Plants 250–350 mm high. *Corm* globose, tapering above, 7 mm diam.; tunics light brown, ± imbricate, papery in texture, cut below into narrow sections and drawn into points above. *Stem* simple or 1- to 3-branched, flexed at base of spike, bearing in addition to a cauline leaf, 1(2) short, sheathing scale-like bracts, flexed at base of spike. *Leaves* (2)3, lower 2 (or 1) basal, ½ to occasionally ± as long as stem, linear, 2–3 mm wide, with slightly thickened to winged margins and main vein, broadly 2-grooved on each surface, somewhat sticky below and with sand adhering, uppermost leaf cauline, sheathing for ½ its length. *Spike* nodding in bud, later becoming straight, 3- to 8-flowered, flexuose; bracts green, flushed red above, recurved above at flowering, outer 7–8 mm long, inner slightly shorter. *Flowers* actinomorphic, rotate, pale mauve to nearly white (usually white when dry); perianth tube ± cylindric, 1.5–2.0 mm long; included in bracts; tepals elliptic, 15–18 × 5–7 mm. *Filaments* suberect, unequal, two longer 5–6 mm long, shorter one 3–4 mm long; anthers 3.5–5.0 mm long, yellow. *Style* dividing opposite apex of anthers, branches ± 2.5 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: late October to mid-December.

Distribution and ecology: restricted to the lower plateau of Table Mtn on the Cape Peninsula in Western Cape, South Africa; in wet or marshy places in peaty sand, blooming rarely, if at all, except after fire.

Diagnosis: *Geissorhiza tabularis* was for many years included in the smaller-flowered *G. ramosa* and the two are no doubt closely related. *Geissorhiza tabularis* is distinguished by the larger flowers with tepals 15–18 mm long vs. 5–9 mm in *G. ramosa* and longer stamens. The two species share a smooth stem, often more highly branched in *G. ramosa*, a short perianth tube, and unequal filaments.



Distribution of ***Geissorhiza tabularis***.

74. **Geissorhiza ramosa** *Ker Gawl. ex Klatt* in Linnaea 34: 657 (1866); Goldblatt: 410 (1985). *G. secunda* var. *ramosa* (Ker Gawl. ex Klatt) Baker: 155 (1892). Type: South Africa, [Western Cape], 'Tulbaghskloof, Tulbaghsthal, am Fuss des Winterhoeksberg, am Witsenberg und bei Vogelvalei', *Ecklon & Zeyher Irid. 229* (77.11) (B, lecto., designated by R.C.Foster: 24 (1941); B, BM, E, FI, G, GH, L, LD, MO, P, PRE, SAM, W, Z, isolecto.).

Geissorhiza montana R.C.Foster: 55 (1941). Type: South Africa, [Western Cape], Genadendal Mtns, 3 000–4 000 ft [900–1 200 m], '*G. imbricata* a', *Drège s.n.* (B, holo.; BM, E, G, K, L, MO, S, iso.).

Plants 200–450 mm high. *Corm* ovoid, tapering above, 6–8 mm diam.; tunics brown, woody to ± papery in texture, incised below into regular sections. *Stem* 2- to 4-branched (rarely simple), with scale-like bracts subtending branches. *Leaves* 2 or 3(4), lower 1 or 2 basal, half as long to ± as long as stem, linear, 1.2–2.5 mm wide, margins and main vein thickened, narrowly 2-grooved on each surface, upper leaf (rarely two) cauline, sheathing stem below. *Spike* inclined, flexuose, few- to 11-flowered; bracts becoming dry and membranous from tips, outer 3.5–5.5 mm long, inner slightly shorter. *Flowers* rotate, actinomorphic, blue, purple, or violet (fading to pink then white when dry); perianth tube funnel-shaped, 2–3 mm long; tepals obovate-elliptic, (5–)7–9 × 3.3–4.5 mm. *Filaments* erect, unequal, two longer 3–4 mm long, shorter one 2.5–3.0 mm long; anthers 2.2–3.5 mm long, yellow. *Style* dividing opposite upper ⅓ of anthers, branches ± 1.5 mm long. *Capsules* globose to oblong, 3.5–5.0 mm long *Flowering time*: October to December (January at high elevations).

Distribution and ecology: occurring in the mountains of Western Cape, South Africa, from the Grootwinterhoek Mtns in the north to the Langeberg near Riversdale in the east; on stony sandstone ground, often in marshy or wet sites, most frequent after fires.

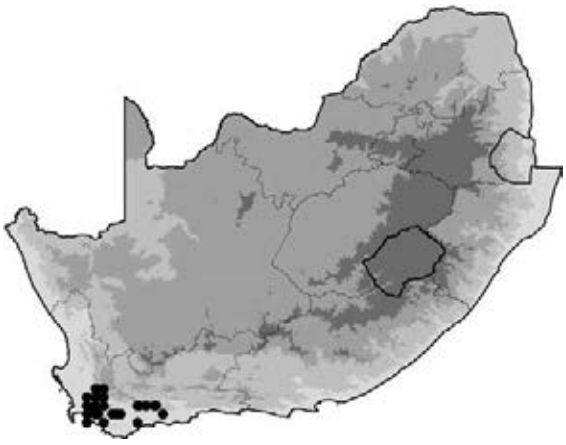
Diagnosis: *Geissorhiza ramosa* is recognised by the small, dark blue to violet or purple flowers with tepals 5–9 mm long and unequal stamens with anthers up to 3.5 mm long, and by its normally 2- to 4-branched, hairless stem. The unequal stamens are typical of most other species of sect. *Monticolae.* Depauperate plants may be less that 200 mm tall and without branches making identification uncertain.

75. **Geissorhiza bryicola** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 413 (1985). Type: South Africa, [Western Cape], Fernkloof Reserve, Hermanus, along path at Psoralea Drip, *Goldblatt 7032* (MO, holo.: K, NBG, PRE, S, WAG, iso.).

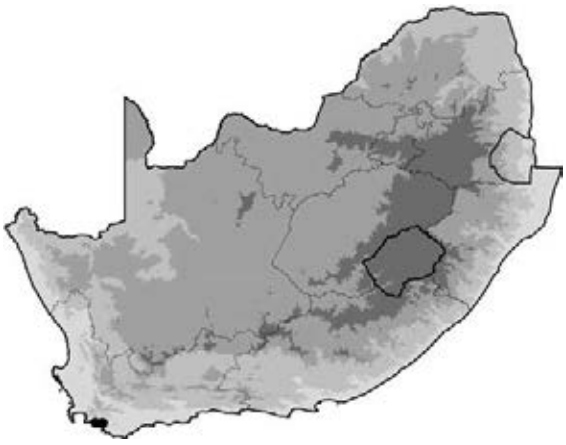
Plants 150–300 mm high. *Corm* subglobose, 5–8 mm diam.; tunics brown, brittle-membranous, imbricate, incised below into regular sections. *Stem* weak, inclined to trailing, simple or with 1(2) branches, sometimes with a scale-like bract in upper ⅓. *Leaves* usually 3(4), lower 2 basal, linear, weak and trailing, usually slightly longer than stem, 1.5–4.0 mm wide, nearly plane, margins and main vein lightly raised, upper leaf cauline, partly sheathing with short free apex. *Spike* inclined to horizontal, flexuose, (2–)5- to 10-flowered; bracts green below, membranous and translucent in upper half, outer 5–8 mm long, inner slightly shorter. *Flowers* actinomorphic, rotate, white; perianth tube funnel-shaped, ± 2.5 mm long; tepals 8–10 × ± 4 mm. *Filaments* suberect, unequal, two longer 4–6 mm long, shorter one 3.5–4.5 mm long; anthers ± 3 mm long, yellow; pollen yellow. *Style* dividing opposite apex of anthers, branches ± 5 mm long. *Capsules* globose, 3–5 mm long. *Chromosome number* $2n$ = 26 + 0–1b. *Flowering time*: late September to mid-November.

Distribution and ecology: restricted to the mountains above Betty's Bay and the Klein River Mtns, in Western Cape, South Africa; in cool shady sites, on damp cliffs near seeps or waterfalls, often in moss pads.

Distribution and ecology: Geissorhiza bryicola is recognised by the weak, inclined to trailing stem and inclined to horizontal spikes of up to 10 small white flowers



Distribution of ***Geissorhiza ramosa***.



Distribution of ***Geissorhiza bryicola***.

with tepals just 8–10 mm long. The stems are hairless and the stamens unequal. It bears the closest resemblance to the widespread montane species, *G. ramosa*, the two having similar small flowers with short unequal stamens but *G. ramosa* is a ± erect plant with 2- to 4-branched stems, blue to mauve or purple flowers, and leaves with strongly thickened margins and midrib.

76. **Geissorhiza ciliatula** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 415 (1985). Type: South Africa, [Western Cape], Cederberg, Middelberg, 1 500 m, *Goldblatt 5144* (MO, holo.; K, NBG, S, iso.).

Plants 60–120 mm high. *Corm* globose, 3.5–5.0 mm diam.; tunics brown, ± imbricate, soft-textured, incised above and below. *Stem* suberect to inclined, minutely ciliate, unbranched, flexed above sheath of upper leaf. *Leaves* 2 or 3, linear and straight to falcate, up to 1 mm wide, oblong in section with margins and main vein strongly thickened, thus narrowly 2-grooved on each surface, lowermost leaf basal, longest, second also basal, but sheathing lower half of stem, free distally, uppermost leaf inserted on upper ⅓ of stem, sheathing for at least half its length (sometimes entirely sheathing and bract-like). *Spike* 1- to 4-flowered, flexuose; bracts 4–5 mm long, green below, membranous to dry and transparent above. *Flowers* actinomorphic, rotate, white, turning purplish on fading; perianth tube ± 1.5 mm long, included in bracts, flaring from base; tepals obovate, 6–7 × 3 mm. *Filaments* erect, equal, ± 2.5 mm long; anthers ± 2 mm long, yellow. *Style* dividing opposite apex of anthers, branches ± 1.3 mm long, recurved. *Capsules* globose, 3–4 mm long, included in bracts. *Chromosome number* 2*n* = 26. *Flowering time*: November.

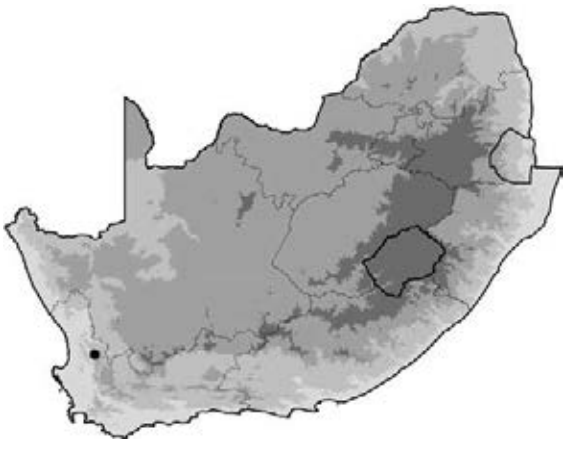
Distribution and ecology: restricted to the Cederberg and Cold Bokkeveld Mtns of Western Cape, South Africa; growing above 1 200 m elevation in sheltered wet mossy places on cliffs and cracks in rocks, mainly south-facing, where shade and water are available late in the growing season.

Diagnosis: *Geissorhiza ciliatula* is distinguished by its low stature, up to 120 mm high, linear leaves with heavily thickened margins and midvein, minutely ciliate stems, and small white flowers with a perianth tube ± 1.5 mm long, tepals 6–7 mm long, and unequal stamens. The corm tunics are soft-textured and not firmly fixed in position but evidently imbricate.

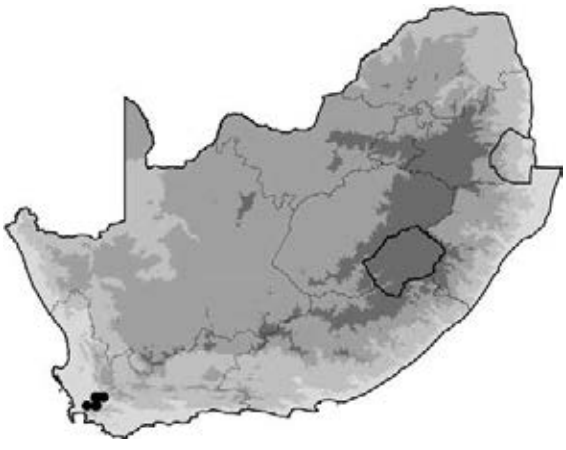
77. **Geissorhiza pseudinaequalis** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 415 (1985). Type: South Africa, [Western Cape], Witteberg, Slanghoek Mtns, wet overhung cliffs on S side, *Esterhuysen 22293* (BOL, holo.; K, MO, iso.).

Plants 180–300 mm high. *Corm* globose, symmetric, 5–9 mm diam., usually with numerous cormlets around base; tunics membranous-papery, ± imbricate, incised below, light brown, outer layers becoming irregularly broken. *Stem* bearing 1 or more green, sheathing bracts in upper half, often branched in upper axils, sometimes also from axil of uppermost leaf, flexed at base of spike. *Leaves* usually 3(4), linear, plane, margins and midrib slightly raised, occasionally sparsely ciliate on edges, 2–4 mm wide, usually ± as long as stem, lower 2 (or 3) leaves basal, uppermost inserted in lower ⅓ to middle of stem, sheathing below. *Spike* (2)3- to 7-flowered, flexuose; bracts 7–10 mm long, green, membranous on upper margins, occasionally ± dry above, rarely ± tawny. *Flowers* actinomorphic, rotate, blue to violet (or blue-mauve), usually pale in tube with throat ringed with darker colour; perianth tube 3–5 mm long, included in bracts; tepals obovate, 12–17(–20) × 5.0–6.5 mm. *Filaments* erect, unequal, two longer 8–10(–12) mm long, shorter one 4–6 mm long; anthers 3.5–5.0 mm long. *Style* dividing near or beyond tips of anthers, branches recurved. *Flowering time*: mid-October to January.

Distribution and ecology: restricted to middle and upper elevations in the mountains of Western Cape, South Africa in the Hex River Mtns and Bain's Kloof to Simonsberg; on damp, sheltered, south- or west-facing rock ledges and cliffs where shade and moisture are



Distribution of ***Geissorhiza ciliatula***.



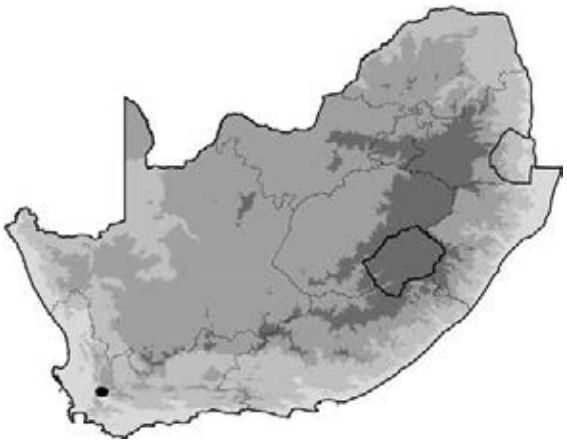
Distribution of ***Geissorhiza pseudinaequalis***.

available in midsummer, flowering as late as January at higher elevations.

Diagnosis: one of several species of *Geissorhiza* that occupy specialised niches in the mountains of southwestern Western Cape, *G. pseudinaequalis* is distinguished by its papery corm tunics, smooth stem and markedly unequal stamens, with the longer two filaments 8–12 mm and shorter one 4–6 mm long. It also has relatively large, blue to violet (rarely blue-purple) flowers with tepals 12–17 mm, rarely up to 20 mm long. *Geissorhiza pseudinaequalis* is sometimes confused with *G. inaequalis* (sect. *Planifoliae*) because of its unequal stamens and flat leaves but that species has woody, imbricate tunics and puberulous stems. *Geissorhiza pseudinaequalis* is probably related to other montane species with similar soft-textured imbricate corm tunics, including *G. burchellii* and *G. tabularis*, both of which also have unequal stamens but differ in their larger size and in their leaves with strongly raised margins and midrib.

78. **Geissorhiza rupicola** *Goldblatt & J.C.Manning* in Novon 5: 158 (1995). Type: South Africa, [Western Cape], Mosterthoek Twins, Green Gullies Kloof, ± 1 250 m, 9 Dec. 1984, *Esterhuysen 36197* (BOL, holo.; NBG, MO, PRE, WAG, iso.).

Plants (100–)150–200 mm high. *Corm* globose, 9–12 mm diam.; tunics initially unbroken, soft and papery, becoming torn into narrow vertical strips, ultimately almost fibrous, accumulating with cataphylls as a fibrous collar around base. *Stem* ascending or trailing from cracks in steep rocks, unbranched. *Leaves* (2)3, lower 1 or 2 basal, linear, 1.5–3.0 mm wide, margins and main veins heavily thickened and raised into wings overarching blade surface, lowermost longest, reaching to between upper ⅓ of stem and base of spike, second basal leaf usually much shorter, sheathing in lower ½, uppermost leaf inserted on mid to upper part of stem, smaller than basal, sheathing for at least half its length, sometimes entirely. *Spike* (1)2- to 6-flowered, flexuose; bracts subequal, outer pale sometimes purple toward apex, 8–11 mm long, inner membranous, narrower than outer, 2-keeled, forked in upper 1–2 mm. *Flowers* salver-shaped, pale pink, unscented; perianth tube cylindric, (16–)19–23 mm long; tepals subequal, ovoid-oblong, spreading, 12–15 × 4.5–5.5 mm. *Filaments* suberect, equal, ± 8 mm long, exserted ± 6 mm from tube; anthers ± 3.5 mm long, cream-coloured; pollen yellow. *Style* dividing at or beyond anther tips, ultimately exceeding anthers by ± 4 mm, branches ± 2 mm long. *Capsules* globose, 4–6 mm long. *Seeds* prismatic with ridged angles, ± 1.5 mm long. *Flowering time*: November to early December.



Distribution of ***Geissorhiza rupicola***.

Distribution and ecology: known only from the Mosterthoek Twins at the western end of the Hex River Mtns in Western Cape, South Africa; confined to moist shady sites in thin soil on rocks, sometimes in cracks in steep cliffs.

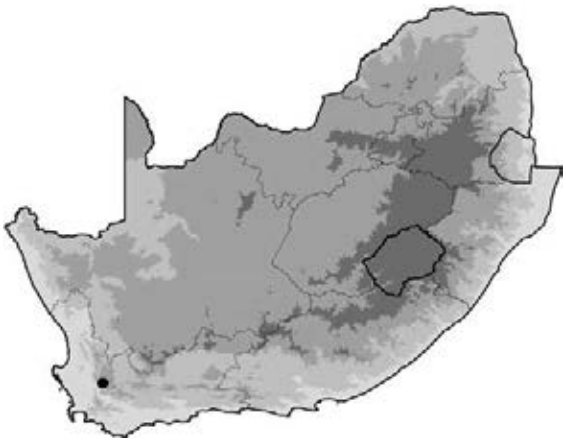
Diagnosis: *Geissorhiza rupicola* stands out in the genus in its unusually long perianth tube, 16–23 mm long, slightly longer than the tepals. A tube of this length is also known in *G. grandiflora* but this species has longer tepals and unequal stamens with one filament shorter than the other two. The soft, papery corm tunics becoming torn into narrow vertical strips, ultimately almost fibrous, and accumulating with cataphylls as a fibrous collar around base are also distinctive for *G. rupicola*, the relationships of which are uncertain.

79. **Geissorhiza silenoides** *Goldblatt & J.C.Manning* in Novon 5: 156 (1995). Type: South Africa, [Western Cape], Ceres District, lower slopes of Gydo Pass, 20 Sept. 1993, *Goldblatt & Manning 9739* (NBG, holo.; K, MO, PRE, WAG, iso.).

Plants 200–300 mm high. *Corm* ± ovoid, one side flattened slightly below, 5–7 mm diam.; tunics woody, ± black, imbricate, layers breaking below into triangular points. *Stem* minutely scabrid-puberulous, unbranched, flexed above sheaths of upper 2 leaves, inclined above. *Leaves* 4, lower 2 basal and longest, reaching at least to middle of stem, sometimes to base of spike, linear, erect or trailing, 1.2–1.5 mm wide, oval in cross section with 2 narrow grooves on each surface, main vein thickened, margins raised and arched over surface, upper 2 leaves cauline, sheathing for at least ½ their length, sometimes only 9–12 mm long and entirely sheathing. *Spike* flexuose, drooping in bud, 4- to 7-flowered; outer bract pale green, upper margins pink-purple, 7–10 mm long, inner ± ⅔ as long, translucent with 2 green keels. *Flowers* actinomorphic, salver-shaped, pale pink, darker near tepal margins, white in throat, unscented; perianth tube cylindric, 15–17 mm long; tepals subequal, obovate, 12.5–14.0 × 6–7 mm, spreading when fully open. *Filaments* suberect, unequal, 4, 7 and 9 mm long; anthers ± 4.5 mm long, cream-coloured; pollen pale yellow. *Style* exceeding anthers by 2–4 mm, branches unusually long, 5–6 mm long. *Flowering time*: September to mid-October.

Distribution and ecology: known only from Gydo Pass in the Ceres District of Western Cape, South Africa; on south-facing slopes in loamy clay in *Protea laurifolia* fynbos.

Diagnosis: with blackish imbricate corm tunics regularly notched below into blunt triangular segments, *Geissorhiza silenoides* is a typical member of subg. *Geissorhiza*, in which it stands out in the scabrid-puberulous stems, short leaves with heavily thickened margins and midribs, thus with two narrow grooves on each surface, and distinctive, pale pink flowers with long perianth tube, 15–17 mm long, and unequal stamens, each filament being of a different length. Unequal filaments are frequent in subg. *Geissorhiza*, but typically only one filament is shorter and the remaining two are equal. The combination of long perianth tube and unequal stamens are known only in sect. *Monticolae*, most members of which have soft-textured corm tunics. Sectional placement of *G. silenoides* is somewhat uncertain, but it has provisionally been included in sect. *Monticolae*.



Distribution of ***Geissorhiza silenoides***.

Sect. 11. **Planifoliae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 417 (1985) [as sect. *Planifolia*]. Type: *Geissorhiza aspera* Goldblatt

Corm tunics blackish, hard and woody, leaves usually 3, blades plane, smooth, lanceolate to sword-shaped or linear, stem puberulous-ciliate, bracts herbaceous below, dry and rusty brown in the upper half, flowers rotate, actinomorphic or zygomorphic with unilateral stamens and style, perianth tube short, stamens equal or unequal.

Species 6: winter-rainfall Northern and Western Cape, South Africa.

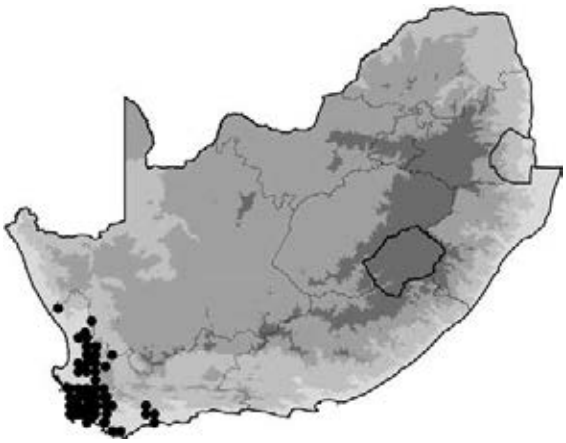
80. **Geissorhiza aspera** *Goldblatt* in Goldblatt & Barnard in Journal of South African Botany 36: 303 (1970); Goldblatt: 417 (1985). Type: South Africa, [Western Cape], Rondebosch Common, *Goldblatt 501* (BOL, holo.; K, NBG, PRE, iso.).

Gladiolus junceus Burm.f.: 2 (1768). Type: South Africa, without precise locality or collector, illustration in Plukenet: t. 187, f. 2 (1691) [not *Geissorhiza juncea* (Link) A.Dietr.].

Geissorhiza secunda Ker Gawl.: 224 (1804), as a new name for *Ixia secunda* P.J.Berg.: 6, & t. 360 (1767), illegitimate homonym, not *I. secunda* D.Delaroche (1766). Type: South Africa, without precise locality (Herb. Bergius).

Plants mostly 100–300 mm high. *Corm* ovoid-globose, 3–6 mm diam., with numerous cormlets at base; tunics dark, often blackish, imbricate, notched into sections below. *Stem* inclined or erect, simple or more often 1- to 3-branched, densely puberulous (slightly rough to touch), usually bearing a short leafy bract from upper node. *Leaves* usually 3, plane, linear to sword-shaped, erect to falcate, margins and main vein slightly raised, smooth or sparsely papillate to ciliate, ± as long as stem or somewhat longer, 2–5(–7) mm wide, lower 2 basal, upper basal or inserted shortly above ground, sheathing lower half of stem. *Spike* (1–)3- to 7-flowered, flexed below first flower, inclined; bracts green below, dry and brown in upper half, 6–12 mm long, spreading above, inner smaller, 6–8 mm long. *Flowers* rotate, often zygomorphic, usually deep blue to violet, or white or pale blue (rarely purple); perianth tube funnel-shaped, 1–2 mm long; tepals 11–15 × 4–6 mm. *Filaments* subequal or unequal, often declinate, 3–5 mm long, one usually shorter by up to 1 mm; anthers suberect or horizontal, (2.0)3.0–5.5 mm long, white to pale yellow. *Style* 7–8 mm long, branches up to 2 mm long. *Capsules* 5–6 mm long, ± ovoid. *Chromosome number* $2n = 26, 52$. *Flowering time*: August to September.

Distribution and ecology: widespread in Western Cape, South Africa, extending from the Cape Peninsula east to the Langeberg at Tradouw Pass and north through the Olifants River Valley as far as the Gifberg, with an isolated population in the high country west of Bitterfontein in Namaqualand; usually on sandy slopes and flats, sometime on granitic gravel.



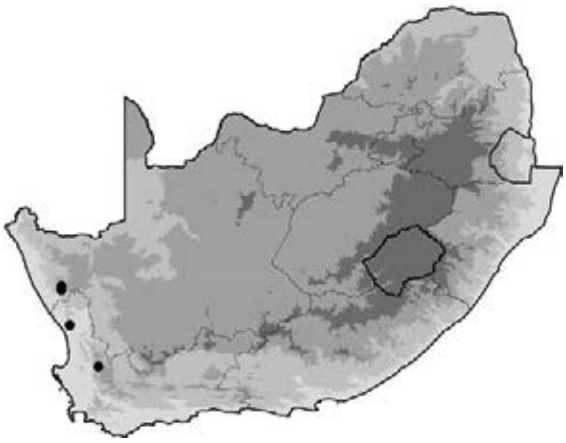
Distribution of ***Geissorhiza aspera***.

Diagnosis: often locally common, *Geissorhiza aspera* is recognised by the minutely puberulous stem, plane leaves with slightly thickened margins, and typically glistening, dark blue (sometimes white) flowers with a greenish yellow throat, usually with slightly unequal filaments. The floral bracts are green in bud but as the flowers open they become dry and turn rusty brown at the tips. Plants vary greatly in size depending on soil fertility and available moisture, and may grow up to or even over 300 mm high, or be stunted and less than 100 mm. Although most often blue, plants in the Olifants River Valley and to the north often have partly or entirely white flowers. The stamens are sometimes described as being equal, but careful examination of live plants shows that one filament is usually slightly shorter, and in populations in the north of its range the filaments are clearly unequal.

Geissorhiza aspera is unusual in the genus in being heteroploid with both diploid $2n = 26$ and polyploid $2n = 52$ populations. From the sample of seven populations so far examined, there is a pattern of diploids in the north of the range and tetraploids in the south, but both cytotypes have been recorded on the Cape Peninsula. *Geissorhiza aspera* is closely allied to *G. inaequalis*, which has larger, pale mauve or purple flowers but shares with *G. aspera* the characteristic puberulous stem and broad flat leaves. In *G. inaequalis* the short filament is about half as long as the other two and the bracts are green to membranous during flowering and unlike the typical dry, brown-tipped bracts of *G. aspera*. An unusual morph at the northern end of the Paardeberg near Malmesbury has purple flowers with a darker purple centre and the radially symmetric flowers are held almost upright in contrast to the nodding flowers of *G. aspera*. The two forms are parapatric and co-blooming near Malmesbury, where the purple-flowered morph grows on drier, more well-drained slopes than the typical, blue-flowered morph.

81. **Geissorhiza demissa** *Goldblatt & J.C.Manning* in Goldblatt *et al.* in Bothalia 39: 135 (2009). Type: South Africa, Northern Cape, upper southeastern slopes of Stalberg, 3 km S of Farm Welkom, among granite boulders, 1 370 m, 28 Oct. 2005, *Helme 3626* (NBG, holo.).

Plants delicate, 60–120 mm high, rarely with 1 short branch, stems puberulous but subglabrous below spike. *Corm* obliquely narrowly ovoid, ± 4 mm diam., with several cormlets at base, tunics woody, blackish, imbricate. *Leaves* 4, lower two basal, third leaf inserted shortly above ground, linear-falcate, reaching to ± base of spike, 0.7–1.0 mm wide, margins and main vein lightly thickened and narrowly winged, smooth, uppermost leaf cauline, largely to entirely sheathing. *Spike* 1- to 4-flowered; bracts green below, dry and brown in upper ½–⅔, outer ± 5 mm long, inner ± 4 mm long. *Flowers* actinomorphic, rotate, white with veins tinged blue below and reverse of outer tepals flushed blue in distal half; perianth tube funnel-shaped, ± 2.0 mm long; tepals subequal, obovate, 7–10 × 3.5 mm. *Filaments* erect, unequal, ± 3.5 mm long, uppermost 0.5 mm shorter, white; anthers 2–3 mm long; pollen ± white. *Style* dividing shortly beyond anthers, branches recurved, ± 0.5 mm long. *Flowering time*: late August to October, probably also in early November.



Distribution of ***Geissorhiza demissa***.

Distribution and ecology: recorded from the Kamiesberg in central Namaqualand, Northern Cape, South Africa, and in Western Cape on the plateau of the Gifberg near Vanrhynsdorp and in the Cold Bokkeveld; local and evidently uncommon in seasonally damp places in the shelter of granite boulders in the Kamiesberg or among sandstone rocks in the Western Cape mountains.

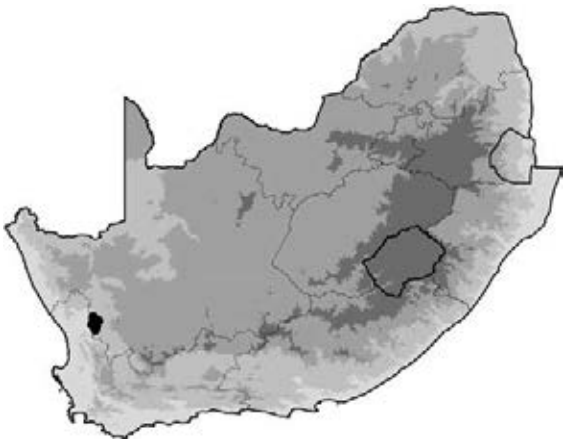
Diagnosis: closely allied to the common and widespread *Geissorhiza aspera*, *G. demissa* is a smaller plant rarely reaching 120 mm in height. It has the plane leaves with margins and main vein only lightly thickened, puberulous stem, and unequal stamens consistent with *G. aspera* but the smaller flowers have tepals only 7–10 mm long and anthers 2–3 mm long. The variable *G. aspera* typically has dark blue to violet flowers although northern populations from the Cederberg and Gifberg have white or bicoloured white and blue flowers. *Geissorhiza aspera* is typically larger in all respects and almost invariably branched, with leaf blades 2–7 mm wide, 2- to 7-flowered spikes, and stems that are puberulous up to the base of the spike, even in the northern, white-flowered populations. The unbranched stems of *G. demissa* are subglabrous below the spike and the leaves are never more than 1 mm wide. The flowers of the two species are similar in shape, but those of *G. aspera* are larger and nodding with horizontally oriented stamens and tepals 11–15 × 4–6 mm and anthers 2–5 mm long.

82. **Geissorhiza inaequalis** *L.Bolus* in South African Gardening and Country Life 20: 346 (1930); Goldblatt: 420 (1985). Type: South Africa, [Northern Cape], Klipkoppies 6 miles [± 9 km] from Nieuwoudtville, *L. Bolus s.n.* (BOL 19256, lecto., designated by Goldblatt 72: 420 (1985); BM, BOL, K, iso.).

Plants 120–250 mm high. *Corm* ovoid-globose, 6–8 mm diam., with several cormlets at base; tunics dark brown to ± black, imbricate, notched below. *Stem* ± erect or inclined, simple or 1- to 3-branched, lightly papillose-puberulous, usually bearing a short leafy bract from the upper node. *Leaves* usually 3, flat, sword-shaped, ± erect to falcate, margins and main vein slightly raised, smooth, shorter to somewhat longer than stem, 4–10 mm wide, lower two basal, third basal or inserted above ground and sheathing for some distance. *Spike* 2- to 7-flowered, usually flexed below first flower and secund; bracts green below, drying and becoming pale and membranous above, rarely ± brown at apex, 10–15(–18) mm long, spreading in upper ½, inner bract shorter than outer. *Flower* zygomorphic, light purple, white in throat and tube; perianth tube 2–3 mm long, funnel-shaped; tepals 20–23 × 4–6 mm wide. *Filaments* unilateral, declinate, unequal, two longer 8–10 mm long, shorter one 5–6 mm long; anthers inclined to horizontal, 5–6 mm long, one slightly shorter, white; pollen white. *Style* dividing near apex of anthers, branches ± 3 mm long, recurved. *Capsules* oblong, 5–8 mm long, ± 3.5 mm diam., shorter than bracts. *Chromosome number*, $2n = 52$. *Flowering time*: late August to early October.

Distribution and ecology: known only from the vicinity of Nieuwoudtville in Northern Cape, South Africa; restricted to dolerite outcrops in heavy clay ground.

Diagnosis: *Geissorhiza inaequalis* is evidently closely related to common and widespread Western Cape species *G. aspera*, and they can be difficult to distinguish when dry. Both have a similar habit, flat, sword-shaped leaves and minutely velvety stems. *Geissorhiza aspera* typically has deep blue-violet, less often white or purple flowers, and at flowering time the upper parts of the floral bracts are often dry and rusty brown. The stamens are only slightly unequal or nearly equal, whereas *G. inaequalis* has larger, pale purple flowers, and green or pale, membranous bracts at flowering time, the brown colouration developing only after the flowers fade. It also has one filament about half as long as the others and even one anther may be slightly shorter then the other two. *Geissorhiza inaequalis* may also be confused with *G. heterostyla*, which is similar in habit and has one short filament. The latter, however, has leaves that are ciliate along the raised margins and main vein, and a short, dry scale-like bract in the upper part of the stem. Dry material must be examined carefully to avoid misidentification. *Geissorhiza inaequalis* is unusual in the genus in being tetraploid, $2n = 52$.



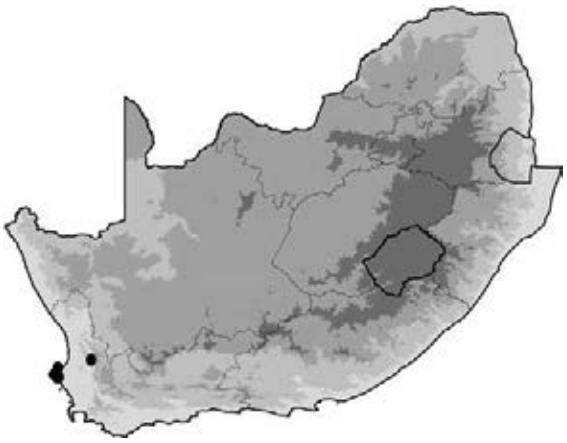
Distribution of ***Geissorhiza inaequalis***.

83. **Geissorhiza lewisiae** *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 45 (1941); Goldblatt & Manning 145: 209 (1985). Type: South Africa, [Western Cape], Langebaan, 7 Sept. 1932, *Lewis s.n.* (K, holo.; BOL 20303, iso.).

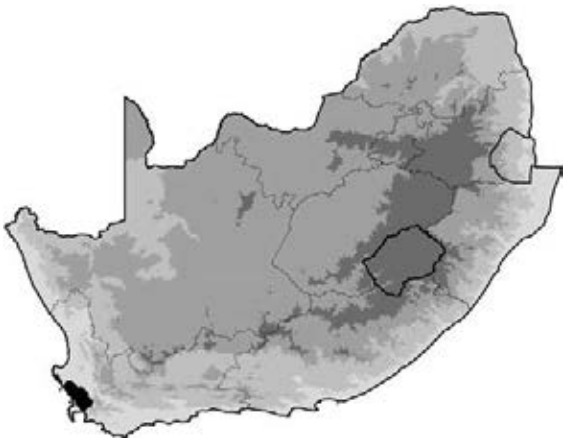
Plants 150–300 mm high. *Corm* narrowly ovoid, ± 4 mm diam., with several cormlets at base. *Stem* puberulous, often 1- sometimes 2-branched. *Leaves* usually 4, lower 2 basal, blades ± linear, mostly 2–4 mm wide, margins and central vein somewhat thickened and narrowly winged, smooth or wing margins and secondary veins ciliate-hairy, uppermost cauline leaf sparsely hairy to smooth. *Spike* nodding in bud, flexuose, (1)2- to 5-flowered, branches with fewer flowers; bracts green below, dry and brown in upper ½–⅔, outer 10–17 mm long, inner 8–12 mm long. *Flowers* nodding, zygomorphic, glossy dark violet, yellow-green at base of tepals and in throat narrowly edged darker violet; perianth tube funnel-shaped, ± 2 mm long; tepals subequal, oblanceolate, outer 15–18 × 7–8 mm, inner longer and narrower, 17–20 × ± 5 mm. *Filaments* unilateral, declinate, unequal, 6–8 mm long, uppermost ± 1.5 mm shorter than lower 2, violet, sometimes pale yellow-green at base; anthers 5–6 mm long, declinate, pale violet; pollen white or mauve. *Style* declinate, dividing opposite anther tips, branches 3–4 mm long. *Flowering time*: late August to end of September.

Distribution and ecology: largely restricted to the Saldanha District of Western Cape, South Africa, extending from Steenberg Cove to the Posberg Peninsula, also local in the upper Olifants River Valley; in rocky sites, on limestone or granite.

Diagnosis: *Geissorhiza lewisiae* is recognised by the relatively large, dark, blue-violet flowers with a pale, yellow-green throat, tepals 15–20 mm long, and unilateral, decumbent stamens with unequal filaments. The stem is minutely puberulous but the leaves are smooth except for the raised margins, which are usually minutely ciliate. It appears to be most closely related to *G. aspera* with which it is sometimes sympatric, but it is always distinguished by the larger flower size, unilateral, declinate stamens and style and more intense blue-violet pigmentation than *G. aspera*, the nodding flowers of which have tepals 11–15 mm long, and shorter, horizontally oriented stamens. Both species have one filament slightly shorter than the other two. *Geissorhiza lewisiae* occurs in two disjunct sets of populations, a northern one around Citrusdal in the Olifants River Valley, and a western set along the Western Cape Coast, from Steenberg Cove on St Helena Bay to Saldanha Bay. Although typically associated with granite



Distribution of ***Geissorhiza lewisiae***.



Distribution of ***Geissorhiza monanthos***.

outcrops, it also occurs on limestone pavement and calcrete in the vicinity of Saldanha Bay. It has been included in *G. monanthos*, but this species has flowers with a pale, translucent centre surrounded by a dark blue to purple or red zone, and curved, bicoloured filaments that are pale in the lower half but dark violet distally. The median filament in *G. lewisiae* is always conspicuously shorter than the others by some 1.5 mm.

84. **Geissorhiza monanthos** *Eckl.* in Topographisches Verzeichniss der Pflanzensammlung von C.F Ecklon: 21 (1827); Foster: 39 (1941) [as *G. monantha* (Thunb.) Eckl.]; Goldblatt: 422 (1985, including *G. lewisiae*). *Ixia monanthos* Thunb.: 226 (1811), illegitimate name not *I. monanthos* D.Delaroche (1766) (= *Sparaxis* sp.). Type: South Africa. [Western Cape], exact locality unknown, *Thunberg s.n.* [UPS–THUNB 975, lecto., designated by Goldblatt: 422 (1982)].

Plants 100–160(–250) mm high. *Corm* narrowly ovoid, ± 3.5 mm diam., bearing several cormlets at base; tunics imbricate, black, notched below. *Stem* minutely puberulous, simple or 1(2 or 3)-branched. *Leaves* 3 or 4, lower 2 ± basal, ± linear to narrowly sword-shaped, slightly shorter than stem, blade narrowed below, 1.5–4.0 mm wide, ± plane with central vein and margins slightly thickened, glabrous, uppermost leaf inserted in upper ⅓ of stem, much shorter than basal leaves. *Spike* inclined, 1- or 2(–5)-flowered, branches 1(or 2)-flowered; bracts green, becoming dry and brown in upper half, outer 10–13 mm long, inner 7–10 mm long. *Flowers* nodding, zygomorphic, violet with glossy translucent white centre broadly edged with a band of intense violet or red; perianth tube ± 2 mm long; tepals subequal, obovate, 14–18 × 9–12 mm, sometimes narrowed below and tepals windowed near bases. *Filaments* unilateral, declinate, unequal; lower two (6–)8–10 mm long, uppermost ± 1.5 mm shorter, slightly thicker in middle, curving upward distally, white below, distal ⅔ violet; anthers 5–6 mm long, ascending, violet; pollen white or brown. *Style* dividing opposite anther tips, branches recurved, 3–4 mm long. *Flowering time*: late August to late September.

Distribution and ecology: restricted to the Atlantic coastal forelands of Western Cape, South Africa, extending from Darling south and east to Malmesbury, Klipheuwel and Joostenberg; usually on gravelly, granite-derived soils.

Diagnosis: usually low growing and seldom reaching more that 160 mm in height, *Geissorhiza monanthos* is recognised by the distinctively coloured flowers, violet with a glossy translucent white centre broadly edged with a band of darker violet or red, and filaments that are white below but violet in the upper ⅔. The flowers are nodding and zygomorphic with decumbent stamens strongly curving upward distally so that the anthers are suberect. As its name suggests, the inclined to horizontal spikes bear few flowers, often only one but occasionally up to four. *Geissorhiza monanthos* may be most closely related to *G. lewisiae*, a taller species with spikes of 2 to 5 flowers that are violet with the bases of the tepals and throat yellow-green to white. The stamens of *G. lewisiae* are unilateral but nearly straight, with the filaments uniformly coloured, thus very different from those of *G. monanthos.* In addition, the leaves of *G. monanthos* have slightly raised margins and midvein and are always smooth, whereas those of *G. lewisiae* have raised and narrowly winged margins and central veins. The pollen of *G. lewisiae* is pale mauve or ± white but *G. monanthos* usually has red-brown or occasionally white pollen.

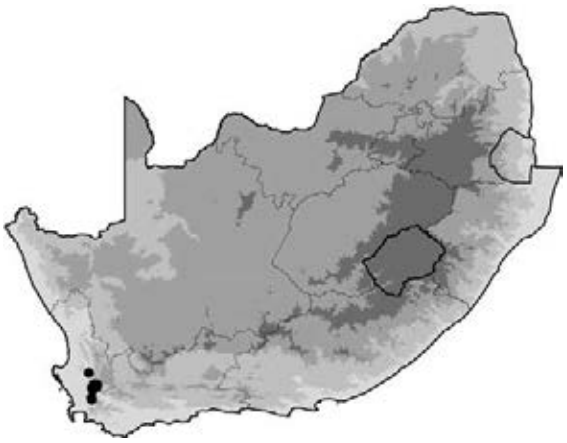
85. **Geissorhiza tulbaghensis** *F.Bolus* in Annals of the Bolus Herbarium 2: 160 (1918); Goldblatt: 424 (1985). Type: South Africa, [Western Cape], Tulbagh, *L. Bolus s.n.* (*BOL14851*, lecto., designated by Foster: 40 (1941); K, PRE, isolecto.).

Plants 70–150 mm high. *Corm* ovoid, symmetric, truncate at base, 5–8 mm diam.; tunics imbricate, blackish, outer layers regularly notched below into truncate sections. *Stem* suberect below, inclined above, minutely puberulous, flexed above leaf sheaths, simple or 1- or 2-branched from axils of cauline or basal leaf. *Leaves* 3 or 4, lower 2 or 3 basal, 2 lowermost narrowed below and petiole-like, third leaf sheathing base of stem, uppermost leaf cauline, partly sheathing stem, sometimes

± scale-like), blades sword-shaped to lanceolate, plane, shorter to slightly longer than stem, 1.5–10.0 mm wide, often sticky below and with soil adhering. *Spike* flexed at base, inclined, flexuose, 1(2)-flowered; bracts green below, brown and dry above, outer 10–18 mm long, inner slightly shorter. *Flowers* zygomorphic, half nodding, stamens unilateral, declinate, held above lowermost tepal, tepals white with maroon-red to brownish markings toward base; perianth tube funnel-shaped, 4–5 mm long; tepals subequal, ovate, 18–22 × 10–13 mm, inner 8–11 mm wide. *Filaments* equal, unilateral, declinate, 10–12 mm long; anthers 3.0–4.5 mm long, ± erect, dark purple; pollen dark red-brown. *Style* arching below stamens, branches ± 5 mm long. *Capsules* ovate-oblong, 6–8 mm long, enclosed in bracts. *Chromosome number* 2*n* = 26 + 1b. *Flowering time*: August to mid-September.

Distribution and ecology: restricted to the lower western slopes and foot of the Olifants River Mtns, Witzenberg and Bain's Kloof Mtns of Western Cape, South Africa, extending from the foot of Piekenierskloof Pass to Wellington and Tulbagh; on heavy, often stony clay soil in renosterveld.

Diagnosis: one of the most striking species of the genus, *Geissorhiza tulbaghensis* has large white flowers marked in the centre with maroon-red to brown. The flowers are half nodding and zygomorphic with the stamens and style unilateral and decumbent. Although similar vegetatively to *G. radians* and sharing with it very similar large zygomorphic flowers with declinate stamens and style, they are evidently unrelated: *G. tulbaghensis* has plane leaves and a puberulous stem typical of sect. *Planifoliae* whereas *G. radians* has the linear, 2-grooved leaves and ribbed leaf sheaths characteristic of sect. *Geissorhiza*. *Geissorhiza tulbaghensis* is distinctive not only in its flower coloration, but in the flat leaves with a slender petiole-like base. The flowers produce no nectar and are pollinated by the small horsefly, *Philoliche atricornis*, which also pollinates co-blooming species of Asteraceae.



Distribution of ***Geissorhiza tulbaghensis***.

Hybrids have been recorded between *Geissorhiza tulbaghensis*, blue-flowered *G. aspera* and pale yellow-flowered *G. erosa* near Porterville. The hybrids are morphologically variously intermediate between the parents.

Sect. 12. **Ciliatae** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 426 (1985) [as sect. *Ciliata*]. Type: *Geissorhiza. inflexa* (D.Delaroche) Ker Gawl.

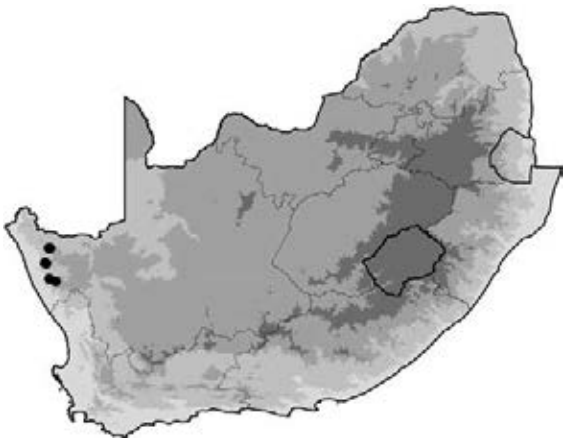
Geissorhiza subsect. *Pubescentes* Foster: 39 (1941). Type: *G. erosa* (Salisb.) Foster

Corm tunics woody with imbricate tunics, leaves with margins and main vein moderately to strongly raised and narrowly winged, edges ciliate-pubescent, sword-shaped to linear, bracts green below, dry and light brown to rust-coloured distally, flowers rotate to salver-shaped, actinomorphic, perianth tube short or long, reaching to apex of bracts, stamens equal or unequal.

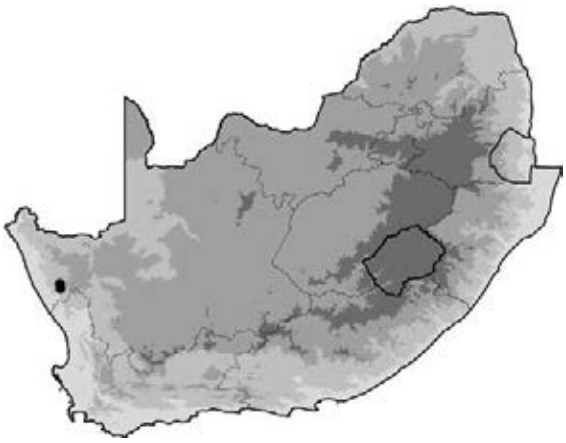
Species 19: winter rainfall Northern and Western Cape, South Africa.

86. **Geissorhiza namaquensis** *W.F.Barker* in Flowering Plants of South Africa 18: t. 688 (1938); Goldblatt: 426 (1985). Type: South Africa, [Northern Cape], Namaqualand, Klipfontein, *Phillips s.n.* (BOL 22163, holo.).

Plants (80–)120–300 mm high. *Corm* globose, 8–10 mm diam., slightly asymmetric with one side obliquely flattened below and extended downward shortly, tunics dark brown, imbricate, notched below into ± regular segments, drawn into points above. *Stem* suberect or inclined, flexed at base of spike, minutely and sparsely puberulous below, sometimes with 1 branch. *Leaves* usually 3, sometimes 4, lower 2 basal, ± as long as stem, 2–4 mm wide, third leaf cauline, sheathing below, shorter than basal, fourth leaf, if present, shortest and becoming scale-like, blades evidently flat but margins raised and narrowly winged, main vein also raised, with margins, main and sometimes secondary vein edges ciliate. *Spike* inclined, flexuose, 2- to 8-flowered; bracts green, becoming dry, membranous and pale near apex, outer mostly 8–12 mm long, inner smaller, enclosed by outer. *Flowers* actinomorphic, salver-shaped, blue to blue-mauve; perianth tube cylindric, widening near throat, (7)8–11 mm long, reaching apex or just exceeding bracts; tepals elliptic, 14–18 × ± 4 mm. *Filaments* erect, equal, 5–6 mm long; anthers usually 4–6 mm long, yellow; pollen yellow. *Style* dividing opposite middle to upper ⅓ of anthers, often tilted downward, branches 2–3 mm long. *Capsules* globose, 6–8 mm long. *Flowering time*: mid-September to October.



Distribution of ***Geissorhiza namaquensis***.



Distribution of ***Geissorhiza namaquamontana***.

Distribution and ecology: endemic to Northern Cape, South Africa, extending from the southern Richtersveld to the Spektakel Mtns west of Springbok and on the escarpment west of Kamieskroon in central Namaqualand; on stony slopes often associated with shale or quartzite in renosterveld vegetation.

Diagnosis: one of three species of *Geissorhiza* endemic to Namaqualand, *G. namaquensis* is recognised by the well-developed perianth tube, mostly 8–11 mm long, minutely velvety stem, and leaves with raised, narrowly winged margins and main vein, both ciliate on the edges. The flowers are bright blue to blue-mauve with tepals 14–18 × 4 mm. Closely related *G. namaquamontana*, from the Grootberg and Kamiesberg, has smaller flowers with a perianth tube 6–7 mm long, tepals (6–)8–10 × 1.5–2.0 mm, and anthers 2–3 mm long. Long-tubed *G. kamiesmontana*, which is restricted to the Kamiesberg, has a longer perianth tube, 18–25 mm long, and dark violet flowers with longer, narrower tepals 16–20 × 3 mm.

87. **Geissorhiza namaquamontana** *Goldblatt & J.C.Manning* in South African Journal of Botany 111: 300 (2017). Type: South Africa, Northern Cape, Grootberg, 21 km SW of Kamieskroon, mid to upper southern slopes NE of Farm Naries, seasonally damp soils at base and between granite boulders, locally common, 700–860 m, 28 Sept. 2016, *Helme 8822* (NBG).

Plants 80–160(–250) mm high. *Corm* ± globose with oblique flattened side; tunics dark brown, imbricate. *Stem* puberulous, simple or 1- or 2-branched. *Leaves* 3 or 4, rarely 5 if plants with more than a single branch, lower 2 basal, ± as long as stem, 2–4 mm wide, remaining leaves cauline, sheathing below, shorter than basal, blades 1.5–3.0 mm wide, evidently flat but margins raised and narrowly winged, main vein also raised, with margins, main and sometimes secondary vein edges ciliate. *Spike* 1- to 3(5)-flowered; bracts green below, dry distally, often turning brown near tips, outer subacute, margins membranous, 7–10 mm long, inner slightly shorter. *Flowers* actinomorphic, salver-shaped, blue, base of tepals and throat white; perianth tube cylindric, widening near throat, 6–7 mm long, shortly exceeding bracts; tepals narrowly lanceolate (sublinear), (6–)8–10 × 1–2 mm. *Filaments* erect, equal, 4–5 mm long; anthers 2–3 mm long, white or yellow; pollen white or yellow. *Style* dividing opposite middle to apex anthers, often tilted downward, branches ± 1 mm long. *Capsules* ovoid?, 3(4) mm long. *Seeds* unknown. *Flowering time*: mid-September to mid-October.

Distribution and ecology: endemic to Namaqualand in Northern Cape, South Africa, restricted to upper elevations above 700 m in the Kamiesberg near Leliefontein, on Rooiberg and on Grootberg to the west; in renosterveld vegetation on granite outcrops and granitic sands, sometimes in seeps on moss pads.

Diagnosis: like those of the other members of the *Geissorhiza namaquensis* group, the leaves of *G. namaquamontana* are narrowly sword-shaped to nearly linear, with the margins narrowly winged and ciliate and the main vein and sometimes a second pair of veins raised and similarly ciliate. There seems no difference in the leaves among the group except for overall size and number. Whereas four leaves are usual, some plants have only three leaves and one from Grootberg with multiple branches has a small fifth leaf. The point of division on the style seems to vary in *G. namaquamontana*, dividing opposite the middle to upper third of the anthers in the two Kamiesberg populations but opposite or shortly above the anther apices in the Grootberg plants which have white anthers and pollen. The style branches in both sets of populations are short, ± 1 mm long. A note on *Helme 3310* from the Kamiesberg states that the anthers and pollen are yellow. The differences between the Kamiesberg and Grootberg plants may simply be due to genetic drift or may signal that there are two separate taxa here. Additional field work in Namaqualand is needed.

88. **Geissorhiza kamiesmontana** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 427 (1985). Type: South Africa, [Northern Cape], Kamiesberg, E slopes of Rooiberg near Welkom, *Goldblatt 5770* (MO, holo.; K, NBG, PRE, WAG, iso.).

Plants mostly 150–300 mm high. *Corm* ± globose, somewhat asymmetric with one side flattened obliquely below, ± 10 mm diam.; tunics dark brown, imbricate, notched below into ± regular sections, drawn into points above. *Stem* minutely velvety, 1- or 2-branched. *Leaves* 3 or 4, lower 2 basal, upper 1 or 2 cauline, uppermost (when present) smallest, becoming scale-like, blades sword-shaped, reaching to ± base of spike, 2–3 mm wide, margins lightly raised and extending at right angles to blade, main vein raised and winged, velvety on edges of margins, main and secondary veins. *Spike* 1- to 4-flowered; bracts becoming dry from apex, turning brown above, outer 12–18(–21) mm long, inner enclosed by much longer outer bracts. *Flowers* salver-shaped, deep blue with pale throat and tube; perianth tube cylindric, widening near mouth, 18–25 mm long; tepals elliptic, 16–20 × ± 3 mm. *Filaments* suberect, equal, 8–10 mm long; anthers 3–4 mm long, yellow; pollen yellow. *Style* dividing opposite lower ⅓ of anthers, branches ± 2.5 mm long, reaching only to middle of anthers. *Capsules* ellipsoid, 6–9 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: September.

Distribution and ecology: restricted to the Kamiesberg of Namaqualand in Northern Cape, South Africa; at middle elevations on granite outcrops, often in moss pads in shallow soil near seasonal water sources.

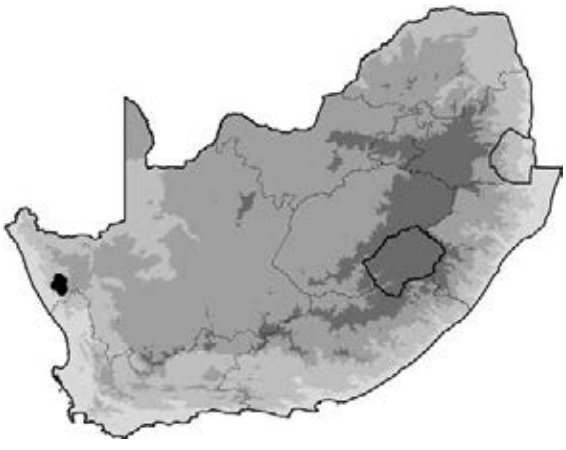
Diagnosis: *Geissorhiza kamiesmontana* is distinguished by its deep blue flowers, paler in the throat, with an elongate perianth tube, 18–25 mm long, shortly exceeding the long floral bracts. The style is relatively short, dividing opposite the lower third of the anthers. The stem and leaves have a heavy, almost velvety, pale pubescence. Both *G. namaquensis* and *G. namaquamontana* are vegetatively similar, with puberulous stems and leaves with raised and winged margins, but their flowers are paler blue to blue-mauve, with a shorter perianth tube only 6–11 mm long.

89. **Geissorhiza divaricata** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 428 (1985). Type: South Africa, [Northern Cape], W of Nieuwoudtville, among rocks in fynbos, *Goldblatt 5838* (MO, holo.; K, NBG, iso.).

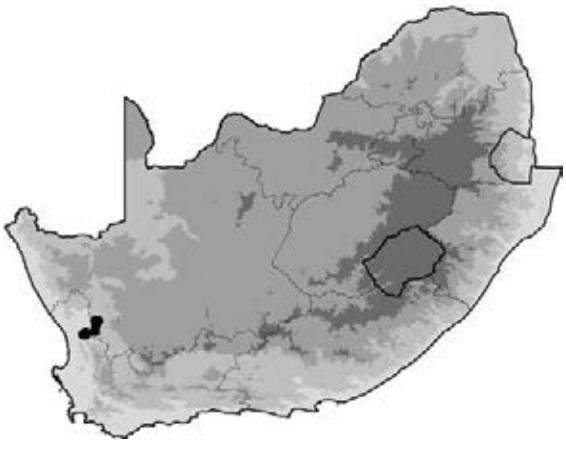
Plants (150–)220–450 mm high. *Corm* ± ovoid, obliquely flattened below, 10–12 mm diam.; tunics blackish, imbricate, notched below into sections. *Stem* usually bearing 1 or more short, dry, sheathing membranous scale-like bracts, usually branched from these nodes, also sometimes from cauline leaf axil, sharply flexed above nodes and at base of spike, sheathed at base by brown, persistent, fibrous leaf bases. *Leaves* 3, lower 2 basal, ½ to ± as long as stem, uppermost leaf inserted in middle of stem, sheathing upper half of stem for ½–⅔ its length, blades linear to sword-shaped, 2–3 mm wide, margins thickened and extended at right angles to blade, main vein also raised and winged, and one or two pairs of secondary veins enlarged, margin edges and veins ciliate-pubescent. *Spike* flexed at base, flexuose, inclined, (2)3- to 6-flowered; bracts dry-membranous, brown at flowering, flexed outward in upper half, outer ± 5.5 mm long, inner slightly shorter. *Flowers* actinomorphic, rotate, violet or white to pale mauve, reddish purple on reverse of outer tepals; perianth tube 1–2 mm long; tepals ovate-elliptic, ± 10 × 4 mm wide. *Filaments* erect, equal, ± 3 mm long; anthers 3–4 mm long. *Style* dividing opposite upper ⅓ of anthers. *Capsules* globose, 4–5 mm long. *Flowering time*: September.

Distribution and ecology: restricted to the Bokkeveld Mtns in Northern Cape, South Africa and the Gifberg in Western Cape; in rocky sandstone ground in fynbos.

Diagnosis: *Geissorhiza divaricata* is apparently very closely allied to *G. subrigida*, also restricted to the Bokkeveld Mtns. The two are distinctive in having a sheath of fibres



Distribution of ***Geissorhiza kamiesmontana***.

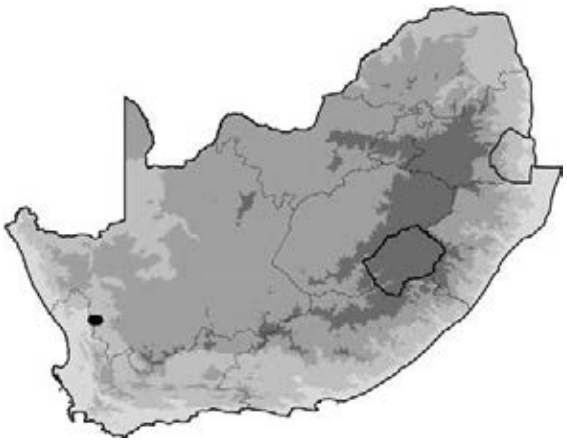


Distribution of ***Geissorhiza divaricata***.

around the stem base, smooth stems, ciliate to pubescent and ribbed leaves, divaricate branching, and brown, membranous stem bracts. These shared similarities have tended to obscure their differences. *Geissorhiza divaricata* has small white to pale mauve or blue flowers with a perianth tube 1–2 mm long and tepals ± 10 mm, while *G. subrigida*, a shorter plant, has larger blue to violet flowers with perianth tube 3–4 mm long and tepals 12–17 mm long. Both grow in rocky sandstone ground but have not been recorded growing together. Plants included in *G. divaricata* from the Gifberg collected to date have either simple or 1-branched stems and lack the distinctive dry stem bracts found in those from the Bokkeveld Mtns.

90. **Geissorhiza subrigida** *L.Bolus* in South African Gardening and Country Life 22: 275 (1932); Goldblatt: 430 (1985). Type: South Africa, [Northern Cape], near Nieuwoudtville, ex hort. L. Bolus, Cape Town, *Buhr s.n.* (BOL 19995 [as 19943], holo.; K, PRE, iso.).

Plants 120–300 mm high. *Corm* ± ovoid, obliquely flattened below, 10–15 mm diam.; tunics blackish, imbricate, notched below into sections. *Stem* with a short, dry, membranous, sheathing scale-like bract in upper ⅓, usually branched at this node, also sometimes at axil of cauline leaf, flexed at nodes and base of spike, sheathed below by a fibrous collar of persistent leaf bases. *Leaves* 3, lower 2 basal, uppermost cauline, inserted in middle of stem, ½ to ± as long as stem, 3–6 mm wide, margins thickened and extending at right angles to blade, main vein also raised and winged and at least two other pairs of veins enlarged, ciliate to pubescent on veins and margin edges. *Spike* flexed at base, inclined, flexuose, (2)3-flowered; bracts ± dry, membranous and brown at flowering time, outer 6–10 mm long, flexed outward in upper half, inner slightly shorter. *Flowers* actinomorphic, rotate, violet, pale in throat and tube; perianth tube 2–3 mm long; tepals ovate-elliptic, 12–17 × 6–7 mm. *Filaments* erect, equal, ± 4 mm long; anthers 4–5 mm long. *Style* dividing opposite upper ⅓ of anthers, becoming decumbent. *Capsules* globose, ± 4 mm long. *Flowering time*: August to mid-September.



Distribution of ***Geissorhiza subrigida***.

Distribution and ecology: a narrow endemic of the Bokkeveld Mtns near Nieuwoudtville in Northern Cape, South Africa; on rocky sandstone ground, flowering well after fire.

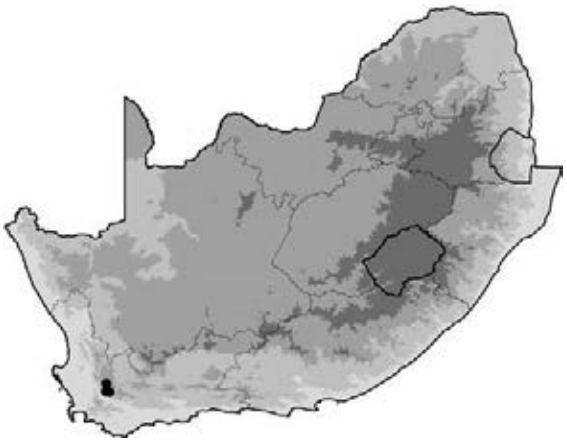
Diagnosis: *Geissorhiza subrigida* stands out in its comparatively large blue to violet flowers, strongly ciliate-pubescent leaves, and a divaricate branching pattern. It is closely allied to the more widespread *G. divaricata*, which is similar in vegetative morphology, also with a divaricate branching pattern, but has smaller, white to pale mauve flowers. The leaves of *G. subrigida* and *G. divaricata*, with raised and flattened margins and the raised and winged midrib, both ciliate on their edges, are similar to several other species of sect. *Ciliatae*, in which the two species stand out in their divaricate branching, the presence of a bract-like scale on the stem, and equal stamens.

91. **Geissorhiza scopulosa** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 414 (1985). Type: South Africa, [Western Cape], Hex River Mtns, Milner Ridge Peak, 4 000–5 000 ft [1 200–1 500 m], *Esterhuysen 9328* (BOL, holo.; NBG, PRE, iso.).

Plants 80–150(–200) mm high. *Corm* globose, 8–10 mm diam.; tunics brown, firm to soft-membranous, imbricate, regularly notched below. *Stem* upright or inclined, simple, minutely ciliate-papillose, bearing a sheathing scale-like bract in upper ⅓. *Leaves* 3, lower 2 basal, lowermost longest, reaching at least to base of spike, sheath sticky and with sand adhering, second leaf sheathing lower part of stem for a short distance, uppermost inserted in upper part of stem, short, sheathing for at least ½ its length, blades linear, 1–2 mm wide, margins raised as narrow wings at right angles to lamina, main vein thickened. *Spike* inclined, flexuose, 2- to 5(–7)-flowered; bracts green in bud, becoming dry and membranous above, outer 3.5–5.0 mm long, inner slightly shorter. *Flowers* actinomorphic, rotate, pale blue-violet, creamy white in throat and tube; perianth tube funnel-shaped, 3–4 mm long, reaching or shortly exceeding bracts; tepals elliptic, 8–9 × ± 3 mm. *Filaments* suberect, unequal, longer two ± 3 mm long, shorter one ± 2 mm long; anthers ± 2.3 mm long, yellow. *Style* dividing opposite upper ⅓ of anthers, branches ± 1 mm long. *Capsules* globose, up to 4 mm long, included in bracts. *Seeds* unknown *Flowering time*: November.

Distribution and ecology: restricted to high elevations in the Hex River Mtns of Western Cape, South Africa; in damp rocky sites, on cliffs and under boulders, usually south-facing at 1 200–1 800 m elevation.

Diagnosis: *Geissorhiza scopulosa* superficially resembles *G. ramosa* in the small, short-tubed flowers and general appearance but is a smaller plant with ciliate-papillose stems and is rarely branched, whereas *G. ramosa* has smooth stems and is almost invariably branched, sometimes with up to three or four branches.



Distribution of ***Geissorhiza scopulosa***.

Geissorhiza scopulosa is vegetatively more like the small-flowered species of sect. *Ciliatae*, in which most species also have ciliate-papillose to puberulous stems. The leaves of *G. scopulosa* have the margins raised into broad wings but the main vein hardly thickened, the blade thus H-shaped in section, a feature also consistent with several species of the sect. *Ciliatae*.

92. **Geissorhiza heterostyla** *L.Bolus* in South African Gardening and Country Life 20: 346 (1930); Goldblatt: 430 (1985). Type: South Africa, [Western Cape], near Whitehill, *L. Bolus s.n. BOL19148* (BOL, lecto., designated by Goldblatt: 430 (1985); BM, BOL, K, isolecto.).

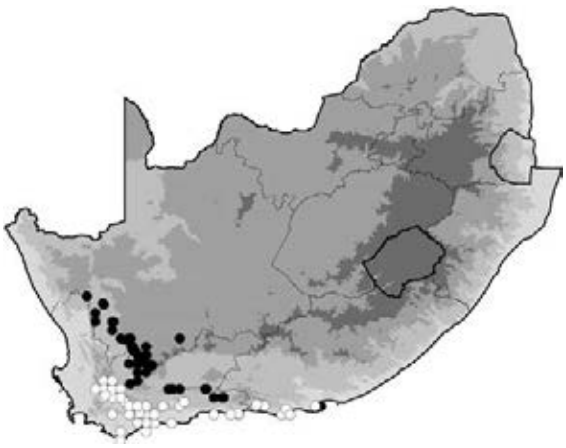
Plants 120–450 mm high. *Corm* ovoid, symmetric, 9–12(–15) mm diam.; tunics blackish, woody, outer accumulating above, notched regularly into segments below. *Stem* puberulous to ciliate (subsp. *heterostyla*) or smooth (subsp. *rosea*), simple or more often branched, bearing membranous, often dry, sheathing bract-like leaf in upper part, usually branching from this axil, or also from axil of sheathing leaf. *Leaves* 3, linear to sword-shaped, lower 2 basal, ½ to ± as long as stem, 2–5 mm wide, I-shaped (to almost H-shaped) in section with margins raised at right angles to blade, ciliate on edges, midrib also raised and ciliate, uppermost basal or cauline, sheathing for most of its length, several ribbed on sheath. *Spike* mostly 3- to 7-flowered, flexed at base, inclined, flexuose; bracts 7–10(–15) mm long, initially pale green with hyaline margins, but drying from apex and becoming transparent, or flushed red or brown, inner shorter than outer. *Flowers* either zygomorphic, nodding, blue to violet (occasionally white) or actinomorphic and upright to half nodding, white, pale pink to pale mauve; perianth tube funnel-shaped, 1–2 mm long; tepals obovate to ellipsoid, 10–18(–22) × 6–9 mm. *Filaments* either unilateral, declinate or ascending, unequal, two longer usually 4–6 mm long, shorter one usually 3–4 mm long; anthers (2.5–)4.0–6.0 mm long, yellow or blue-black. *Style* usually long, dividing opposite upper half or beyond anther tips, branches usually long (rarely short, dividing opposite base of anthers and branches short). *Capsules* globose, 5–8 mm long. *Chromosome number* 2*n* = 26, 26 + 2b. *Flowering time*: August to early October.

Distribution and ecology: widespread through the Greater Cape Floristic Region, extending from the Langberg and Kubiskou Mtns in the western Karoo in Northern Cape, South Africa, through the Roggeveld and Witteberg in Western Cape and along the South Coast as far east as Port Elizabeth in Eastern Cape; on various soils, often on heavy clay or in stony sandstone ground in well-drained sites, also on limestone substrates.

Diagnosis: *Geissorhiza heterostyla* was based on plants from Whitehill in the western Karoo, individuals of which were variable for style length, hence the specific epithet. Plants had variously long styles dividing beyond the apex of the anthers, medium styles dividing at anther level, or short styles, dividing below the anthers. Other distinguishing features are the puberulous stem, submembranous sheathing, bract-like scale on the upper part of the stem, and leaves with raised, narrowly winged, ciliate margins (leaves I-shaped in section). Flowers are half to fully nodding and zygomorphic with the stamens unilateral and lying above the lower tepals or more-or-less upright with ascending, symmetrically arranged stamens. The stamens are consistently unequal, one filament 1–2 mm shorter than the other two, and the style arches downward to lie beneath the stamens.

Collections from near the type area and elsewhere either consist of plants with unequal styles or all plants in the population have long styles but otherwise match the species. Populations mixed or uniform for style length have now been collected across the western half of its range and while it appears likely that populations with uniformly long styles are the same species, the variation in style length is remarkable. All populations from the eastern end of the range examined have long styles.

The Witteberg, Ceres and Hex River Valley populations of *Geissorhiza heterostyla* are generally less robust than



Distribution of ***Geissorhiza heterostylya*** subsp. ***heterostyla***, ●; subsp. ***rosea***, ○.

plants from the western Karoo (though not invariably so), and match the type of *G. rogersii* (from the Hex River Mtns) in having leaves with less strongly raised margins and almost invariably smooth stems. One curious feature of the species is that the northern and usually larger-flowered populations have pollen grains with ancestral type apertures, whereas those from the south of its range have derived, complex apertures. This inconsistency plus the stems, which are not invariably hairy, renders the circumscription of *G. heterostyla* ambiguous. It seems useful to separate the smooth-stemmed plants as a separate subspecies, subsp. *rosea*.

Key to subspecies

1a Stems ciliate-papillate (rarely smooth); stamens unilateral and decumbent with blue-grey to white anthers; flowers usually blue to violet with white throat edged violet (rarely white to mauve) . . . . . 91a. subsp. *heterostyla*

1b Stems smooth (rarely sparsely ciliate-papillate); stamens mostly suberect with yellow anthers; flowers often uniformly white, or pale pink or pale mauve . . . . . 91b. subsp. *rosea*

92a. subsp. **heterostyla**

Geissorhiza rogersii N.E.Br.: 452 (1931). Type: South Africa, [Western Cape], Worcester, between Osplaats and Tunnel Sidings, 600–900 m, *Rogers 16725* (K, lecto., designated by Goldblatt: 430 (1985); J, K, isolecto.).

Distribution and ecology: extending from the Langberg and Kubiskou Mtns west of Loeriesfontein across the Bokkeveld Plateau, Roggeveld and Klein Roggeveld in Northern Cape and across the Matjiesfontein-Witteberg Karoo to the Swartberg and Little Karoo; often in dolerite or shale-derived clay or sandstone.

Plants with stem minutely pubescent-papillate; flowers zygomorphic, nodding with decumbent stamens, tepals mostly blue to violet with yellow-green throat edged darker violet, less often pale blue or white; stamens and pollen mostly grey-blue (or white).

92b. subsp. **rosea** *(Klatt) Goldblatt & J.C.Manning* in South African Journal of Botany 106: 32 (2016). *Hesperantha rosea* Klatt: 395 (1882). *Geissorhiza rosea* (Klatt) Foster: 48 (1941), illegitimate homonym, not *G. rosea* Eckl. (1827) [= *G. erosa* (D.Delaroche) Ker Gawl.]. Type: South Africa, [Western Cape], Knysna, *Newdegate s.n.* (B: Herb. Lubeck, holo.).

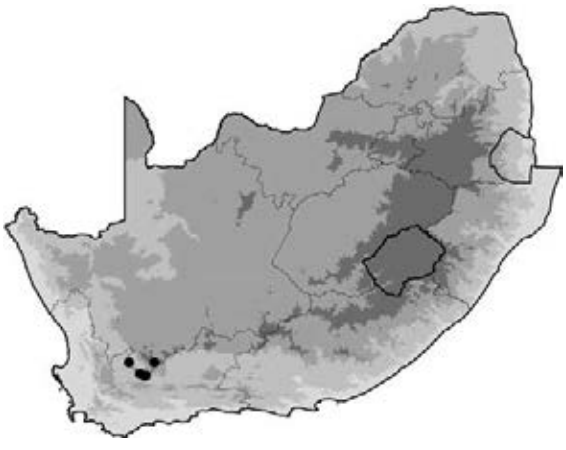
Plants with stem smooth and hairless; flowers more-or-less actinomorphic, upright to half nodding with suberect stamens, tepals mostly white, then sometimes pink outside, or pale mauve to pale pink; stamens and pollen mostly yellow or white.

Distribution and ecology: extending across the southern coast and near interior of Western Cape, from Worcester and the Robertson Karoo to Knysna and along to Eastern Cape Coast from Plettenberg Bay to Port Elizabeth; mainly in clay or limestone.

93. **Geissorhiza cantharophila** *Goldblatt & J.C. Manning* in Goldblatt et al. in Bothalia 39: 137 (2009). Type: Western Cape, Klein Roggeveld, 26.5 km north of N1 on road to Sutherland from Matjiesfontein, Farm Fortuin, 26 Aug. 2006, *Goldblatt & Porter 12704* (NBG, holo.; MO, PRE, iso.).

Plants 250–450 mm high. *Corm* ovoid, 8–10 mm diam.; tunics imbricate, blackish. *Stem* sparsely short-hairy, usually 1- to 3-branched, with a sheathing, bract-like scale up to 10 mm long in upper ⅓. *Leaves* 3, lower 2 with suberect to falcate blades, upper leaf sheathing stem but free distally, blades linear, margins raised into broad wings held at right angles to blade, main vein raised and bearing winged edges parallel to blade surface, ciliate on wing edges of margins and main vein. *Spike* inclined, flexuose, 3- to 6-flowered; outer bract dull grey-green in bud with submembranous margins, drying pale straw with age, ± 10 mm long, inner ± opaque-membranous with 2 dark green keels, ± 2 mm shorter than outer, apically forked. *Flowers* actinomorphic, rotate, bright, glistening pink (turning blue on drying) with a glossy, dark purple central zone, filaments and style also dark purple; perianth tube funnel-shaped, 2.0–2.5 mm long; tepals subequal, ovate, spreading, ± 15 × 7 mm. *Filaments* suberect, unequal, 4–5 mm long, one ± 1 mm shorter than other two; anthers 5–8 mm long, mauve-pink to purple; pollen pale pink (yellow when dry). *Style* slender, short, ± 3 mm long, dividing opposite lower ⅓ of filaments, branches ascending, ± 3 mm long, extending between anthers. *Capsules* subglobose, 3-lobed, 6–7 mm long. *Flowering time*: late August to mid-September, occasionally until early October; opening late morning and closing in late afternoon.

Distribution and ecology: restricted to the southern Roggeveld and Klein Roggeveld in Northern Cape and



Distribution of ***Geissorhiza cantharophila***.

adjacent Western Cape, South Africa; most often on south-trending slopes or flat ground on shale and clay.

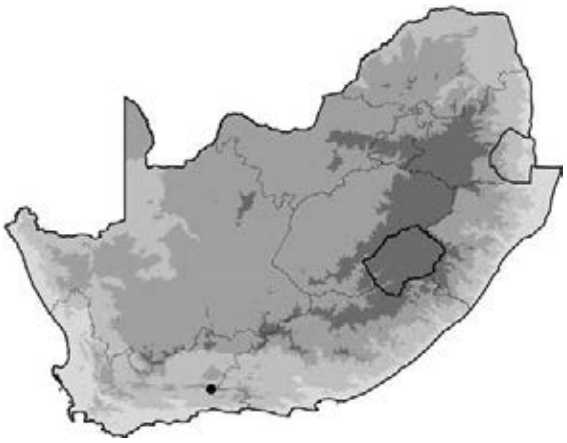
Diagnosis: with corms typical of subg. *Geissorhiza*, *G. cantharophila* is distinguished by the two basal leaves with narrowly winged margins and a raised and winged central vein exactly like those of its presumed immediate relative *G. heterostyla*, and it also has the derived pollen grains with complex aperture and operculum often found in that species. In living plants, the glistening purple-pink flowers with a dark purple centre, purple filaments and a short purple style are unmistakable. The style, ± 3 mm long, divides opposite the lower third of the filaments and the nearly straight style branches are unusual in the subgenus and probably associated with its pollination by hopliine beetles, species of which have been captured on the flowers.

Vegetatively almost identical, widespread *Geissorhiza heterostyla* is particularly difficult to distinguish from *G. cantharophila* in the herbarium but alive the blue to mauve or almost white flowers, pale yellow to green in the throat and tube usually edged in darker blue or mauve, and ± white stamens and style branches make it easy to separate the two species.

94. **Geissorhiza reclinata** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 39: 139 (2009). Type: Western Cape, Swartberg, Meiringspoort, SW trending slopes among sandstone rocks, 16 Aug. 2002, *Goldblatt & Porter 12057* (NBG, holo.; MO, PRE, iso.).

Plants 80–120 mm high. *Corm* ovoid, ± 8 mm diam.; tunics imbricate, dark brown, fragmenting below into tile-like sections. *Stem* sparsely short-hairy or sometimes ± smooth in upper ⅓, usually 1- to 3-branched, bearing sheathing scale-like bract up to 10 mm long in upper ⅓. *Leaves* mostly 3, lower 2 ± prostrate, blades linear, 80–120 × 1.5–2.0 mm, margins and main vein raised into narrow wings held at right angles to blade, wings sparsely ciliate, upper leaf sheathing stem below, free distally. *Spike* flexed at base and inclined, flexuose, 1- to 3-flowered; bracts unequal, green flushed purple above, margins membranous, outer ± 10 mm long, inner ± 8 mm long, apex entire. *Flowers* zygomorphic, held at ± 45° from vertical, blue-mauve (turning pale lilac on drying), greenish yellow in tube, upper 3 tepals dark blue-purple at base, filaments and style pale blue; perianth tube funnel-shaped, ± 2 mm long; tepals narrowly ovate, subequal, spreading, 14–16 × 7 mm. *Filaments* unilateral, declinate, unequal, two longer 10–12 mm long, shorter one 8–9 mm long; anthers 5–8 mm long, pale mauve-pink; pollen pale yellow (brown when dry). *Style* declinate, lying beneath filaments, dividing opposite anther tips, branches ± 1.5 mm long, extending above anthers. *Flowering time*: mid-August to mid-September, later at higher elevations.

Distribution and ecology: endemic to the eastern Swartberg in Western Cape, South Africa, where it is known only from Meiringspoort east of Oudtshoorn; on moist, peaty sand on southwest-trending slopes among sandstone rocks, flowering well after fire.

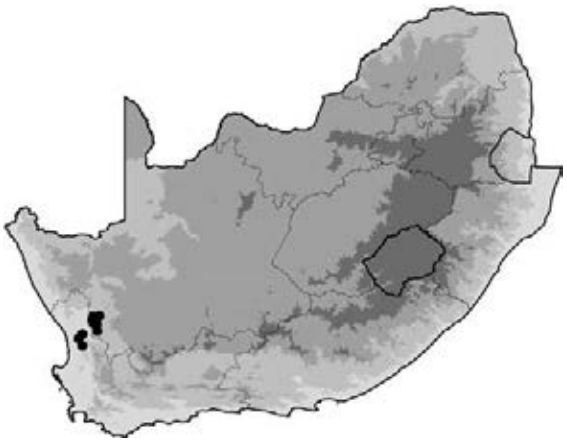


Distribution of ***Geissorhiza reclinata***.

Diagnosis: the dark brown, overlapping corm tunics and unequal filaments place *Geissorhiza reclinata* in subg. *Geissorhiza*, where it was initially compared with the Cape mountain species *G. pseudinaequalis* and *G. scopulosa* of sect. *Monticolae* partly because of the zygomorphic flowers with unilateral, declinate stamens and style and the upper tepals with dark markings near the base. However, it has pollen grains with specialised apertures known only in sect. *Ciliatae*, where it may be allied to *G. heterostyla* subsp. *heterostyla*, also with zygomorphic flowers. The sparsely short-hairy stems and leaves with the margins and central vein winged with ciliate wing edges likewise are consistent with *G. heterostyla* and other species of sect. *Ciliatae*. Unusual in subg. *Geissorhiza*, the basal leaves are prostrate and the stamens are unusually long, the two long filaments 10–12 mm long. The relatively large flowers have a perianth tube ± 2 mm long and tepals 14–16 mm long.

95. **Geissorhiza arenicola** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 434 (1985). Type: South Africa, [Northern Cape], sandy wet heathland west of Nieuwoudtville, *Goldblatt 7056* (MO, holo.; K, NBG, PRE, S, iso.).

Plants 120–260 mm high. *Corm* globose, symmetric, 6–10 mm diam.; tunics blackish, imbricate, woody, notched into regular segments below. *Stem* finely puberulous above third leaf, smooth below, occasionally with 1 branch, without a sheathing, bract-like cauline leaf. *Leaves* 3, narrow, linear, 1–2 mm wide, reaching to between middle of stem and base of spike, margins and main vein enlarged and thus 2-grooved on each surface, edges of margins and main vein minutely ciliate or evidently smooth, often sticky below with adhering sand, lower 2 leaves basal, uppermost inserted shortly above ground, often largest, sheathing stem for ⅔ of its length, sheath several ribbed, somewhat inflated. *Spike* flexuose, inclined, (1–)3- to 8-flowered; bracts green, margins



Distribution of ***Geissorhiza arenicola***.

often lined with red above, sometimes becoming dry and membranous from apex, 7–9 mm long, inner shorter and much narrower than outer. *Flowers* actinomorphic, rotate, deep blue-mauve with pale throat or white; perianth tube funnel-shaped, 1.5–2.0 mm long, enclosed in bracts; tepals elliptic, 10–15 × 4–8 mm. *Filaments* suberect, unequal, two longer 3–4 mm long, shorter one 2.0–2.5 mm long; anthers 3–5 mm long, white or pale yellow. *Style* dividing opposite or beyond anther tips, branches ± 2 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: September to mid-October.

Distribution and ecology: occurring on the Bokkeveld Mtns in Northern Cape and the Gifberg and northern Olifants River Mtns in Western Cape, South Africa; in stony sandstone ground.

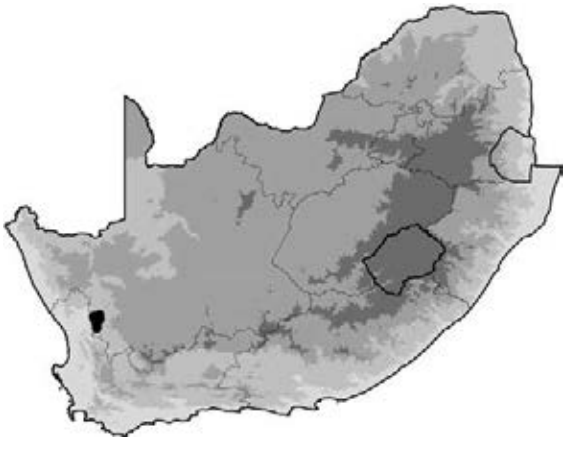
Diagnosis: *Geissorhiza arenicola* is recognised by the puberulous stem (usually smooth below), two basal leaves with thickened margins and raised and thickened central vein, minutely ciliate on the edges and slightly sticky on the raised surfaces. The third leaf is largely sheathing, the sheath slightly inflated and distinctly ribbed. The flowers are usually deep blue and relatively large, with tepals mostly 12–15 mm long, and the filaments are unequal. Populations in the southern Bokkeveld Mtns are unusual in having uniformly white flowers. *Geissorhiza arenicola* is most easily confused with the more widespread and usually smaller-flowered *G. aspera* but is apparently related to the dark blue-flowered *G. splendidissima*, with which it shares a puberulous stem, a strongly ribbed and grooved upper leaf sheath, short perianth tube, and basal leaves with strongly raised margins and midrib, the edges of which are usually lightly ciliate.

96. **Geissorhiza splendidissima** *Diels* in Botanische Jahrbücher für Systematik 44: 117 (1909); Goldblatt: 435 (1985). Type: South Africa, [Western Cape], Oorlogskloof, *Diels 627* (B, holo.).

Plants 80–200 mm high. *Corm* ovoid, truncate at base, 7–10 mm diam.; tunics dark brown to black, imbricate, outer layers notched below into regular truncate sections. *Stem* suberect, densely minutely puberulous, simple or with 1(2) branch(es), with short sheathing scale-like bract in upper ⅓. *Leaves* 3, lower 2 basal, lowermost longest, shorter to slightly longer than stem, blades linear, mostly 1.5–2.0 mm wide, margins raised and extended at right angles to blade, main vein thickened, blade thus narrowly 2-grooved on each surface, edges of margins and midrib minutely ciliate, slightly sticky and with sand adhering, uppermost leaf inserted shortly above ground, sheathing below, with inflated sheath. *Spike* flexuose, flexed at base and inclined, mostly 2- to 5-flowered; bracts initially green, becoming dry and brown from apex, outer 16–20(–25) mm long, inner 8–16 mm long. *Flower* zygomorphic, glossy deep blue, darker toward base of tepals, yellow-green in throat, tepals widely cupped and tilted 30°, stamens unilateral and declinate, held above lowermost tepal; perianth tube funnel-shaped, 2–4 mm long; tepals broadly ovate, 15–22 × 9–14 mm, inner 8–12 mm wide. *Filaments* equal, unilateral, declinate, ± 5 mm long; anthers 7–8 mm long, horizontal; pollen red-brown. *Style* ± 10.5 mm long, lying beneath stamens, dividing opposite anther tips, branches 2 mm long. *Capsules* globose, ± 6–7 × 5 mm, enclosed in bracts. *Chromosome number* 2*n* = 26. *Flowering time*: late August to mid-September.

Distribution and ecology: restricted to the Bokkeveld Mtns and western Bokkeveld Plateau in Northern Cape, South Africa; on sandy to stony flats, mainly on tillite derived soils; flowering well only when the surrounding vegetation has been cleared or disturbed.

Diagnosis: immediately recognised by the glossy, dark blue flowers with dark red-brown pollen, *Geissorhiza splendidissima* has imbricate corm tunics typical of subg. *Geissorhiza*. Its affinities seem to be with sect. *Ciliatae* as it has similar leaf morphology, with strongly raised and winged margins ciliate on the edges. The puberulous stem is also consistent with the section, but the zygomorphic flowers with unilateral, declinate stamens and dark red-brown pollen are unusual, as is the somewhat ribbed sheath of the uppermost leaf. This



Distribution of ***Geissorhiza splendidissima***.

character is shared with the apparently allied *G. arenicola*, a character that sets these two species somewhat apart in the section.

97. **Geissorhiza inflexa** *(D.Delaroche) Ker Gawl.* in König & Sims, Annals of Botany 1: 224 (1804); Goldblatt: 436 (1985, including *G. erosa*). *Ixia inflexa* D.Delaroche: 15 (1766). *Hesperantha inflexa* (D.Delaroche) R.C.Foster: 77 (1941) [name misapplied to *H. vaginata*]. Type: South Africa, [Western Cape], Cape Peninsula, *Barker 3869* (BOL, neo., designated by Goldblatt & Barnard: 298 (1970); NBG, iso.).

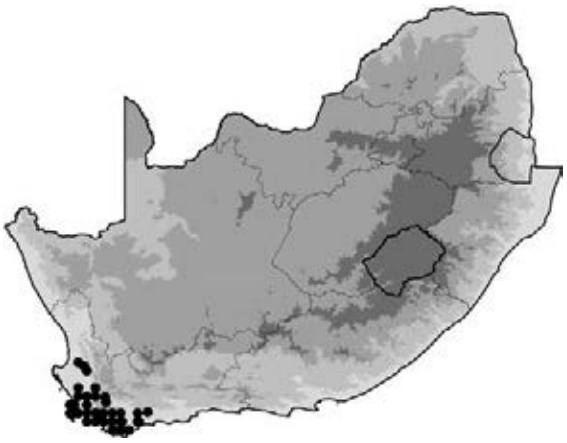
Geissorhiza quinquangularis Eckl. ex Klatt: 654 (1866), illegitimate superfluous name for *G. rosea* Eckl. (1827). *G. hirta* var. *quinquangularis* (Eckl. ex Klatt) Baker: 155 (1892). *Hesperantha quinquangularis* (Eckl. ex Klatt) Klatt: 176 (1894). Type: South Africa, [Western Cape], Caledon Division, Swartberg, *Ecklon & Zeyher Irid. 214B* (B, 'type', designated by Foster: 55 (1941); G, isolecto.).

Geissorhiza graminifolia Baker: 155 (1892). Type: South Africa, [Western Cape], near Swellendam, *Drège 3496* (K, lecto., designated by Goldblatt: 438 (1985); B, E, G, L, MO, P, isolecto.).

Geissorhiza graminifolia var. *bicolor* Baker: 155 (1892). Type: South Africa, [Western Cape], Hout Bay, *MacOwan s.n. in Herb. Norm. Austr. Afr. 261* (K, lecto., designated by Goldblatt: 438 (1985); B, BOL, G, SAM, isolecto.).

Geissorhiza quinquangularis var. *atrofaux* R.C.Foster: 55 (1941). Type: South Africa, [Western Cape], Piketberg, *Schlechter 5210* (B, holo.; B, BM, G, K, SAM, W, Z, iso.).

Plants (50–)120–300(–400) mm high. *Corm* ± ovoid, 7–12 mm diam.; tunics blackish, imbricate, outer layers notched regularly below into sections. *Stem* smooth, sheathed below by uppermost leaf, rarely branched. *Leaves* 3, lower 2 basal, usually ½–⅔ as long as stem, sometimes exceeding spike, linear-sword-shaped, (1.5–)3.0–4.0(–10.0) mm wide, margins extended outward at right angles to blade, main vein also raised and winged, with wing edges minutely hairy, uppermost leaf basal or more often cauline, sheathing for most of its length, sheath ribbed and minutely hairy, slightly inflated. *Spike* (3)4- to 7-flowered, flexed at base; bracts usually ± dry at anthesis, reddish brown, occasionally greenish below, outer 8–16 mm long, inner somewhat smaller than outer. *Flowers* actinomorphic, rotate, creamy white to pale yellow, outer tepals usually flushed pink to red outside, sometimes dark at base of tepals and in throat; perianth tube short 1.5–2.0 mm long; tepals obovate-elliptic, (8–)10–15(–18) × 5–7 mm. *Filaments* suberect, equal, 4–5 mm long; anthers (2.5–)4.0–6.0 mm long. *Style* dividing near apex of anthers, branches ± 3 mm long, recurved above. *Capsules* globose-ellipsoid, 3–6 mm long. *Chromosome number* 2*n* = 26, 26 + 1b. *Flowering time*: August to September.



Distribution of ***Geissorhiza inflexa***.

Distribution and ecology: relatively common in southwestern Western Cape, South Africa, extending from Piketberg in the north to the Cape Peninsula and east to Bredasdorp and Swellendam in the east; mainly on clay slopes and flats.

Diagnosis: *Geissorhiza inflexa* is recognised by the relatively small, creamy white flowers, often lightly flushed pink to red outside, inflexed stem, and narrowly sword-shaped leaves with raised and narrowly winged margins. The flowers have tepals mostly 10–15 mm long but exceptionally up to 18 mm in populations on the Cape Peninsula and nearby, and stamens with the anthers 4–6 mm long. The edges of the marginal wings, the main vein and sometimes secondary veins are ciliate to obviously hairy but the stem is quite smooth. *Geissorhiza inflexa* is closely allied to *G. erosa* and the two species have at times been united. The latter has larger, pink, red, purple or sometimes white flowers with tepals 18–24 × 8–10 mm, longer anthers 7–8 mm long, and usually broader leaves 5–10 mm wide.

98. **Geissorhiza erosa** *(Salisb.) R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 52 (1941); Goldblatt et al.: 142 (2009). *Ixia erosa* Salisb.: 36 (1796). Type: unknown (possible authentic material at G: Herb. De Candolle); South Africa, [Western Cape], Tulbagh, 9 Sept. 1945, *Lewis 5738* [NBG, neo., designated by Goldblatt et al.: 36 (2009)].

Ixia hirta Thunb.: no. 6 (1783), superfluous name for *I. inflexa* D.Delaroche (1766). *Geissorhiza hirta* Ker Gawl.: 224 (1804). Type: South Africa, [Western Cape], without date, *Thunberg s.n.* (UPS–THUNB, holo.).

Geissorhiza rosea Eckl.: 21 (1827). *Hesperantha ciliata* E.Mey. ex Klatt: 394 (1882), illegitimate superfluous name for *G. rosea* Eckl. Type: South Africa, [Western Cape], near Tulbagh, cultivated in Cape Town, without date, *Ecklon s.n.* [S, lecto., designated by Nordenstam: 282 (1972)].

Geissorhiza candida Eckl.: 21 (1827). Type: South Africa, [Western Cape], Hottentots Holland, *Zeyher s.n.* (S, holo.).

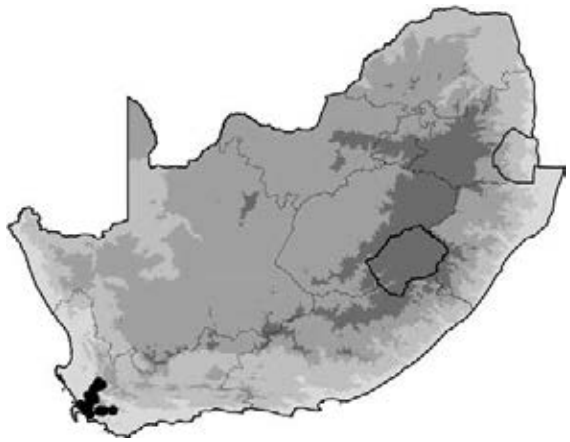
Hesperantha kermesina Klatt: 15: 395 (1882). *Geissorhiza erosa* var. *kermesina* (Klatt) R.C.Foster: 53 (1941). Type: South Africa, [Western Cape], between Paarl and Pont, without date, *Drège 8480* (B, effectively designated by Foster: 53 (1941); BM, G, K, L, MO, S, isolecto.).

[*Ixia ciliaris* Salisb. ex Ker Gawl.: t. 549 (1802b), invalid name only in synonymy.]

[*Geissorhiza* (as *Gissorhiza*) *ciliaris* Salisb.: 321 (1812), invalid name without description.]

Plants 120–350 mm high. *Corm* ± ovoid, 7–12 mm diam.; tunics blackish, imbricate, outer layers notched regularly below into sections. *Stem* smooth, sheathed below by the uppermost leaf, rarely branched. *Leaves* 3, lower 2 basal, usually ½–⅔ as long as stem, sometimes exceeding spike, sword-shaped, 3–10 mm wide, margins extended outward at right angles to blade, main vein also raised and winged, edges of margins and main vein and sometimes secondary veins minutely hairy, uppermost leaf ± basal or cauline, sheathing for most of its length, sheath ribbed, minutely hairy, slightly inflated. *Spike* slightly flexed at base, flexuose, mostly 2- to 4(5)-flowered; bracts green or becoming dry distally, outer 18–20 mm long, inner ± 2 mm shorter. *Flowers* rotate, shallowly cupped, purple, pink, red, or white to pale yellow, unscented; perianth tube funnel-shaped, 1.5–2.0 mm long; tepals obovate to elliptic, 18–24 × 8–10 mm. *Filaments* suberect, equal, 5–7 mm long; anthers mostly 7–10 mm long; pollen yellow or white. *Style* dividing near apex of anthers, branches 3–4 mm long. *Capsules* globose to barrel-shaped, 4–6 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: mid-August to September.

Distribution and ecology: occurring in the southwestern corner of Western Cape, South Africa, extending from Porterville and the Tulbagh Valley to Stellenbosch and Gordon's Bay; on clay or stony sandstone slopes, usually in renosterveld.



Distribution of ***Geissorhiza erosa***.

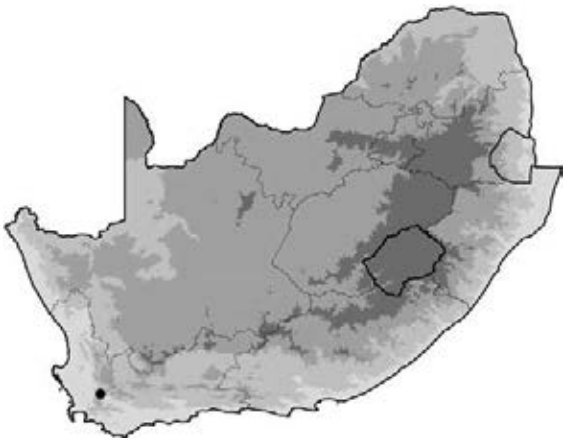
Diagnosis: the large-flowered *Geissorhiza erosa* is vegetatively almost indistinguishable from *G. inflexa*, but the spikes usually have fewer flowers, usually 2 to 4, with larger tepals, 18–24 × 8–10 mm, and often broader leaves. Consistent with the larger flower, the anthers are 7–10 mm long and the outer bracts are 18–20 mm long vs. tepals 10–15(–17) × 5–7 mm and anthers 4–6 mm long in *G. inflexa*. Generally the bracts of *G. inflexa* are dry and brown at flowering but in *G. erosa* the bracts are often green, turning light brown with age. The tepals are brilliant scarlet in popoulations from the upper Tulbagh Valley but pink to almost white or purple elsewhere.

99. **Geissorhiza exilis** *Goldblatt & J.C.Manning* in Goldblatt et al., Bothalia 39: 139 (2009). Type: Western Cape, Waaihoek Mtns, Farm Boesmansvlei, steep slopes above vineyards, SW-facing slopes among sandstone rocks, ± 390 m, 22 Sept. 2007, *Goldblatt & Manning 13014* (NBG, holo.; K, MO, PRE, iso.).

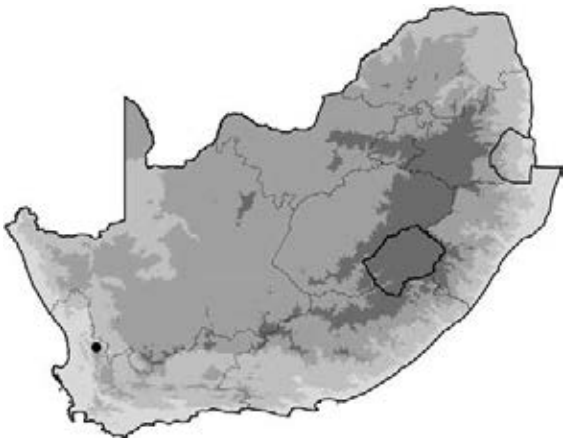
Plants 70–140 mm high. *Corm* 3–4 mm diam., ovoid, tunics imbricate, dark brown, fragmenting below into tile-like sections. *Stem* erect, smooth, usually 1- or 2-branched, bearing scale-like bract up to 10 mm long in upper ⅓ when second branch present. *Leaves* usually 3, lower 2 erect, blades linear or falcate, 30–40 × 1.5–2.5 mm, margins and main vein raised into narrow wings held at right angles to blade, wings prominently ciliate, upper leaf sheathing stem but free distally. *Spike* flexed at base and inclined, flexuose, 1- to 3-flowered, branches when present 1- or 2-flowered; bracts unequal, becoming dry and brown in upper half, outer 7–8 mm long, inner 5–6 mm long, 2-keeled and forked apically. *Flowers* actinomorphic, rotate, white with outer tepals flushed pale pink outside; perianth tube funnel-shaped, ± 1.5 mm long; tepals subequal, ± elliptic, spreading, ± 8 × 3–4 mm. *Filaments* suberect, equal, ± 2 mm long, anthers 3–4 mm long, white; pollen white. *Style* erect, dividing opposite upper ⅓ of anthers, branches ± 1.5 mm long, arching above anthers. *Flowering time*: September.

Distribution and ecology: known only from the slopes of the Waaihoek Mtns west of Worcester in Western Cape, South Africa; on fairly steep slopes in sandy ground among sandstone boulders, probably flowering only after fire.

Diagnosis: *Geissorhiza exilis* is identified by the narrow, sublinear to falcate leaves with the margins and central vein raised and extended into prominently ciliate wings, combined with a smooth stem, and flowers with equal filaments. Leaf morphology places the species in sect. *Ciliatae*, in which it appears to be most like *G. inflexa*. This species is an altogether larger plant with corms 7–12 mm diam., leaves mostly at least 3–4 mm wide, and flowers with tepals at least 8 mm long and more often 10–18 mm long. The stamens of *G. inflexa* are also larger, the filaments 4–7 mm long, the anthers



Distribution of ***Geissorhiza exilis***.



Distribution of ***Geissorhiza saxicola***.

mostly 3–6 mm long, and the style branches 4–5 mm long. Whereas *G. inflexa* favours clay or loam slopes and flats in renosterveld, *G. exilis* is a plant of sandy slopes in fynbos habitats.

100. **Geissorhiza saxicola** *Goldblatt & J.C.Manning* in Goldblatt et al., Bothalia 39: 140 (2009). Type: South Africa, [Western Cape], Biedouw Valley, east-facing slopes above Biedouw Jeugkamp, damp sheltered places among sandstone rocks, 7 Sept. 1992, *Goldblatt & Manning 9404* (NBG, holo.; MO, iso.).

Plants 35–100 mm high. *Corm* unknown. *Stem* erect, pubescent, simple or rarely with a single short branch. *Leaves* 3, all basal or uppermost inserted on stem shortly above ground level, ± plane, falcate to trailing, lower 2 longest, exceeding stem, sublinear to narrowly sword-shaped, 1.5–4.0 mm wide, margins and main vein winged with marginal wings held at right angles to blade, wing edges prominently ciliate. *Spike* mostly 2- to 5-flowered, branch when present 1- or 2-flowered; bracts dry and brown in distal half, outer 7–8(–10) mm long, inner slightly shorter, 2-veined to 2-keeled, notched at apex. *Flowers* actinomorphic, rotate, white to pale pink, outer tepals pink to light purple outside, unscented; perianth tube funnel-shaped, 1.5–2.0 mm long; tepals 7–8 × 2–3 mm, spreading. *Filaments* suberect, unequal, two longer ± 3 mm long, shorter one ± 2 mm long; anthers 3.3–4.0 mm long. *Style* evidently erect, dividing opposite middle of anthers, branches 1.3–1.8 mm long. *Flowering time*: August to mid-October.

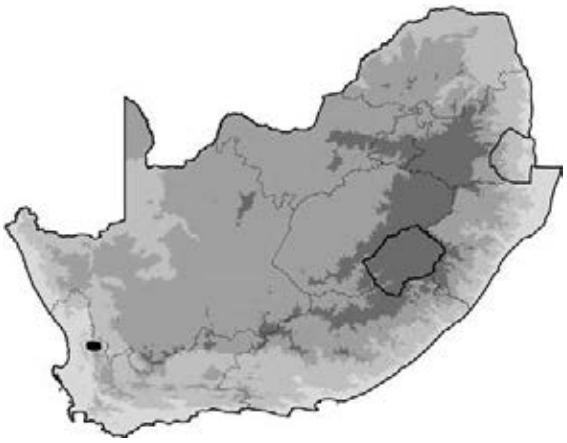
Distribution and ecology: poorly known, occurring in the northern Cederberg and Pakhuis Mtns of Western Cape, South Africa; in sandy soil, in moist shady sites in the shelter of sandstone rocks, sometimes locally abundant.

Diagnosis: *Geissorhiza saxicola* is recognised by the combination of a hairy stem, leaves with the margins and central vein winged with pilose wing edges, and small, white to pink flowers with unequal filaments. Its immediate relationships are uncertain although it evidently falls in sect. *Ciliatae*. Pollen grains with specialised, complex apertures place the species closest to *G. exilis* and *G. inflexa*, but the filaments of both these species are equal in length. The low stature and small flowers recall *G. minuta* of the Gifberg and Pakhuis Mtns, but that species has a smooth stem, equal stamens, and the thickened leaf margins and central vein lack the wings with ciliate edges of *G. saxicola*.

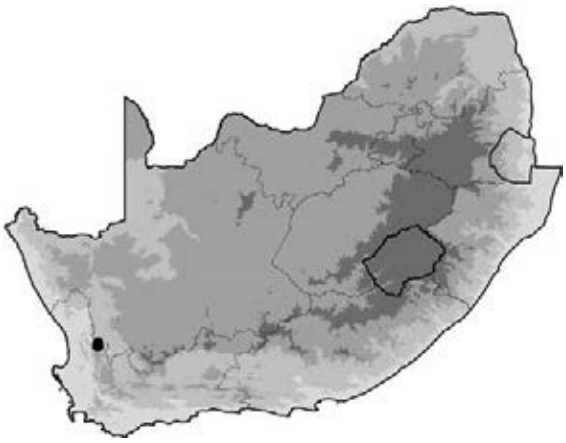
101 **Geissorhiza erubescens** *Goldblatt* in Annals of the Missouri Botanical Garden 72: 440 (1985). Type: South Africa, [Western Cape], Pakhuis Pass, shale slopes near top of pass, *Goldblatt 6396* (MO, holo.; K, NBG, PRE, S, WAG, iso.).

Plants 50–150 mm high. *Corm* ± globose, obliquely flattened below, 5–12 mm diam.; tunics blackish, imbricate, notched regularly below into sections. *Stem* suberect, ciliate to pubescent below third leaf, ciliate or smooth above, simple or 1-branched, sheathed below by fibrous collar of decayed leaf bases. *Leaves* 3, lower 2 basal, uppermost largest, inserted in middle of stem, blades linear, straight, ½–⅔ as long as stem, 2–3 mm wide, margins raised into wings extending at right angles to blade, main veins also raised and winged, minutely ciliate to visibly pubescent on wing edges, main veins and sometimes secondary veins. *Spike* flexed at base, flexuose, mostly 3- to 7-flowered; bracts membranous and greenish to transparent below, rust brown above, outer 6–8 mm long, flexed outward in upper ½, inner slightly shorter. *Flowers* actinomorphic, rotate, creamy white, outer tepals bright red outside; perianth tube funnel-shaped, 1.5–2.0 mm long, enclosed in bracts; tepals ovate-elliptic, 8–12 × 3–4 mm. *Filaments* suberect, equal, ± 3 mm long; anthers 2.5–3.0 mm long, creamy white; pollen creamy white. *Style* dividing opposite apex of anthers, branches recurved. *Chromosome number* 2*n* = 26. *Flowering time*: September.

Distribution and ecology: known only from Pakhuis Pass in the Pakhuis Mtns of Western Cape, South Africa; common on the shale band, especially after fires.



Distribution of ***Geissorhiza erubescens***.



Distribution of ***Geissorhiza leipoldtii***.

Diagnosis: a small-flowered species of sect. *Ciliatae*, *Geissorhiza erubescens* is recognised by the unusual collar of fibres around the stem base (at least in older individuals), strongly winged leaf margins, and relatively small flowers with tepals 8–12 mm long and equal stamens. The flowers are creamy white with the outer tepals bright red on the outside and the stem is ciliate-pubescent, less so in the upper half. It may be most closely allied to the smooth-stemmed southwestern Cape *G. inflexa*, or larger-flowered *G. leipoldtii* or *G. nutans*, the latter with unequal stamens and somewhat larger white flowers with tepals 14–16 mm long without the deep red markings on the reverse of the outer tepals characteristic of *G. erubescens*.

102. **Geissorhiza leipoldtii** *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 47 (1941). Type: South Africa, [Western Cape], Pakhuis-Wuppertal road, *Leipoldt s.n. BOL20778* (K, holo.; BOL, SAM, iso.).

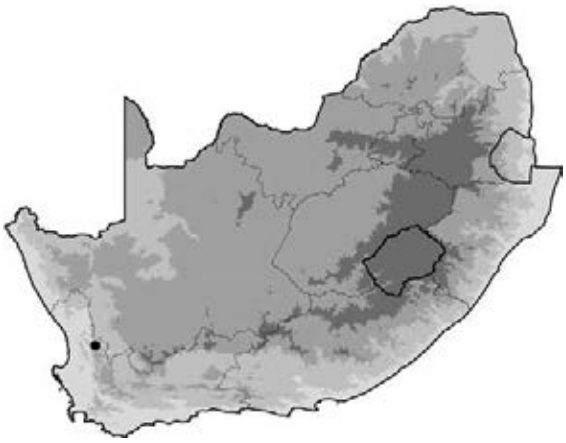
Plants mostly 200–350 mm high. *Corm* ovoid, symmetric, 5–8 mm diam.; tunics dark brown to blackish, imbricate, outer layers regularly notched below into sections. *Stem* sparsely ciliate, simple or 1- or 2-branched from axil of cauline leaf. *Leaves* 3, lower 2 basal, linear to sword-shaped, usually shorter than stem, 3–6 mm wide, apparently plane but margins raised into narrow, ascending wings ciliate along edges, main vein also slightly raised, winged and sparsely ciliate along edges, uppermost leaf cauline, sheathing for at least half its length. *Spike* flexed at base, mostly 3- to 6-flowered, flexuose; bracts ± membranous, dry and pale brown above, outer 12–16 mm long, inner smaller than outer. *Flowers* actinomorphic, upright to half nodding, shallowly cupped, stark white, greenish in throat (sometimes palest pink on fading); perianth tube funnel-shaped, 1.5–2.0 mm long; tepals narrowly obovate, 18–26 × 5–11 mm. *Filaments* suberect, equal (rarely upper filament slightly shorter), 7–8 mm long; anthers 6.5–8.0 mm long, bright yellow; pollen yellow. *Style* dividing opposite or slightly above anther tips, branches 4–6 mm long. *Capsules* globose, ± 5 mm long. *Flowering time*: late August to September.

Distribution and ecology: known only from hill slopes in the Biedouw Valley and near Wuppertal in Western Cape, South Africa; on seasonally moist, south-facing clay slopes.

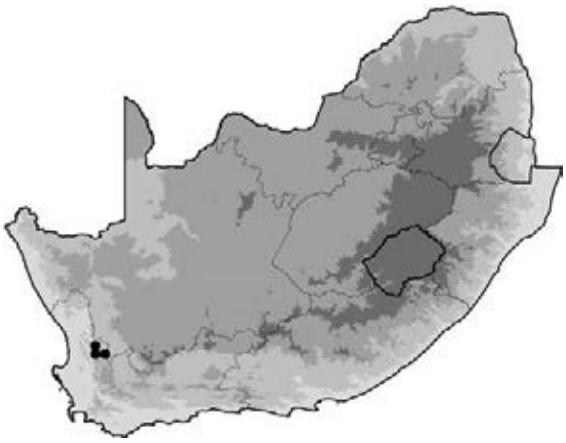
Diagnosis: recognised by its ciliate stem and only two basal leaves, the margins with narrowly, ascending wings minutely ciliate on the edges, *Geissorhiza leipoldtii* has large, upright to slightly nodding, pure white flowers with tepals 19–26 × 7–11 mm. The stamens are relatively long and usually equal (or one filament slightly shorter) with anthers up to 8 mm long, bright yellow and bearing yellow pollen. In the past *G. leipoldtii* included plants from the Olifants River Valley and nearby with nodding flowers and markedly unequal filaments, but these are now recognised as *G. nutans*, as well as mauve-pink flowered *G. ixioides*, now also recognised as a separate species.

103. **Geissorhiza ixioides** *Schltr. ex R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 43 (1941). Type: South Africa, [Western Cape], 'Agtertuin, in collibus,' 15 Aug. 1897, *Schlechter 10866* (B, holo.; BM, BOL, BR, G, K, MO, P, PH, PRE, S, Z, iso.).

Plants (120–)160–300 mm high. *Corm* ovoid, symmetric, 5–8 mm diam.; tunics dark brown to blackish, imbricate, outer layers regularly notched below into sections. *Stem* sparsely ciliate, simple or 1(2)-branched. *Leaves* 3, lower 2 basal, linear to sword-shaped, usually shorter than stem, 3–5 mm wide, apparently plane, but margins raised at right angles to blade into wings ciliate along edges, main vein also slightly raised and winged, sparsely ciliate along edges, uppermost cauline, sheathing for at least ½ its length. *Spike* flexed at base, 2- to 6-flowered, flexuose; bracts ± membranous, dry and pale brown above, outer 10–12 × 4–4 mm, inner slightly smaller. *Flowers* actinomorphic, shallowly cupped, pale red-purple, dark in throat; perianth tube funnel-shaped,



Distribution of ***Geissorhiza ixioides***.



Distribution of ***Geissorhiza nutans***.

1.5–2.0 mm long; tepals narrowly obovate, (10–)12–16 × 5–7 mm. *Filaments* erect, equal, 3.5–4.5 mm long; anthers 5–7 mm long (4 mm after anthesis), light purple; pollen dull yellow. *Style* dividing opposite middle ⅓ of anthers, pale mauve (drying dark purple), branches 3–6 mm long. *Capsules* globose, ± 5.5 mm long. *Flowering time*: August to early September.

Distribution and ecology: a narrow endemic known only in the lower Doorn River Valley near Doornbos in Western Cape, South Africa; on stony, south- and east-facing slopes in rocky loamy clay ground.

Diagnosis: evidently allied to *Geissorhiza leipoldtii* and sharing with it a papillate to ciliate stem and three leaves, the lower two basal and the upper cauline and largely sheathing, *G. ixioides* is recognised by its mauve-pink flowers with a dark purple centre, relatively short, equal filaments, and short, purple style dividing opposite the middle third of the anthers. *Geissorhiza leipoldtii* has larger, pure white flowers with longer stamens with equal filaments 7–8 mm long and anthers 6.5–8.0 mm long. The species was included in *G. leipoldtii* by Goldblatt (1985) but later recognised as distinct (Goldblatt & Manning, 2016).

104. **Geissorhiza nutans** *Goldblatt & J.C.Manning* in South African Journal of Botany 106: 30 (2016). Type: South Africa, Western Cape, Olifants River to Algeria road, Farm Kriedouwkrans, moist, south-facing clay slope, 21 Aug. 2015, *Goldblatt & Porter 14094* (NBG, holo.; K, MO, PRE, iso.).

Plants mostly 150–240 mm high. *Corm* ovoid, symmetric, 5–8 mm diam.; tunics dark brown to blackish, imbricate, outer layers regularly notched below into sections. *Stem* sparsely ciliate, simple or 1-branched from axil of cauline leaf. *Leaves* 3, lower 2 basal, linear to sword-shaped, usually shorter than stem, 3–6 mm wide, apparently plane but margins with narrow, ascending wings ciliate along edges, main vein also slightly raised and winged, sparsely ciliate along edges, uppermost leaf cauline, sheathing for at least half its length. *Spike* flexed at base, 2- to 5-flowered, flexuose; bracts ± membranous, dry and pale brown above, outer 10–16 mm long, inner smaller than outer. *Flowers* zygomorphic with unilateral, decumbent stamens and style, shallowly cupped, white flushed mauve on reverse of outer tepals (often becoming pink or mauve with age); perianth tube funnel-shaped, 1.5–2.0 mm long; tepals narrowly obovate, 14–16 × 3–6 mm. *Filaments* unilateral, horizontal, unequal, two longer 5–7 mm long, shorter one ± 3 mm long; anthers 4.5–6.0 mm long, creamy white. *Style* dividing opposite upper ⅓ of anthers, branches 3–4 mm long. *Capsules* globose, ± 5 mm long. *Flowering time*: August to September.

Distribution and ecology: occurring in the Olifants River Valley and Cederberg in Western Cape, South Africa; usually on rocky clay ground, especially on south-facing, lightly wooded slopes.

Diagnosis: previously included in *Geissorhiza leipoldtii* (Goldblatt 1985), largely due to the limited material then available, *G. nutans* is readily distinguished from that species by the somewhat smaller flowers with narrower tepals 14–16 × 3–6 mm long vs. 18–26 × 5–11 mm in *G. leipoldtii* and shorter, markedly unequal stamens. Vegetatively the two are almost indistinguishable, having sparsely and minutely ciliate stems, and three leaves, the lower two basal and the upper one cauline and largely sheathing and the leaf blades with narrowly winged, ciliate margins and main vein. The flowers are nodding with the stamens unilateral and horizontal to drooping with white anthers 4.5–6.0 mm long and the filaments are markedly unequal, the longer two 5–7 mm long and the shorter ± 3 mm long. *Geissorhiza leipoldtii* has larger, upright to half nodding flowers with tepals 19–26 mm long and stamens symmetrically arranged with anthers 7–8 mm long and filaments ± 7 mm long (or one up to 0.5 mm shorter). The differences in the filament length in *G. nutans* are striking, the upper filament about half as long as the lower two, thus unmistakable. The anthers and pollen of *G. nutans* are white whereas those of *G. leipoldtii* are bright yellow.

INCOMPLETELY KNOWN

105. *Geissorhiza* sp. 1.

Plants up to 450 mm high. *Corm* ± ovoid, symmetric, ± 10 mm diam.; tunics blackish, imbricate, woody, notched into regular sections below. *Stem* smooth below, minutely ciliate in upper half but spike axis ± smooth, usually with 1 or 2 filiform branches, lower branch from cauline leaf axil and upper from axil of sheathing scale-like bract. *Leaves* 3, lower 2 basal, reaching to lower ⅓ or ± middle of stem, linear, ± 2 mm wide, margins expanded into broad wings raised at right angles to or arching over lamina, main vein slightly raised, thus H-shaped in section, edges of marginal wings and main vein ciliate; uppermost leaf inserted at or shortly above ground, sheathing for most of its length. *Spike* inclined, flexuose, several-flowered; bracts with broad membranous margins, becoming dry and rust-coloured distally at anthesis. *Flowers* actinomorphic, rotate, white or pale blue-mauve, white in throat often edged with darker blue, outer tepals flushed blue outside; perianth tube funnel-shaped, 1.5–2.3 mm long; tepals obovate-elliptic, outer 9(–12) × 3.5(–7) mm, inner slightly longer and narrower. *Filaments* unequal; two longer ± 3 mm long, shorter one ± 2 mm long; anthers ± 3.5 mm long, pale yellow; pollen ± white. *Style* dividing opposite middle to near apex of anthers, branches ± 1 mm long. *Flowering time*: mid-September to mid-October.

Distribution and ecology: to date only confirmed on the summit plateau of the Hantamsberg in the Calvinia District in Northern Cape, South Africa; in waterlogged or rocky clay or sandy ground.

Diagnosis: with corms typical of subg. *Geissorhiza*, this species remains incompletely known and keys out closest to *G. scopulosa* because of the minutely pubescent stem and leaf blades with broad marginal wings held at right angles to or arching over the surface, thus H-shaped in cross section. The radially symmetric flowers are pale grey-blue to white and have unequal stamens, the two longer filaments ± 3 mm long and the shorter one ± 2 mm long. Plants usually have one or two particularly slender, almost thread-like branches produced from the axils of the uppermost leaf and scale-like bract, this usually dry at flowering. *Geissorhiza scopulosa,* restricted to high elevations in the Hex River Mtns is a short plant, rarely exceeding 150 mm, is rarely branched and is also separated by its longer perianth tube 3–4 mm long. *G.* sp. 1 has also been confused with *G. heterostyla*, which also occurs on the Hantamsberg but only below the summit plateau, and has large, nodding, deep blue-violet flowers with decumbent stamens. It remains to be established whether *G.* sp. 1 occurs elsewhere.

REFERENCES

ANDREWS, H. 1802. *Ixia pusilla*. Dwarf blue ixia. *The Botanist's Repository* 4: t. 245.

ASCHERSON, P.F.A. & GRAEBNER, K.O.R.P.P. 1906. *Synopsis der Mitteleuropäischen Flora*, 3(4). Engelmann, Leipzig.

BAKER, J.G. 1876. New species of Ixieae. *Journal of Botany, British and foreign* 14: 236–239.

BAKER, J.G. 1877. Systema Iridacearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell & Sons, London.

BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1901. Iridaceae. In H. Schinz, Beiträge zur Kenntnis der Afrikanischen Flora (Neue Folge). *Bulletin de l'Herbier Boissier*, sér. 2, 1: 853–868.

BAKER, J.G. 1906. Diagnoses Africanae XIV. *Bulletin of Miscellaneous Information, Kew* 1906: 15–30.

BARKER, W.F. 1938. *Geissorhiza namaquensis. Flowering Plants of South Africa* 18, t. 688.

BERGIUS, P.J. 1767. *Descriptiones plantarum capite bonae spei*. Salvius, Stockholm.

BOLUS, F. 1918. Novitates Africanae. *Annals of the Bolus Herbarium* 2: 153–162.

BOLUS, L. 1926. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 37–61.

BOLUS, L. 1927. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 113–118.

BOLUS, L. 1930. Plants — new or noteworthy. *South African Gardening and Country Life* 20: 345–346.

BOLUS, L. 1931. Plants — new or noteworthy. *South African Gardening and Country Life* 21: 281–282.

BOLUS, L. 1932. Plants – new or noteworthy. *South African Gardening and Country Life* 22: 275, 276.

BOUCHÉ, C.D. & WITTMACK, L. 1876. *Acidanthera bicolor* Hochst. (Irideae). *Monatsschrift zum Vereines Beförderung des Gartenbaues* 19: 12–17.

BROWN, N.E. 1928. The Iridaceae of Thunberg's Herbarium. *Journal of the Linnean Society, Botany* 48: 34–55.

BROWN, N.E. 1929. The Iridaceae of Burmann's Florae capensis prodromus. *Bulletin of Miscellaneous Information, Kew* 1929: 129–137.

BROWN, N.E. 1931. LX. Decades kewenses. Plantarum novarum herbario horti regii conservatorum. Decas CXX-VII. *Bulletin of Miscellaneous Information, Kew* 1931: 448–453.

BURCHELL, W.J. 1822. *Travels in the interior of South Africa*, vol. 1. Longman, London.

BURMAN, J.L. (fil.). 1768. *Florae Capensis Prodromus*. Cornelius Haak, Leiden.

DELAROCHE, D. 1766. *Descriptiones plantarum aliquot novarum*. J. & H. Verbeek, Leiden.

DIETRICH, A.G. 1833. *Species plantarum*, vol. 2. Nauck, Berlin.

DIETRICH, F.G. 1817. *Nachtrag zum vollständingen Lexicon der Gärtnerei und Botanik*, vol. 3. Gädickte, Berlin.

DIELS, L. 1909. Formationen und Florenelemente im nordwestlichen Kapland. *Botanische Jahrbücher für Systematik* 44: 91–124.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon.* Reiseverein, Esslingen.

FOSTER, R.C. 1936. Notes on nomenclature in Iridaceae. *Contributions from the Gray Herbarium of Harvard University* 114: 37–50.

FOSTER, R.C. 1941. Studies in the Iridaceae—II. A revision of *Geissorhiza* Ker Gawler. *Contributions from the Gray Herbarium of Harvard University* 135: 3–78.
GOLDBLATT, P. 1971. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460.
GOLDBLATT, P. 1983. The species of *Geissorhiza* (Iridaceae) of Thunberg's herbarium (Uppsala, Sweden). *Nordic Journal of Botany* 3: 437–442.
GOLDBLATT, P. 1985. Systematics of the southern African genus *Geissorhiza* (Iridaceae-Ixioideae). *Annals of the Missouri Botanical Garden* 72: 277–447.
GOLDBLATT, P. 1989. *Geissorhiza callista*. (Iridaceae). *Flowering Plants of Africa* 50: t. 1996, 49–52.
GOLDBLATT, P. & BARNARD, T.T. 1970. The Iridaceae of Daniel de la Roche. *Journal of South African Botany* 36: 291–318.
GOLDBLATT, P. & MANNING, J.C. 1995. New species of the southern African genus *Geissorhiza* (Iridaceae: Ixioideae). *Novon* 5: 156–161.
GOLDBLATT, P., MANNING, J.C. 2013. *Geissorhiza melanthera* sp. nov. (Iridaceae: Crocoideae) from the southern African winter rainfall region with comments on its pollination by the bee-fly *Megapalpus capensis* (Bombyliidae). *South African Journal of Botany* 87: 22–24.
GOLDBLATT, P. & MANNING, J.C. 2014. Nomenclatural corrections in *Babiana* and *Geissorhiza* (Iridaceae: Crocoideae). *Bothalia*: 44: 6–7 of 9, or online at http://dx.doi.org/10.4102/abc.v44i1.169.
GOLDBLATT, P. & MANNING, J.C. 2016. Review of species limits in *Geissorhiza leipoldtii* (Iridaceae: Crocoideae) and *G. heterostyla* with the recognition of new taxa plus important new records in the genus. *South African Journal of Botany* 106: 29–34.
GOLDBLATT, P. & MANNING, J.C. 2017. A review of the *Geissorhiza namaquensis* (Iridaceae: Crocoideae) group with the new species *G. namaquamontana* from Northern Cape, South Africa. *South African Journal of Botany* 111: 299–301.
GOLDBLATT, P., MANNING, J.C. & NÄNNI, I. 2009. New species of *Geissorhiza* (Iridaceae: Crocoideae) from the southern African winter-rainfall zone, nomenclatural changes, range extensions and notes on pollen morphology and floral ecology. *Bothalia* 39: 123–152.
HOUTTUYN, M. 1780. *Natuurlijke historie*, vol. 12. Amsterdam.
KER GAWLER, J.B. 1802a. *Ixia bicolor*. *Curtis's Botanical Magazine* 15: t. 548.
KER GAWLER, J.B. 1802b. *Ixia maculata* var. *viridis* (γ). Green-stained ixia. *Curtis's Botanical Magazine* 16: sub t. 549.
KER GAWLER, J.B. 1802c. *Ixia rochensis* var. (α). Plaid ixia. *Curtis's Botanical Magazine* 17: t. 598.
KER GAWLER, J.B. 1803. *Geissorhiza obtusata*. Yellow-flowered geissorhiza. *Curtis's Botanical Magazine* 18: t. 672.
KER GAWLER, J.B. 1804 ['1805']. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.
KLATT, F.W. 1864. Revisio Iridearum. *Linnaea* 32: 689–784.
KLATT, F.W. 1866. Revisio Iridearum (Conclusio). *Linnaea* 34: 537–689.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
KLATT, F.W. 1885. Determination and description of Cape Irideae. *Transactions of the South African Philosophical Society* 3: 202–205.
KLATT, F.W. 1894 ['1895']. Irideae. In T. Durand & H. Schinz, *Conspectus Florae africae* 5: 143–230. Jardin botanique de l'Etat, Bruxelles etc.
KUNTZE, O. 1891. *Revisio Generum Plantarum*, vol. 2. Felix, Leipzig.
LEWIS, G.J. 1933. Plants — new and noteworthy. *South African Gardening and Country Life* 23: 255, 266.
LEWIS, G.J. 1941. Iridaceae. New genera and species and miscellaneous notes. *Journal of South African Botany* 7: 19–59.
LEWIS, J.G. 1962. South African Iridaceae: the genus *Ixia*. *Journal of South African Botany* 27: 45–195.
LINK, J.H.F. 1821. *Ennumeratio plantarum horti regii berolinensis*, *altera* 1. G. Reimer, Berlin.
LINNAEUS, C. 1762. *Species plantarum*, edn. 2. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 ['1781']. *Supplementum Plantarum*. Orphanotropheus, Brunswick.
LOUDON, J.C. 1830. *Loudon's Hortus Britannicus*. Longmans, London.
LOUDON, J.W. 1841. *The Ladies' Flower-Garden of Ornamental Bulbous Plants,* William Smith, London.
MEYER, E. 1844 ['1843']. Zwei pflanzengeographische Documente von J.F. Drège. *Flora* 26 (Beigabe): 1–230.
NORDENSTAM, B. 1972. Types of Ecklon's 'Topographisches Verzeichniss' in the Swedish Museum of Natural History in Stockholm. *Journal of South African Botany* 38: 277–298.
PLUKENET, L. 1691. *Phytogeographia*. London.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium secundum*, vol. 1. J.G. Cotta, Stuttgart.
SALISBURY, R.A. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.
SCHINZ, H. 1894. Iridaceae. In Beiträge zur Kenntnis der Afrikanischen Flora. *Bulletin de l'Herbier Boissier*, sér. 2, 2: 222–223.
SCHLECHTER, R. 1899. Plantae Schlechterianae novae vel minus cognitae describuntur 11. *Botanische Jahrbücher für Systematik* 27: 86–220.
STEUDEL, E.G. 1841. *Nomenclator botanicus*, edn. 2, vol. 2. J.G. Cotta, Stuttgart.
SWEET, R. 1830. *Hortus britannicus,* edn. 2. Ridgeway, London.
THUNBERG, C.P. 1783. *Dissertatio de Ixia*. Uppsala.
THUNBERG, C.P. 1800. *Prodromus plantarum capensium*. Edman, Uppsala.
THUNBERG, C.P. 1803. Novae species plantarum capensium examine et descriptae. *Phytographische Blätter* 1: 1–5 [original pagination 31–34].
THUNBERG, C.P. 1811. *Flora capensis*, vol. 2. Edman, Uppsala.
VAHL, M. 1805. *Enumeratio plantarum*, vol. 2. Moller & fil., Copenhagen.
WOLLEY-DOD, M.A.H. 1900. New Cape plants. *Journal of Botany, British and foreign* 38: 170–171.

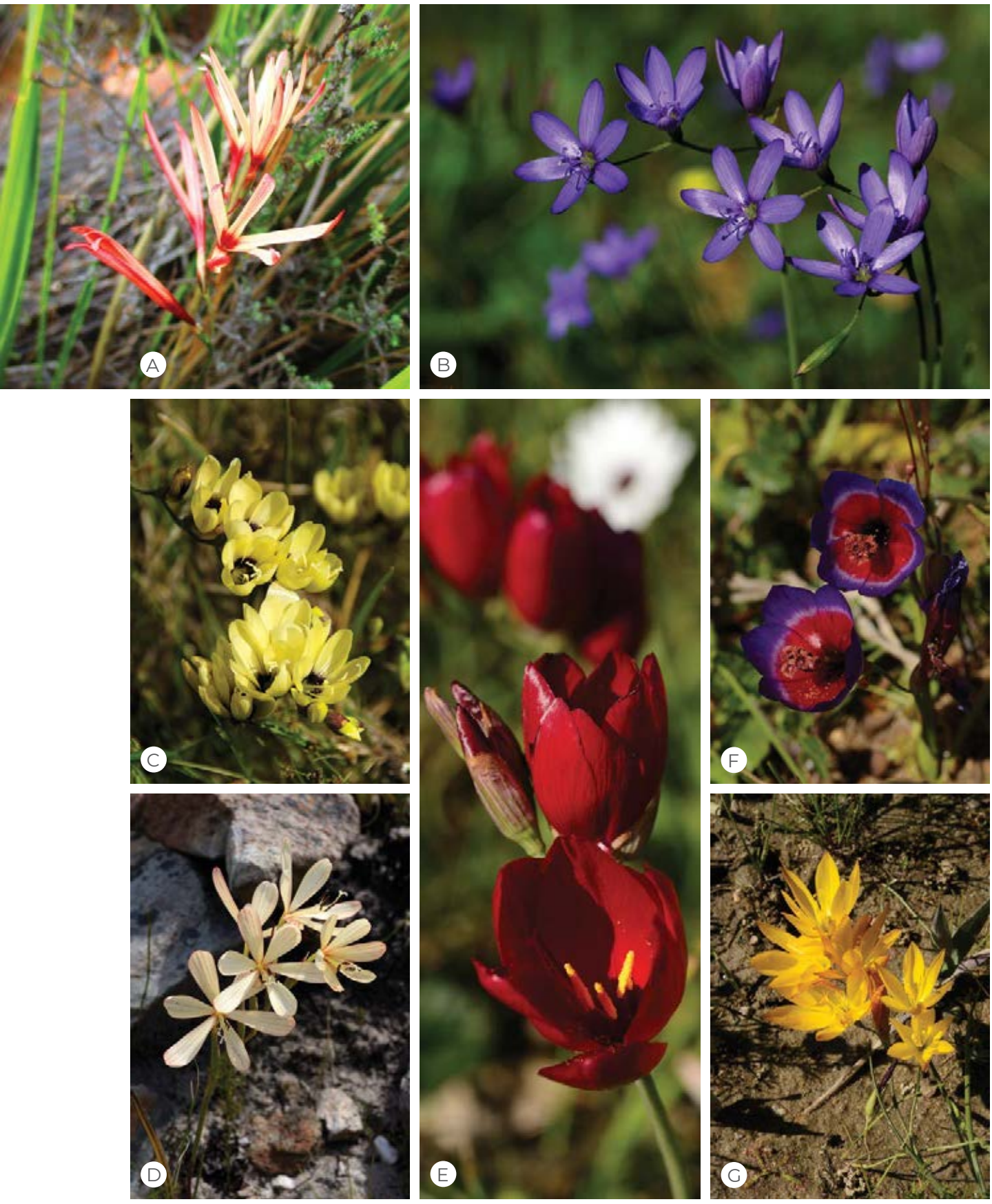


Plate 38. A, ***G. adriaanii***, Piketberg, WC; B, ***Geissorhiza aspera***, Hermon, WC; C, ***G. barkerae***, Piketberg, WC; D, ***G. confusa***, Wellington, WC; E, ***G. erosa***, Tulbagh, WC; F, ***G. eurystigma***, Darling, WC; G, ***G. furva***, Hermon, WC.

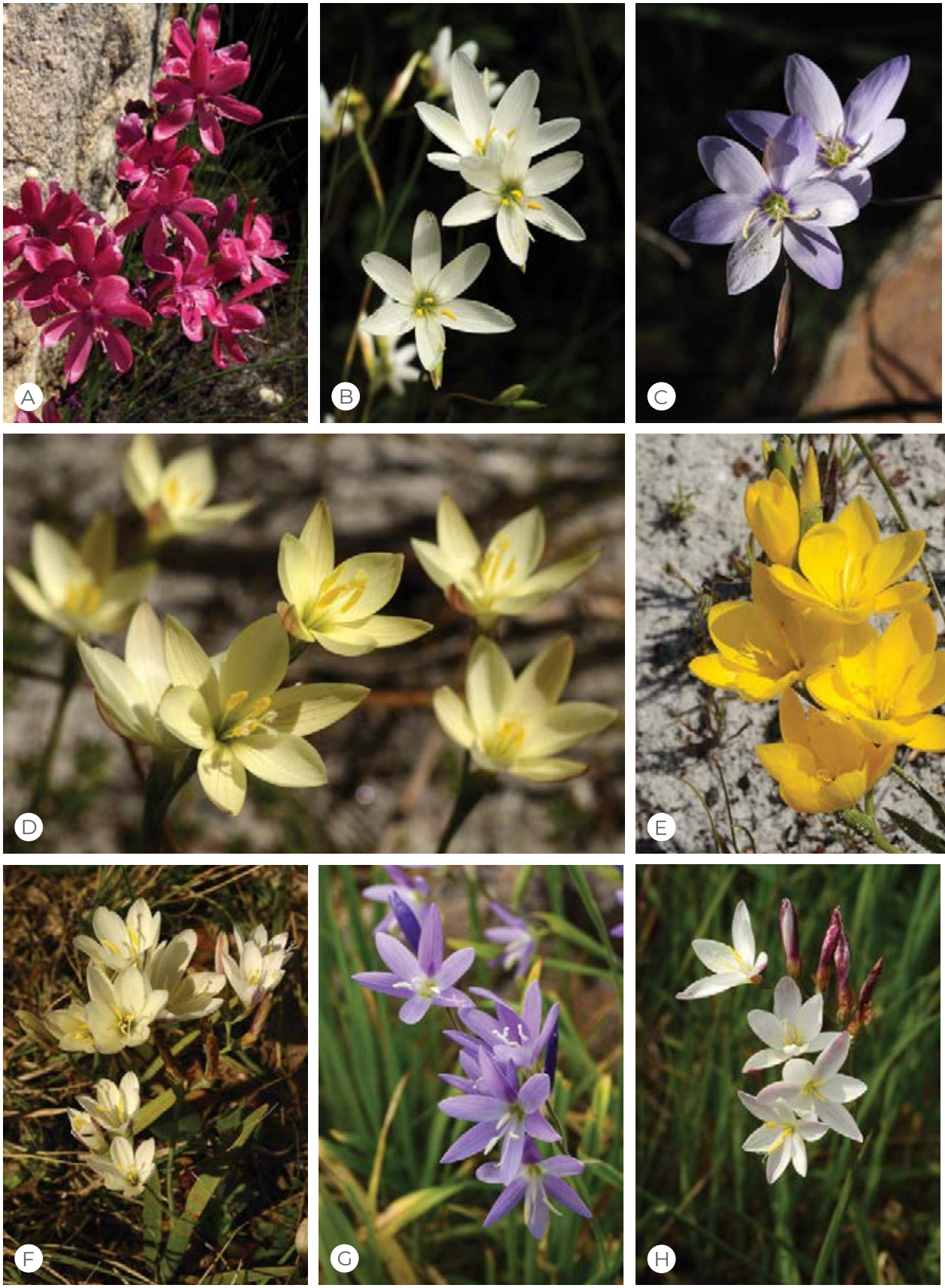


Plate 39. A, ***G. grandiflora***, Bain's Kloof, WC; B, ***Geissorhiza heterostyla*** subsp. ***ciliata***, Worcester, WC; C, ***G. heterostyla*** subsp. ***heterostyla***, Sutherland, NC; D, ***G. hispidula***, Cape Peninsula, WC; E, ***G. humilis***, Scarborough, WC; F, ***G. imbricata*** subsp. ***imbricata***, Somerset West, WC; G, ***G. inaequalis***, Nieuwoudtville, NC; H, ***G. inflexa***, Napier, WC.



Plate 40. A, ***Geissorhiza juncea***, Darling, WC; B, ***G. karroica***, Sutherland, NC; C, ***G. leipoldtii***, Biedouw, WC; D, ***G. lewisiae***, Saldanha, WC; E, ***G. monanthos***, Darling, WC; F, ***G. namaquamontana***, Kamiesberg, NC (photograph: N. Helme); G, ***G. namaquensis***, Springbok, NC; H, ***G. nana***, Napier, WC.



Plate 41. A, ***Geissorhiza ovata***, Cape Town, WC; B, ***G. purpurascens***, Mamre, WC; C, ***G. purpureolutea***, Hermon, WC; D, ***G. pusilla***, Table Mt, WC; E, ***G. setacea***, Hermon, WC, F & G, ***G. radians***, Darling, WC.

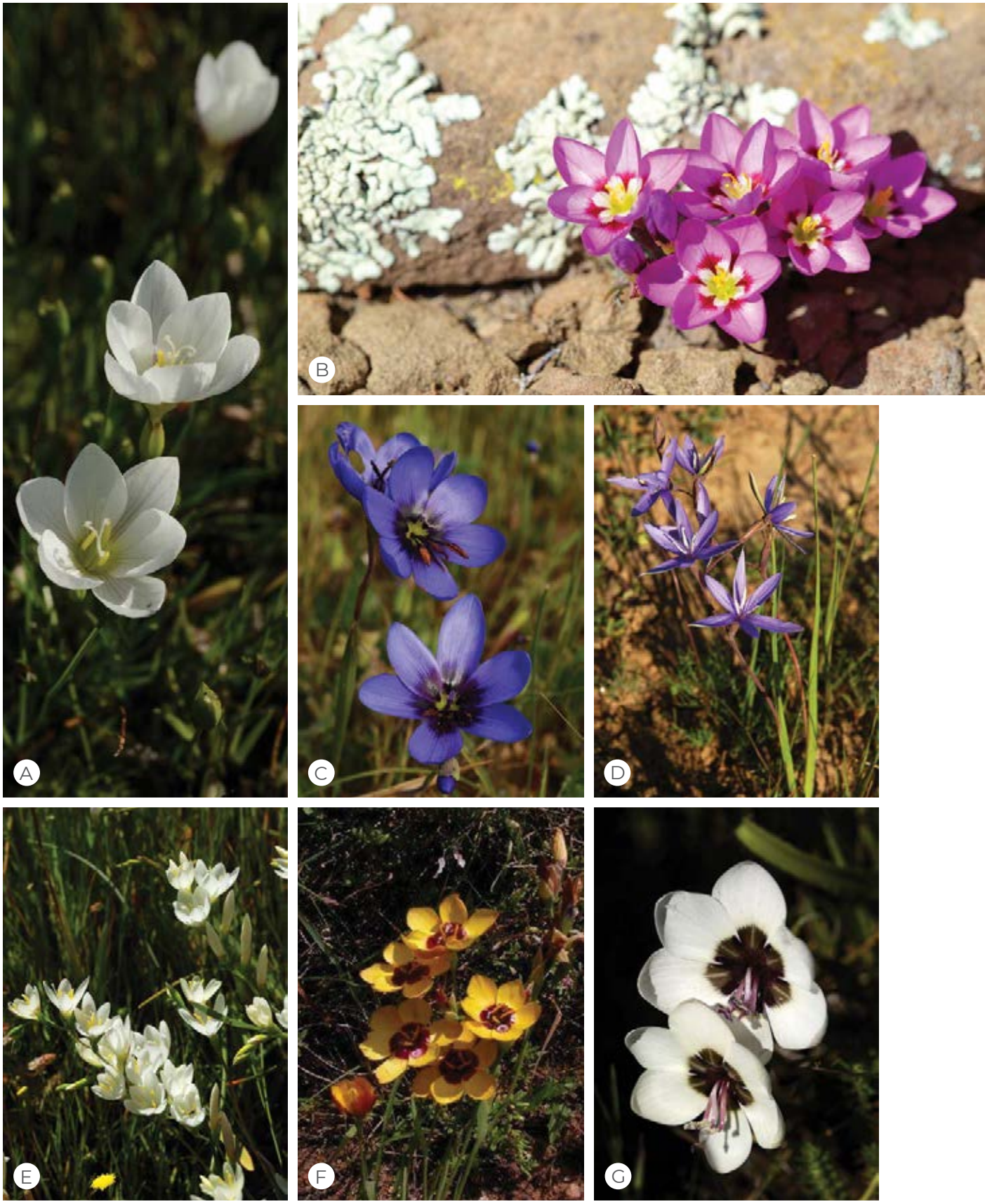


Plate 42. A, ***Geissorhiza setacea***, Paarl, WC; B, ***G. spiralis***, Sutherland, NC (photograph: J. Adendorf); C, ***G. splendidissima***, Nieuwoudtville, NC; D, ***G. subrigida***, Nieuwoudtville, NC; E, ***G. sulphurascens***, Nieuwoudtville, NC; F, ***G. tricolor***, Swellendam, WC; G, ***G. tulbaghensis***, Hermon, WC.

21. **Hesperantha**

Hesperantha *Ker Gawl.* in König & Sims, Annals of Botany 1: 225 (1804a). Type: *H. falcata* (L.f.) Ker Gawl.

Schizostylis Backh. & Harv.: t. 5422 (1864); Goldblatt & Manning: 263 (1996). Type: *S. coccinea* Backh. & Harv. = *Hesperantha coccinea* (Backh. & Harv.) Goldblatt & J.C.Manning

Revisionary accounts: Goldblatt: 15–141 (1984), 390–443 (2003); Hilliard & Burtt: 407–438 (1986).

From the Greek, *hesperos*, evening, *anthos*, flower, for the night flowering of many species.

Deciduous perennials. *Rootstock* a corm, rarely a rhizome; corm globose to ovoid, often asymmetric with basal ridge from which roots emerge or bell-shaped; tunics woody, less often firm-papery, concentric or imbricate and then notched into sections below. *Stem* aerial or subterranean, simple or branched, terete, sometimes hairy or velvety. *Leaves* few to several, lower 2 or 3 cataphylls, these membranous or ± green above ground; foliage leaves unifacial, plane with a definite main vein or ± terete to oval in section, sometimes margins and/or main vein, sometimes hairy; margins with subepidermal sclerenchyma bundle and thin-walled epidermal cells. *Inflorescence* a spike with flowers usually spirally arranged, rarely flowers solitary; bracts green, soft-textured, inner slightly to significantly smaller than outer, notched apically. *Flowers* rotate to salver-shaped or nodding to ± pendent, diurnal or crepuscular, mostly white or pink, also yellow or blue to violet or red, usually actinomorphic, rarely weakly zygomorphic, often fragrant then usually in evenings, with nectar produced from septal nectaries; perianth tube cylindric, expanded near apex, short or long, sometimes curved; tepals subequal, spreading, sometimes recurved. *Stamens* symmetrically disposed or rarely unilateral and declinate; filaments inserted shortly below mouth of tube, sometimes very short, erect or drooping; anthers erect and facing inward or articulated on filament apices and horizontal, sometimes pendent, rarely included in tube. *Ovary* ± ellipsoid, sessile; style filiform, usually dividing at or just below mouth of tube, rarely above anthers, branches filiform, usually spreading (rarely suberect), stigmatic along most of their length. *Capsules* thin-walled, globose to oblong or ± cylindric, sometimes splitting open only in upper ⅓. *Seeds* globose to angular, flattened at chalazal end, sometimes slightly winged on angles or at opposite ends, smooth or rugulose, surface cells usually domed. *Pollen grains* monosulcate-operculate; operculum 2-banded, exine perforate-scabrate. *Basic chromosome number x* = 13.

Species ± 89, 87 in southern Africa with major centres in the winter-rainfall zone of South Africa and the Drakensberg and escarpment of eastern southern Africa, but extending through the tropical African highlands to Ethiopia and Cameroon.

As its name indicates *Hesperantha* was named for species with crepuscular flowers that open in the late afternoon, at which time they become fragrant, and close again during the night. *Hesperantha* has the highest proportion of moth-pollinated species in the family. The majority of species occur in the southern African winter-rainfall zone and have been found to be pollinated by settling moths of several lepidopteran families. Just a few species in the region have yellow, pink or purple flowers that open during the day and close at sunset, and these have different pollination strategies, notably *H. vaginata*, which has yellow tepals with dark brown markings and is pollinated by hopliine beetles. Species of eastern southern Africa show the opposite pattern, with most species having pink flowers with a diurnal pattern of opening and closing. Among these, species with short-tubed flowers are pollinated mainly by large-bodied bees and those with long-tubed flowers are pollinated only by long-proboscid flies, mostly nemestrinids. The few species of the area that have yellow or white flowers surprisingly also have a diurnal floral phenology.

The genus is recognised by ± woody corm tunics and flowers in which the style divides at or close to the mouth of the perianth tube into relatively long, laxly spreading style branches. The stamens are inserted just below the mouth of the tube or at the base of the tepals, the filaments are usually relatively short, and the anthers are articulated on the filaments and come to lie horizontally. Some striking exceptions include *Hesperantha cedarmontana*, in which the style divides in the lower part of the tube and both the style branches and stamens are included within the tube. In *H. kiarataylo-riae* the style divides above the mouth of the tube and the style branches are erect and coiled around themselves. Flowers of most species are radially symmetric, although *H. radiata* and its close allies have a perianth tube curved near the apex and the flowers are nodding or pendent and the stamens are unilateral, and *H. grandiflora* has zygomorphic flowers with unilateral, decumbent stamens oriented horizontally and lying above the lower tepals. Floral symmetry does not affect the pollination strategies in the genus.

The genus is divided into three sections with the majority of the species included in sect. *Concentricae*, with globose to ovoid corms with ± concentric corm tunics. The corms are slightly asymmetric and have a small flattened side from which the roots emerge. Sect. *Hesperantha* has bell-shaped corms with a broad, flat base and concentric tunics, in some species with the margins drawn into long spines. Sect. *Radiatae* has similar flat-based corms,



HESPERANTHA. H. coccinea: A, flowering plant. ***H. petitiana***: B, flowering plant; C, flower. ***H. brevistyla***: D, capsules; E, seed.

also sometimes with marginal spines, but stands out in having the outer floral bract margins united around the axis for some distance and most species have a curved perianth tube. *Hesperantha radiata* of the section has the widest range in the genus, extending from northern Namaqualand in the northwest to Eswatini in the east. Except for *H. radiata* both sect. *Hesperantha* and sect. *Radiatae* are restricted to the winter-rainfall part of southern Africa and most species of both are narrow endemics, several known only from one or a few populations. Exceptional in the genus, *H. coccinea* has a rhizomatous rootstock, the base producing narrow runners or stolons that develop into new plants. In some populations cormlets are produced in the stem axils. The species has red or pink, long-tubed flowers of typical *Hesperantha* structure, and although it was placed in the genus *Schizostylis* in the past there is no doubt that it is nested in *Hesperantha* and probably closely related to the long-tubed species of eastern southern Africa.

Molecular studies show that *Hesperantha* is most closely related to *Geissorhiza*, an association also indicated by morphology and cytology. Both genera have woody corm tunics, and slightly asymmetric corms (unless bell-shaped with a flat base), and both have the same basic chromosome number $x = 13$, unique in the subfamily. The genera differ in floral structure, the styles of *Geissorhiza* typically dividing well above the mouth of the perianth tube, usually opposite the anthers, and eccentric with short, recurved branches.

Keys to species

Note: For leaf number include the entirely sheathing leaves on the upper part of the stem and examine more than one plant since the character is, to a limited extent, variable. Measure leaf width in ± middle of one of lower leaves.

A. Species of the southern African winter-rainfall zone (SW Namibia and South Africa in Namaqualand, the western Karoo, and the southwestern and southern Cape as far east as Port Elizabeth)

1a Outer floral bract margins united around axis in lower part (sometimes only near base); corm bell-shaped to triangular in outline, tunics sometimes forming scalloped, concave segments (sect. *Radiatae*):
2a Stamens and style branches included in tube; flowers pink . . . . . 85. *H. elsiae*
2b Stamens and style branches exserted; flowers white to creamy yellow or pale to deep pink:
3a Anthers erect and cohering around style; style dividing near anther apices and branches ± erect and twisted around one another . . . . . 87. *H. kiaratayloriae*
3b Anthers ascending to decumbent, never cohering; style dividing near or opposite mouth of perianth tube and diverging:
4a Bract margins united only basally; perianth tube 6–8 mm long. . . . . 79. *H. brevifolia*
4b Bract margins united for at least 2 mm:
5a Flowers large with tepals 16–25 mm long and tube 15–25 mm long; perianth pale pink with darker veins 86. *H. muirii*
5b Flowers smaller with tepals 10–17 mm long and tube 5–12 mm long; perianth white or cream-coloured to yellow:
6a Leaves terete. . . . . 80. *H. juncifolia*
6b Leaves ± plane, often somewhat thicker in middle and occasionally weakly cross-shaped:
7a Bracts usually united around stem for 6–10 mm, i.e., ± half their length; spike straight with bracts parallel to axis; plants mostly 200–600 mm high with (1–)5 to 15 flowers per spike . . . . . 83. *H. radiata*
7b Bracts usually united around stem for ± ⅓ their length; spike flexuose with bracts diverging from axis; plants short, mostly 50–100 mm high, with 1 to 5 flowers per spike:
8a Corm base with prominent horizontal spines; bracts united around axis for up to 3 mm . . . . . 81. *H. marlothii*
8b Corm base without spines; bracts united around axis for 3–5 mm . . . . . 82. *H. decipiens*
1b Outer floral bract margins free to base; corm triangular to bell-shaped in outline, with a horizontal or oblique flat base OR globose to ovoid with rounded to pointed base and tunics imbricate to concentric, sometimes splitting into vertical sections tapering to points above (sect. *Concentricae* and sect. *Hesperantha*):
9a Corm bell-shaped to triangular in outline, with a horizontal or oblique flat base (sect. *Hesperantha*):
10a Plants acaulescent or almost so with aerial part of stem enclosed by leaf sheaths:
11a Flowers white with purple marking at bases of outer tepals. . . . . 76. *H. luticola*
11b Flowers deep pink to red-purple. . . . . 74. *H. latifolia*
10b Plants with aerial stem:
12a Style dividing at or below middle of perianth tube; style branches and sometimes anthers partly or completely included in perianth tube:
13a Anthers and style branches fully included in perianth tube. . . . . 72. *H. cedarmontana*
13b Anthers exserted; style branches reaching at least to mouth of tube or upper halves exserted:
14a Plants with 3 basal leaves and without cauline leaves; flowers pale watery yellow; upper half of style branches exserted; perianth tube 12–16 mm long . . . . . 67. *H. sufflava*
14b Plants with basal and cauline leaves; flowers white; style branches reaching only to mouth of tube; perianth tube 9–12 mm long. . . . . 78. *H. saldanhae*
12b Style dividing at or just below mouth of perianth tube; anthers and style branches fully exserted and filaments usually at least partly exserted from perianth tube:
15a Flowers small, erect or inclined on straight spike; perianth tube slightly curved, 4–6 mm long; tepals 4–7 mm long; leaves either plane and sometimes with crisped margins, or terete to ovoid in cross section and hollow; seeds with sharp angles (minute wings) and seed coat with whitish spongy cells. . . . . 77. *H. spicata*

15b Flowers small to large, upright, on straight or flexuose spike; perianth tube straight, (5–)7–14 mm long; tepals 6–18 mm long; leaves plane with straight margins; seeds globose or sides lightly flattened by pressure, seed coat dark brown:
16a Corm base usually with prominent radiating spines or margins toothed; flowers diurnal, closing in late afternoon; perianth pink to red-purple, rarely yellow:
17a Perianth tube 6–11 mm long; tepals 18–25 mm long, at least twice as long as tube; plants of Namaqualand and Bokkeveld Mtns . . . . . 73. *H. pauciflora*
17b Perianth tube 20–25 mm long; tepals ± 10 mm long about half as long as tube; plants of SW Namibia 75. *H. longistyla*
16b Corm base with small teeth or scarcely serrated and usually without prominent spines; flowers diurnal or crepuscular, opening in late afternoon or after sunset; perianth white, cream-coloured or yellow:
18a Plants with 2 basal foliage leaves and 1 or 2 smaller cauline leaves largely to entirely sheathing stem:
19a Basal leaves usually prostrate, semi-succulent, 4–5 mm wide; filaments < 1 mm long; style branches ascending, ± 2.5 mm long . . . . . 71. *H. laxifolia*
19b Basal leaves ± falcate, 2–6 mm wide, not noticeably succulent; filaments ± 3 mm long; style branches spreading, ± 12 mm long. . . . . 70. *H. eremophila*
18b Plants with 3 or more basal leaves, erect or falcate :
20a Tepals uniformly white on reverse, ascending and cupped when fully open; perianth tube 12–14 mm long, ± as long as tepals; leaves falcate to trailing. . . . . 69. *H. dolomitica*
20b Outer or all tepals flushed red to brown outside, spreading horizontally when fully open; perianth tube 4–12 mm long, shorter than tepals; leaves falcate to trailing:
21a Leaves narrow, 1–2 mm wide; perianth tube 10–12 mm; plants of shallow soils on sandstone pavement . . . . . 68. *H. lithicola*
21b Leaves broader, 4–8 mm wide; perianth tube 4–9 mm long; plants of deeper sandy soils or on clay ground . . . . . 66. *H. falcata*
9b Corm globose to ovoid with rounded or pointed base, often asymmetric with flattened side and tunics imbricate to concentric, sometimes splitting into vertical sections tapering to points above (sect. *Concentricae*):
22a Plants acaulescent or stem extending barely above ground but sheathed by leaf bases:
23a Flowers small, tepals 8–10(–12) mm long . . . . . 26. *H. hantamensis*
23b Flowers larger, tepals 13–25 mm long:
24a Flowers yellow; flowers crepuscular, opening at sunset. . . . . 28. *H. flava*
24b Flowers pink to red-purple; flowers diurnal, closing at night. . . . . 27. *H. humilis*
22b Plants with aerial stem:
25a Leaves pilose to scabrid ciliate on veins and margins, sometimes visible only microscopically (×10 magnification):
26a Leaves hollow or ± solid and with narrow longitudinal grooves; finely scabrid ciliate along groove edges:
27a Leaves ± round in cross section; flowers white to cream-coloured, crepuscular, opening in late afternoon, closing late at night . . . . . 13. *H. teretifolia*
27b Leaves oval in cross section; flowers pink, mauve or purple, diurnal, closing in early afternoon . . . . . 9. *H. pilosa*
26b Leaf blade flat sometimes with margins and main vein somewhat thickened or raised; pilose along sheath and blade margins and veins:
28a Plants dwarf, up to 50 mm high with spikes 1(2)-flowered; flowers magenta; leaves sparsely hairy (rarely evidently smooth) . . . . . 11. *H. glabrescens*
28b Plants mostly at least 100 mm high, with spikes usually with > 2 flowers; flowers white, blue, magenta or mauve; leaf blades and sheath of third leaf sparsely to densely hairy:
29a Leaves sword-shaped to oblong; scale-like leaf below spike mostly 12–20 mm long, often pilose. . . . . 10. *H. pseudopilosa*
29b Leaves linear to narrowly sword-shaped; scale-like leaf below spike 3–5(–10) mm long, usually smooth:
30a Leaves finely hairy; main vein and margins raised and thickened, margins forming wing-like ridges; flowers ± nodding; perianth white . . . . . 12. *H. secunda*
30b Leaves glabrous or hairy; margins sometimes raised and wing-like; flowers upright; perianth white or pink to violet:
31a Leaf blades usually conspicuously hairy; leaf tips usually acute (plants of open sandy slopes and flats) . . . . . 9. *H. pilosa*
31b Leaf blades sparsely hairy (often visible only under hand lens); leaf tips obtuse (plants of rocky cliffs) . . . . . 8. *H. malvina*
25b Leaves and stems smooth:
32a Flowers with perianth tube curved at apex, thus nodding to ± pendent . . . . . 35. *H. bachmannii*
32b Flowers with ± straight perianth tube, thus upright to half nodding:
33a Flowers predominantly shades of pink, mauve or purple:
34a Perianth tube elongate, 20–35 mm long, exceeding tepals:
35a Leaves linear, 2–3 mm wide; tube 25–30 mm long and filaments ± 8–10 mm long . . . . . 5. *H. oligantha*
35b Leaves sword-shaped, 7–10 mm wide; tube ± 20 mm long and filaments ± 2 mm long . . . . . 23. *H. purpurea*
34b Perianth tube 7–17 mm long, usually shorter than to ± as long as (or slightly longer) than tepals:
36a Basal leaves ovate, 12–20 × 4–8 mm, margins and main vein hardly thickened; stem with a short, scale-like leaf in upper part of stem . . . . . 22. *H. truncatula*
36b Basal leaves sword-shaped to linear or falcate, 40–100 × 2–4 mm; stem lacking a scale-like leaf in upper part of stem:
37a Perianth tube 7–10 mm long; leaf margins and often main vein somewhat to heavily thickened. . . . . 19. *H. fibrosa*

37b Perianth tube 13–17 mm long; leaf margins and main vein not noticeably thickened . . . . . 2. *H. namaquana*
33b Flowers predominantly white, cream-coloured or yellow (excluding pigment on reverse of outer tepals):
38a Perianth tube mostly 16–20 mm long, as long to slightly longer than tepals . . . . . 37. *H. pallescens*
38b Perianth tube 3–12(–17) mm long, shorter than to slightly longer than tepals:
39a Plants consistently with 2 basal leaves and a third usually cauline and partly to entirely sheathing lower part of stem:
40a Plants tiny, mostly 40–50 mm high; tepals 5–10 mm long; leaves linear, 1–2 mm wide:
41a Tepals 5–6 mm long; leaves linear-filiform, < 1 mm wide. . . . . 18. *H. minima*
41b Tepals ± 10 mm long; leaves linear, 1.4–2.0 mm wide . . . . . 4. *H. rupicola*
40b Plants small to moderate in size, usually at least 100–200 mm high; tepals 8–13 mm long; leaves linear to lanceolate and 1–7 mm wide:
42a Cataphylls dark chestnut-brown; sheathing leaf somewhat inflated and quadrangular in cross section; perianth tube 2–3 mm long; anthers 3–4 mm long . . . . . 15. *H. quadrangula*
42b Cataphylls pale; sheathing leaf not inflated nor noticeably quadrangular in cross section; perianth tube 5–12 mm long; anthers 4.5–6.0 mm long:
43a Perianth tube 6–10 mm long; leaves ± linear, up to 1.5 mm wide, fleshy and somewhat thicker in middle (plants of Namaqualand) . . . . . 17. *H. flexuosa*
43b Perianth tube ± 12 mm long; leaves lanceolate–falcate, 3–6 mm wide, plane and firm (plants of the western Karoo). . . . . 16. *H. filiformis*
39b Plants mostly with 4 (or more) leaves, sometimes uppermost ± scale-like:
44a Leaves elliptic to ± rectangular with squared margins in cross section and seemingly hollow (interior with large empty parenchyma cells), without thickened margins or main vein. . . . . 7. *H. rivulicola*
44b Leaves ± plane, not hollow, and with main vein and margins present, often slightly thickened:
45a Corms relatively large, mostly 10–15 mm diam.:
46a Flowers predominantly white (outer tepals often coloured outside):
47a Outer tepals usually glossy bright red outside (rarely glossy brown); filaments mostly 4–5 mm long; flowers opening 16:00–16:30 (or earlier), then intensely fragrant; plants of well-drained open habitats. . . . . 20. *H. cucullata*
47b Outer tepals dull grey-brown on outer midline; filaments ± 2 mm long; flowers opening after dark, ± 19:00–19:30, then odourless of faintly scented; plants of wet marshes. . . . . 21. *H. palustris*
46b Flowers predominantly or entirely yellow:
48a Plants up to 60 mm tall, sometimes almost acaulescent; flowers moderate in size, tepals ± 20 mm long, uniformly yellow . . . . . 25. *H. karooica*
48b Plants 120–180 mm tall, with well-developed aerial stem; flowers large with tepals 25–35 mm long, usually but not invariably marked with dark chocolate-brown . . . . . 24. *H. vaginata*
45b Corms fairly small, mostly 3–8 mm diam.:
49a Stem with a short, sheathing leaf in upper half . . . . . 3. *H. acuta*
49b Stem without a short, sheathing leaf in upper half:
50a Leaves (3)4 or 5, lower 3 basal, linear to sword-shaped and acute, always erect; perianth tube 8–10 mm long; flowers cream-coloured, occasionally white; plants of Western Cape Atlantic Coast, mostly on granite outcrops . . . . . 1. *H. erecta*
50b Leaves (3)4, lower 2 basal, oblong and obtuse, normally prostrate; perianth tube ± 12 mm long; flowers white; plants of montane habitats growing in rocky sandstone soil . . . . . 6. *H. montigena*

B. Species of eastern South Africa, Lesotho and Eswatini, extending from Eastern Cape, South Africa, east of Port Elizabeth to the Limpopo River (the summer-rainfall part of the subcontinent with a prolonged dry season in the winter and spring months)

1a Perianth tube curved just below apex and flowers nodding to ± pendent; flowers white to cream-coloured, tepals often brown or dull red outside:
2a Outer bract margins free to base; corms ± globose . . . . . 36. *H. bulbifera*
2b Bract margins united around spike axis for up to half their length; corms ± bell-shaped with flat base:
3a Perianth tube 18–30 mm long; plants flowering in spring . . . . . 84. *H. longicollis*
3b Perianth tube 8–15 mm long; plants flowering in early to midsummer, mostly November to January . . . . 83. *H. radiata*
1b Perianth tube mostly straight, curved in two species with pink flowers; flowers variously pink to mauve, red, or white to creamy yellow, sometimes outer tepals shaded red to purple or brown outside:
4a Flowers produced in spring (dry season) when foliage leaves absent or partly emergent; leaves 1 or 2, fully developed after flowering and produced on separate shoots (occasionally old, partly to completely dry foliage leaves still attached to flowering stem at flowering):
5a Flowers borne close to ground level, raised above ground by perianth tube 9–14 mm long; tepals short, 6–7 mm long. . . . . 34. *H. crocopsis*
5b Flowers borne above ground on short flowering stem; perianth tube short or long; tepals 14–22 mm long:
6a Perianth tube 5–10 mm long; tepals white or pale pink inside; outer tepals lightly to strongly marked purple to brownish outside; leaves 2 or more, ± terete. . . . . 32. *H. schelpeana*
6b Perianth tube 20–27 mm long; tepals uniformly creamy white; leaf solitary, falcate, plane . . . . . 33. *H. altimontana*
4b Flowers produced in spring, summer or autumn (dry or rainy season) but always bearing fully developed foliage leaves on flowering stem:
7a Perianth tube (14–)18–60 mm long, sometimes curved near apex; seeds (where known) often with a prominent wing or thread-like appendage at one or both ends:

8a Perianth tube strongly curved near apex and tepals vertically oriented; stamens and style branches unilateral and declinate; anthers 8–13 mm long, dark brown . . . . . 60. *H. grandiflora*
8b Perianth tube straight or weakly curved above, tepals spreading horizontally or weakly ascending; stamens ascending to erect, and style branches spreading but not unilateral; anthers 3–9 mm long, yellow to whitish, or dark brown to black in three species:
9a Leaves and often stem weak and trailing; plants of cliffs and rock outcrops:
10a Plants with cormlets in lower leaf axils (sometimes lost when handled); leaves 4 to 6 (plants of Eastern Cape) . . . . . 61. *H. huttonii*
10b Plants without cormlets in lower leaf axils; leaves 4 or sometimes 3:
11a Flowers mauve-pink; perianth tube mostly 18–30 mm long; anthers 6–8 mm long (plants of Mpumalanga and Limpopo) . . . . . 63. *H. brevicaulis*
11b Flowers deep pinkish purple; perianth tube 18–42 mm long; anthers 3–6 mm long; (plants of KwaZulu-Natal and nearby):
12a Perianth tube 18–25 mm long; anthers 3–4 mm long. . . . . 64. *H. curvula*
12b Perianth tube mostly 30–42 mm long; anthers mostly 5–6 mm long. . . . . 65. *H. scopulosa*
9b Stem erect and leaves usually firm and upright; plants of grassland, open slopes, or streams and marshes:
13a Filaments 6–12 mm long:
14a Plants of streams, usually growing in water; rootstock a rhizome or vestigial, but producing slender underground rhizomes and sometimes axillary cormlets at aerial nodes; flowers pink or red, tepals spreading horizontally. . . . . 59. *H. coccinea*
14b Plants of grassland, rocky slopes or grassy marshes; rootstock a corm with woody tunics and stems lacking axillary cormlets; flowers pink to mauve-pink . . . . . 56. *H. woodii*
13b Filaments 3–6 mm long:
15a Leaves scabrid-pubescent; stamens erect and style branches evidently remaining suberect and noticeably shorter than anthers. . . . . 54. *H. pubinervia*
15b Leaves smooth; stamens and style branches ascending to spreading, style branches as long or longer than stamens:
16a Plants flowering in spring, August to October; flowers white, often pink outside . . . . . 31. *H. longituba*
16b Plants flowering in summer and autumn or winter, December to April or July; flowers pink to rosy purple:
17a Perianth tube mostly 45–60 mm long; anthers dark brown-black . . . . . 58. *H. stenosiphon*
17b Perianth tube mostly 14–25 mm long; anthers yellow or purple:
18a Style branches 18–20 mm long, exceeding anthers in closed flowers . . . . . 57. *H. mtamvunae*
18b Style branches 10–16 mm long, not exceeding anthers in closed flowers:
19a Spike with 5 to 11 flowers; leaves 3.0–5.5 mm wide; perianth tube 14–20 mm long; anthers and pollen yellow . . . . . 55. *H. pulchra*
19b Spike with (1)2 or 3 flowers; leaves 1.5–2.0 mm wide; perianth tube 16–23 mm long; anthers and pollen dark purple . . . . . 62. *H. hutchingsiae*
7b Perianth tube 3–15(–22) mm long, always straight; seeds (where known) globose or lightly angled, sometimes ridged on angles but not winged:
20a Plants flowering in spring, August to October, before main rainy season; flowers pale pink or white:
21a Perianth tube mostly 14–22 mm long; flowers crepuscular, white, opening in late afternoon and closing after dark . . . . . 31. *H. longituba*
21b Perianth tube mostly 4–12 mm long; flowers diurnal, white or pink to mauve-pink, outer tepals often flushed or feathered pink to mauve outside, closing in late afternoon:
22a Leaves usually 3 (rarely 4), lower 2 basal and with long, linear blades 2–3 mm wide, upper 1(or 2) largely or entirely sheathing; spike usually 2- or 3-flowered; plants of coastal KwaZulu-Natal and Transkei [northern Eastern Cape]. . . . . 51. *H. modesta*
22b Leaves usually 4, 2 basal, one subbasal and partly sheathing and a short, sheathing leaf in upper part of stem, basal leaves linear to oblong-lanceolate, 1–6 mm wide; spike mostly 1- to 6-flowered; plants of interior southern Africa, from southern Mpumalanga to Grahamstown in the south:
23a Leaves oblong-lanceolate, 2–6 mm wide; spike mostly 2- to 6-flowered; perianth tube (7–)9–12 mm long . . . . . 29. *H. candida*
23b Leaves linear, 1–2 mm wide; spike 1- or 2-flowered; perianth tube 4–6 mm long . . . . . 30. *H. debilis*
20b Plants flowering in wet season, summer and autumn, mainly mid-November to April, rarely earlier; flowers mostly pink to mauve or white to cream-coloured:
24a Plants growing on rocks, often on cliffs, stem weak and drooping; leaves ± linear:
25a Flowers pink, mauve or white; perianth tube 6–8 mm long; anthers 6.0–7.5 mm long; plants of KwaZulu-Natal . . . . . 53. *H. gracilis*
25b Flowers white, sometimes flushed pale pink on fading; perianth tube 7–11 mm long; anthers ± 4 mm long; plants of Mpumalanga. . . . . 48. *H. saxicola*
24b Plants not hanging from cliffs, stem erect:
26a Blades of lower leaves terete and grooved; flower mauve-pink. . . . . 14. *H. helmei*
26b Blades of lower leaves not terete, ± plane, sometimes with thickened and raised margins and veins; flowers white, pink or yellow:
27a Leaf blades with thickened margins, main and secondary veins; marginal and main vein thickenings with narrow wings arching over blade surface . . . . . 49. *H. hygrophila*
27b Leaf blades with or without thickened margins and main vein, but secondary veins not or hardly thickened and midrib and marginal thickenings rounded, not wing-like and arching over blade surface:
28a Flowers white to cream-coloured or palest yellow entirely or outer tepals pink or red outside:

29a Outer tepals speckled or uniformly bright red outside:
30a Stem usually 70–120 mm high (taller in cultivated plants); tepals 9.5–15.0 mm long; anthers 3–4 mm long; plants of KwaZulu-Natal . . . . . 43. *H. alborosea*
30b Stem usually 400–500 mm high; tepals 12–15 mm long; anthers 6–7 mm long; plants of Mpumalanga . . . . . 50. *H. rupestris*
29b Tepals uniformly white to cream-coloured, or sometimes faintly pink on outside of tepals, especially on fading:
31a Flowers tiny; tepals ± 5 mm long; perianth tube ± 4 mm long; anthers ± 2 mm long; leaves soft-textured . . . . . 52. *H. umbricola*
31b Flowers medium to large; tepals 12–20(–23) mm long; perianth tube (5.5–)6.5–8.5 mm long; anthers 5–8 mm long; leaves firm, with thickened margins and main vein:
32a Tepals uniformly cream-coloured to pale yellow, remaining cream-coloured on fading, 14–20(–23) mm long; filaments 3–4 mm long; anthers mostly golden-brown, dark when dry, 5–7 mm long . . . . . 46. *H. lactea*
32b Tepals uniformly white to cream-coloured or faintly flushed pink on outside of outer tepals especially on fading, 12–16 mm long; filaments 2.5–3.5 mm long; anthers creamy white, not darker on fading, mostly 6.5–8.0 mm long . . . . . 47. *H. inconspicua*
28b Flowers pink to mauve entirely:
33a Leaves mostly 0.7–2.0 mm wide, linear; perianth tube 3–6 mm long:
34a Stem slender and evidently soft; spike with 1 to 3 flowers widely spaced; tepals 6–8 mm long . . . . . 42. *H. exiliflora*
34b Stem slender but firm and wiry; spike mostly with 3 to 8 flowers; tepals 10–14 mm long:
35a Leaves usually 5 (unless plants depauperate), mostly 2–4 mm wide; tepals 13–16 mm long; anthers 4.0–4.5 mm long . . . . . 40. *H. schlechteri*
35b Leaves usually 4, mostly 1–2 mm wide; tepals 10–12 mm long; anthers 4.5–5.0 mm long . . . 39. *H. glareosa*
33b Leaves > 5 mm wide, falcate; perianth tube mostly 6–13(–15) mm long:
36a Leaves 4 or 5, lower 3 basal, often ± as long as stem or slightly longer; anthers 2.3–5.5 mm long and with white pollen; perianth tube 7–12(–15) mm long:
37a Tepals 7–9 mm long; perianth tube 7–9 mm long; anthers 2.3–3.0 mm long; style branches unusually short, suberect, reaching to base or lower ⅓ of anthers; outside of outer tepals pale greenish toward base and with darker green longitudinal veins . . . . . 44. *H. brevistyla*
37b Tepals 12–16 mm long; perianth tube 5–14 mm long; anthers 4–6 mm long; style branches 10–12 mm long, exceeding anthers in closed flower; outer tepals ± uniformly coloured outside:
38a Perianth tube mostly 12–14 mm long; anthers 4.5–5.5 mm long; perianth pale pink; stem and leaves weak and trailing . . . . . 41. *H. leucantha*
38b Perianth tube to 10 mm long; anthers 4–6 mm long; perianth middle to deep pink; stem and leaves ± erect . . . . . 40. *H. schlechteri*
36b Leaves normally 4, sometimes 3, with lower 2 basal, usually ± ½–⅔ as long as stem; anthers mostly 3–7 mm long and with yellow or white pollen; perianth tube (4.5–)6.0–12.0 mm long:
39a Spike with 1 or 2 flowers; tepals 10–12 mm long; uppermost leaf inserted in lower half of stem and not much distant from lower leaves . . . . . 45. *H. ingeliensis*
39b Spike with (2–)4 to many flowers; tepals 12–16 mm long; uppermost leaf often inserted in upper half of stem and distant from lower leaves . . . . . 38. *H. baurii*

Sect. 1. **Concentricae** *Goldblatt* in Annals of the Missouri Botanical Garden 69: 375 (1982) [as sect. *Concentrica*]. Type: *Hesperantha pilosa* (L.f.) Ker Gawl.

Sect. *Imbricatae* Goldblatt: 376 (1982) [as sect. *Imbricata*]. Type: *Hesperantha humilis* Baker

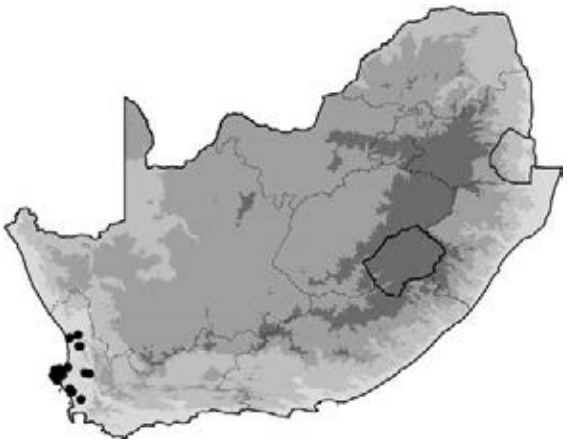
Plants with small to large asymmetric corms, ± rounded at base, usually with a flattened lateral ridge; older corm tunics splitting from base into vertical segments or into overlapping layers notched at base. *Spike* with floral outer bract margins free to base. *Flowers* variously coloured, usually with a straight perianth tube (curved near apex in *H. bachmannii, H. bulbifera* and *H. grandiflora*).

Species 65: occurring across entire range of the genus from Western Cape, South Africa, to Ethiopia.

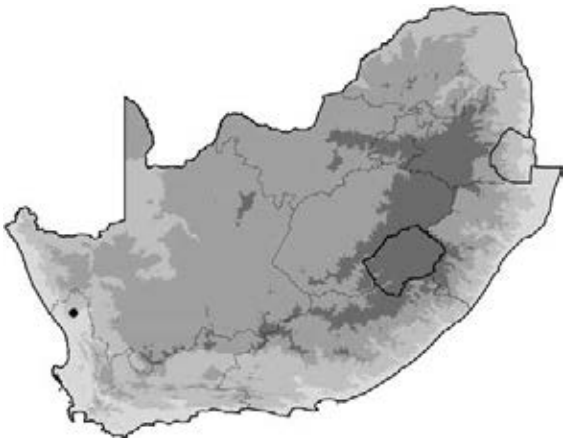
1. **Hesperantha erecta** *(Baker) Benth. ex Baker*, Handbook of the Irideae: 150 (1892); Goldblatt: 45 (1984). *Geissorhiza erecta* Baker: 238 (1876a). Type: South Africa, [Western Cape], Olifants R., July–Aug. 1830, *J. F. Drège 8468* (K, lecto., designated by Foster: 11 (1948); K, L, P, isolecto.).

Hesperantha semipatula R.C.Foster: 24 (1948). Type: South Africa, [Western Cape], Vogelfontein, *Schlechter 8521* (K, holo.; B, BOL, GRA, K, L, MO, PH, PRE, US, Z, iso.).

Plants (60–)120–220 mm high. *Corm* ovoid, with obliquely flattened side, 6–8 mm diam.; tunics dark brown, ± concentric layers fragmenting into elliptic segments. *Stem* unbranched, smooth. *Leaves* 3(5), linear to lanceolate, mostly basal, reaching ± to base of spike, (2)5–8 mm wide, soft-textured, main vein and



Distribution of ***Hesperantha erecta***.



Distribution of ***Hesperantha namaquana***.

margins barely thickened, uppermost cauline and largely sheathing. *Spike* mostly 3- to 6-flowered; bracts 8–15 mm long. *Flowers* diurnal, white to creamy yellow, sometimes outer tepals flushed light brown to grey outside, slightly foetid-smelling; perianth tube funnel-shaped, 8–11 mm long; tepals spreading, narrowly ovate, 10–15 mm long. *Filaments* ascending, ± 5 mm long; anthers 4–6 mm long, pale yellow; pollen whitish. *Style branches* spreading, reaching nearly ± middle of anthers in closed flower. *Capsules* ovoid, 6–9 mm long. *Seeds* light brown, angular. *Chromosome number* 2*n* = 26. *Flowering time*: August to mid-September.

Distribution and ecology: restricted to the Atlantic Coast and near interior of Western Cape, South Africa, from near Mamre north to the Olifants River Valley near Klawer, especially common in the Saldanha Bay area; often on granite outcrops.

Diagnosis: an unspecialised species, *Hesperantha erecta* is recognised by the relatively short stature, rarely exceeding 150 mm, small corm with the tunics fragmenting into elliptical segments, and pale yellow to creamy white flower open during the day, the outer tepals only lightly pigmented grey to light brown outside. Although the flowers are white to creamy yellow, they are not, as might be expected in the genus, crepuscular as far as known and have been recorded opening ± midday and at 14:00 and closing at ± 16:00, thus before sunset.

2. **Hesperantha namaquana** *Goldblatt* in Journal of South African Botany 50: 47 (1984). Type: South Africa, [Northern Cape], Bitterfontein, Kareebergen, 24 July 1896, *Schlechter 8304/5* (K, holo.; B, BOL, PRE, iso.).

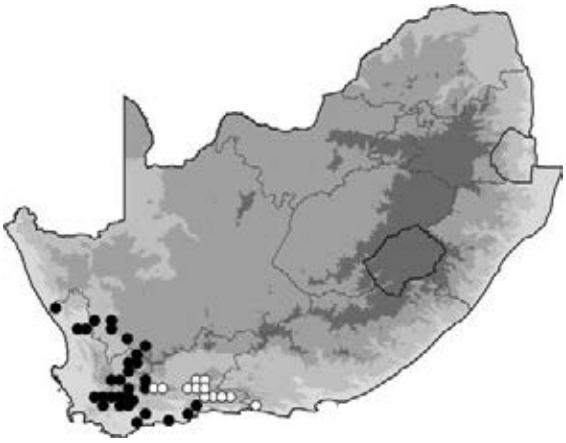
Plants 80–150 mm high. *Corm* ovoid, with obliquely flattened side, ± 9 mm diam.; tunics dark brown, ± concentric layers fragmenting into elliptic segments. *Stem* unbranched, smooth. *Leaves* 3(4), lower 2 basal, falcate, ± half as long as stem, 3–9 mm wide, main vein and margins barely thickened, upper 1 or 2 leaves cauline and largely sheathing. *Spike* mostly 2- to 5-flowered; bracts (12–)15–22 mm long. *Flowers* diurnal, ± salver-shaped, white to pale pink, outer tepals flushed pink to red outside; perianth tube funnel-shaped, 13–17 mm long, cylindric; tepals narrowly ovate-elliptic, 10–15 mm long, spreading. *Filaments* ascending, ± 3 mm long; anthers ± 6 mm long, pale yellow; pollen whitish. *Style branches* spreading, 8–10 mm long, exceeding anthers in closed flower. *Capsules* ovoid, 10–15 mm long. *Seeds* light brown, angular. *Flowering time*: late July to mid-August.

Distribution and ecology: a poorly documented and evidently very narrow endemic restricted to southern Namaqualand near Bitterfontein in Western Cape, South Africa; growing on sandy banks of watercourses.

Diagnosis: *Hesperantha namaquana* is recognised by the ovoid corm with prominently flattened side and relatively large pale pink to nearly white flowers with perianth tube 13–17 mm long and slightly shorter tepals 10–15 mm long.

3. **Hesperantha acuta** *(Licht. ex Roem. & Schult.) Ker Gawl.*, Genera Iridearum: 91 (1827); Goldblatt: 48 (1984). *Ixia acuta* Licht. ex Roem. & Schult.: 383 (1817). Type: South Africa, [Northern Cape], foot of the Roggeveld Mtns, Aug. 1805, *Lichtenstein s.n.* (B, holo.).

Plants mostly 100–250 mm high. *Corm* ovoid to globose, with obliquely flattened side, 6–8 mm diam.; tunics dark brown, ± concentric, layers fragmenting irregularly into sections. *Stem* unbranched, smooth. *Leaves* mostly 4, lower 2 basal, linear to lanceolate, reaching ± to base of spike, 2–3 mm wide, soft-textured, main vein slightly thickened, uppermost leaf cauline, often entirely sheathing. *Spike* 2- to 5(–8)-flowered; bracts mostly 8–15 mm long, often becoming dry above. *Flowers* crepuscular, salver-shaped, white or yellow, outer tepals flushed red to brown outside; perianth tube funnel-shaped, 8.5–15.0 mm long; tepals, narrowly ovate, 9.5–17.0 mm long, inner slightly shorted and wider, spreading. *Filaments* ± erect, 2.0–4.5 mm long; anthers 5.3–8.0 mm long, horizontal, pale yellow; pollen whitish.



Distribution of ***Hesperantha acuta*** subsp. ***acuta***, ●; subsp. ***tugwelliae***, ○.

Style branches ± 8 mm long, spreading, reaching middle of anthers or slightly exceeding them in closed flower. *Capsules* ovoid, 6–10 mm long. *Seeds* light brown, angular. *Chromosome number* 2*n* = 26. *Flowering time*: July to mid-September.

Distribution and ecology: a species of the dry interior of the South African winter-rainfall zone, extending from southern Namaqualand and the interior valleys of the Cederberg in Western Cape and the Roggeveld Mtns in Northern Cape though the Worcester–Robertson Karoo and the Little Karoo as far east as Joubertina in the Long Kloof in Eastern Cape.

Diagnosis: including both yellow- and white-flowered populations, *Hesperantha acuta* is recognised by the relatively large, rounded corms with obliquely flattened lateral ridge, this sometimes particularly prominent, and concentric tunics. Plants usually have four leaves, the uppermost, entirely sheathing. Flowers of both colour morphs, treated as separate subspecies, are crepuscular. The white-flowered populations occur in the west of its range and the yellow in the southeast. Flowers of white-flowered plants are slightly smaller that those with yellow flowers, with shorter filaments but longer style branches.

Key to subspecies

1a Flowers white, outer tepals usually red outside; filaments exserted ± 1.5–2.5 mm from tube . . . . . 3a. subsp. *acuta*

1b Flowers yellow, outer tepals yellow or sometimes light brown outside; filaments exserted ± 4 mm from tube . . . . . 3b. subsp. *tugwelliae*

3a. subsp. **acuta**

Hesperantha discolor N.E.Br.: 451 (1931). Type: South Africa, [Western Cape], Worcester, Osplaats–Tunnel Sidings, *Rogers 16740* (K, holo.; K, iso.).

Flowers white, outer tepals often red(brown) outside; perianth tube 8.5–12.0 mm long; tepals 9.5–16.0 mm long. *Filaments* exserted ± 1.5–2.5 mm; anthers 5.3–7.0 mm long. *Style* with branches reaching to ± upper ⅓ of anthers or shortly exceeding them in closed flower. *Flowering time*: August to mid-September.

Distribution and ecology: extending from the slopes of the Bokkeveld Mtns in the north though the Cederberg and Roggeveld and Worcester Karoo to Matjiesfontein and the western Little Karoo.

Diagnosis: distinguished from subsp. *tugwelliae* by the white flowers, the outer tepals usually bright red outside. The slightly smaller flowers have tepals 9.5–16.0 mm long and the filaments are exserted up to 2.5 mm.

3b. subsp. **tugwelliae** *(R.C.Foster) Goldblatt & J.C.Manning* in Bothalia 37: 182 (2007). *Hesperantha tugwelliae* R.C.Foster: 26 (1948). Type: South Africa, [Western Cape], Prince Albert, *Tugwell s.n.* as *Nat.Bot.Gard.1151/29* (K, holo.; BOL, MO, iso.).

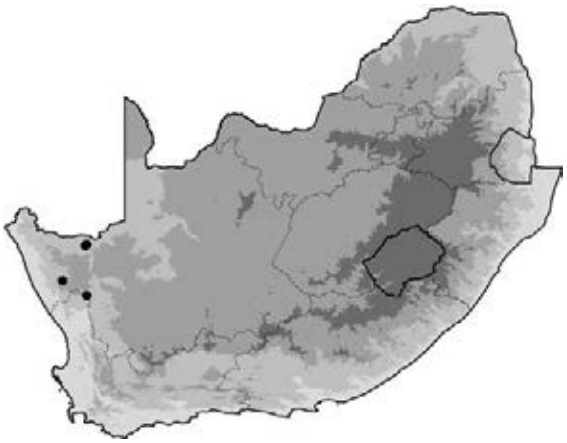
Flowers yellow, outer tepals flushed brown outside; perianth tube 12.5–15.0 mm long; tepals 12.5–16.0 mm long. *Filaments* exserted ± 4 mm; anthers 6–8 mm long. *Style* with branches reaching to ± middle of anthers in closed flower. *Flowering time*: August to mid-September.

Distribution and ecology: occurring in the east of the range of *Hesperantha acuta*, along the northern foothills of the Swartberg Mtns, locally in the Kammanassie Mtns of the Little Karoo, and in the Long Kloof to the south in the vicinity Joubertina.

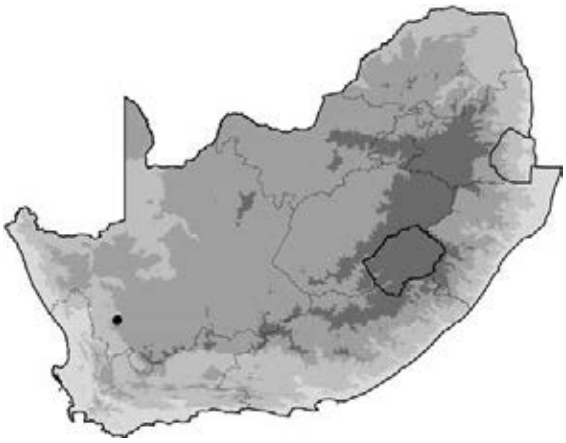
Diagnosis: subsp. *tugwelliae* is distinguished from subsp. *acuta* by the clear yellow flowers, often flushed brown outside, and with a strong, carnation-like scent. Relatively larger, the flowers have a perianth tube up to 15 mm long and tepals up to 16 mm long. The filaments are well exserted up to 4 mm from the mouth of the tube vs. up to 2.5 mm in subsp. *acuta*, and the style branches reach to ± the middle of the anthers in the closed flower whereas those of subsp. *acuta* reach close to or exceed the anther tips.

4. **Hesperantha rupicola** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 403 (2003). Type: South Africa, [Northern Cape], Bushmanland, Farm Naab, E of Springbok, south-facing quartzite rocks, 14 Aug. 2000, *P. Desmet 3009* (NBG, holo.).

Plants 30–50 mm high. *Corm* globose with obliquely flattened side, 9–11 mm diam.; tunics dark brown, ± concentric layers. *Stem* unbranched, smooth. *Leaves* 3, all basal, spreading or drooping, ± as long to twice as long as stem, up to 90 mm long, ± linear to falcate, 1.4–3.5 mm wide, soft-textured, midrib and margins barely thickened. *Spike* 1-, occasionally 2- or 3-flowered; bracts



Distribution of ***Hesperantha rupicola***.



Distribution of ***Hesperantha oligantha***.

9–10 mm long, soft-textured, pale green or becoming membranous above, inner membranous with 2 green keels. *Flowers* white, outer tepals lightly flushed mauve outside; perianth tube funnel-shaped, ± 10 mm long; tepals ovate, ± 10 × 3–4 mm, obtuse, spreading. *Filaments* ± 4 mm long; anthers ± 5 mm long, shortly tailed, pale yellow; pollen whitish. *Style branches* spreading over tepals, reaching nearly to anther tips in closed flower. *Flowering time*: August.

Distribution and ecology: restricted to interior Namaqualand and western Bushmanland in Northern Cape, South Africa; in shade on south-facing slopes on cliffs and among boulders, in quartzite or granite rocks.

Diagnosis: *Hesperantha rupicola* can be distinguished by its short stature, up to 50 mm tall, soft-textured, spreading to drooping leaves, and a 1- to 3-flowered spike of moderate-sized white flowers. The relatively large corms have an oblique flat side and ± concentric tunics, and most closely resemble those of *H. acuta*, suggesting a possible relationship with this interior Western Cape and western Karoo species.

5. **Hesperantha oligantha** *(Diels) Goldblatt* in Journal of South African Botany 50: 87 (1984). *Lapeirousia oligantha* Diels: 117 (1909). Type: South Africa, [Northern Cape], Hantam Mtns, Oct. 1900, *F. Diels 725* (B, holo.; MO, iso.).

Plants mostly 60–80 mm high. *Corm* ovoid with obliquely flattened side, 4–5 mm diam.; tunics of dark brown, ± imbricate layers fragmenting into sections from base. *Stem* unbranched, sheathed below by membranous cataphyll. *Leaves* 3 or 4, all ± basal or uppermost cauline, falcate or ± straight, 30–70 × 2–3 mm, soft-textured, main vein slightly thickened. *Spike* (1)2- or 3-flowered; bracts 15–23(–30) mm long, inner concealed by outer. *Flowers* diurnal, salver-shaped, glossy red-purple; perianth tube cylindric, expanded neat apex, 25–35 mm long; tepals subequal, oblanceolate 15–18 × 3 mm, spreading. *Filaments* ± erect, 10 mm long; anthers ± 5 mm long, horizontal, pale yellow; pollen yellow. *Style branches* ± 10 mm long, spreading. *Flowering time*: October, probably also in late September.

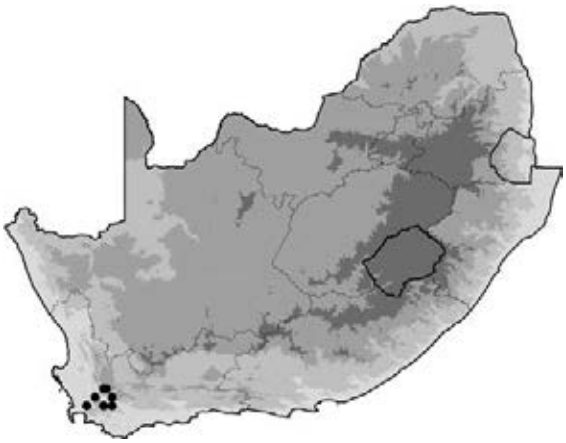
Distribution and ecology: endemic to the summit plateau of the Hantamsberg above Calvinia in Northern Cape, South Africa; very local and restricted to shallow pools and streambanks.

Diagnosis: *Hesperantha oligantha* is unmistakable in its 2- or 3-flowered spikes of uniformly red-purple flowers with a perianth tube up to 35 mm long, and long, narrow tepals 15–18 × 3 mm. The plants are quite small, mostly less than 80 mm tall, with narrow, falcate leaves 2–3 mm wide. The flowers have the typical adaptations for pollination by long-proboscid flies of the genus *Prosoeca* (Manning & Goldblatt 1996).

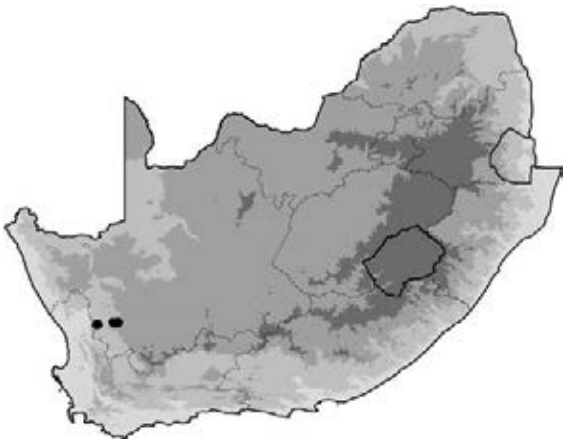
6. **Hesperantha montigena** *Goldblatt* in Journal of South African Botany 50: 51 (1984). Type: South Africa, [Western Cape], Hex River Mtns, 11 Oct. 1980, *Esterhuysen 35528* (BOL, holo.; K, MO, iso.).

Plants 50–150(–250) mm high. *Corm* ovoid-elliptic with obliquely flattened side, 3–6 mm diam.; tunics dark brown, ± concentric, layers irregularly notched below. *Stem* unbranched. *Leaves* mostly 4, lower 2 basal, ± lanceolate, often prostrate, mostly 40–100 × 2–8 mm, soft-textured, main vein slightly thickened, upper 2 leaves cauline, largely to entirely sheathing. *Spike* 2- to 4(–8)-flowered; bracts mostly 9–15 mm long, often flushed red distally. *Flowers* crepuscular, salver-shaped, white, outer tepals usually flushed red outside; perianth tube ± cylindric, 12–15 mm long; tepals elliptic, 14–16 mm long, spreading. *Filaments* ± erect, 3–5 mm long; anthers 5–6 mm long, horizontal, white; pollen white. *Style branches* ± 8 mm long, spreading, reaching middle of anthers in closed flower. *Capsules* ovoid, ± 8 mm long. *Seeds* light brown, softly angular. *Chromosome number* $2n = 26$. *Flowering time*: October to late November.

Distribution and ecology: a montane species, occurring at high elevations,1 200–2 000 m, in the mountains of



Distribution of ***Hesperantha montigena***.



Distribution of ***Hesperantha rivulicola***.

Western Cape, South Africa, from the Hex River Mtns and Keeromsberg south to the Riviersonderend and Groot Drakenstein Mtns; in stony sandstone-derived soils, flowering well only after fire.

Diagnosis: *Hesperantha montigena* is recognised by the moderate-sized crepuscular flowers, white with the outer tepals red outside, with tepals 14–16 mm long and as long as to slightly longer than the perianth tube. Plants bear four leaves, the lower two basal and largest, often prostrate or nearly so and the upper leaves small and sheathing the flowering stem. Plants mostly have two to four flowers per spike but plants with up to eight flowers are known.

7. **Hesperantha rivulicola** *Goldblatt* in Journal of South African Botany 50: 60 (1984). Type: South Africa [Northern Cape], Calvinia District, stream beds below the Hantamsberg, 16 Sept. 1980, *P. Goldblatt 5807* (MO, holo.; B, BOL, E, K, NBG, PRE, S, US, WAG, iso.).

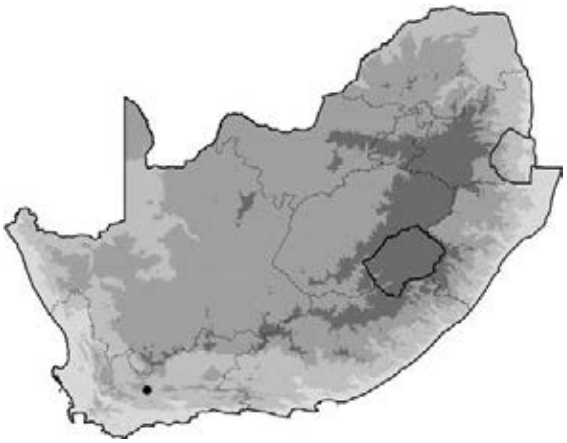
Plants mostly 150–300 mm high. *Corm* ± ovoid with obliquely flattened side, 7–10 mm diam.; tunics dark brown, ± concentric, layers fragmenting irregularly into sections. *Stem* simple or 1- to 3-branched from base, sheathed below by membranous cataphyll. *Leaves* usually 3 or 4, lower 2 or 3 basal, ± linear, slightly inflated, reaching ± to base of spike, 2–3 mm wide, soft-textured, veins and margins not raised, uppermost leaf cauline, with elongate sheath and short free apex. *Spike* 2- to 5-flowered; bracts mostly 9–12 mm long, green or becoming dry above. *Flowers* crepuscular, salver-shaped, white, outer tepals flushed brown outside, sweetly scented; perianth tube cylindric, funnel-shaped, 7–10 mm long; tepals ± elliptic, 14–15 mm × 4–5 mm, inner slightly shorter and wider, spreading. *Filaments* ± erect, ± 3 mm long; anthers ± 6 mm long, horizontal, white; pollen white. *Style branches* ± 8 mm long, spreading. *Chromosome number* 2*n* = 26. *Flowering time*: mainly September.

Distribution and ecology: restricted to the Bokkeveld Mtns and Hantamsberg in the Calvinia District of Northern Cape, South Africa, occurring on several farms near Nieuwoudtville and on the Hantamsberg, both on the lower slopes and summit plateau; among rocks in seasonal watercourses on sandy, shale or dolerite substrates.

Diagnosis: although not particularly distinctive in its white, relatively large flowers, *Hesperantha rivulicola* is recognised by the small corms with concentric tunics and unusual, pale green leaves with slightly inflated blades without raised veins or margins. In cross section the leaves are oval to almost rectangular with rounded margins and internally have large, spongy cells. The uppermost leaf has an unusually long sheath, enclosing a good part of the stem with a short free apex. The flowers are pollinated by large anthophorine bees when they open after 16:00 and after dark by a range of settling moths.

8. **Hesperantha malvina** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 405 (2003). Type: South Africa, [Western Cape], Anysberg, Farm Tapfontein, W of Matjiesgoedkop, ledges on cliff face, 3 Sept. 1987, *Lloyd 1120* (NBG. holo.).

Plants 100–270 mm high, stem unbranched. *Corm* ovoid, ± 6 mm diam.; tunics woody, concentric. *Stem* unbranched, ?smooth. *Leaves* 4, lower 2 basal, linear-oblong, blades ± 2 mm wide, margins and main vein lightly thickened and sparsely long-hairy in lower ½, third leaf largely sheathing with short free apex, uppermost leaf entirely sheathing, partly membranous, 8–22 mm long, inserted shortly below spike. *Spike* 1- to 3-flowered; bracts 10–14 mm long, green or flushed purple, margins and apices membranous. *Flowers* mauve, diurnal; perianth tube cylindric below, expanded near apex, 8–9 mm long; tepals subequal, elliptic, 13–14 × 4–5 mm, spreading at right angles to tube. *Filaments* ± 3 mm long; anthers 5.5–6.0 mm long, yellow; pollen yellow. *Style branches* ± 7 mm long, reaching upper ⅓ of anthers in bud, spreading when mature. *Flowering time*: late September to early October.



Distribution of ***Hesperantha malvina***.

Distribution and ecology: restricted to the Anysberg in the Little Karoo, Western Cape, South Africa; on damp, south-facing sandstone cliffs and rocks.

Diagnosis: assigned to *Hesperantha pilosa* when first collected because it has sparsely hairy leaves, *H. malvina* actually bears little further resemblance to that species. The flowers are in general larger, with broadly elliptic tepals up to 14 mm long and 4–5 mm wide, while the leaves are linear-oblong and somewhat obtuse at the tips. In *H. pilosa* the tepals are seldom as long as 14 mm, rarely more than 3 mm wide, and the leaves are usually linear or linear-lanceolate and acute. The habitat, rocky sandstone cliffs, also differs from that of *H. pilosa,* which grows on granitic or sandy flats or lower slopes.

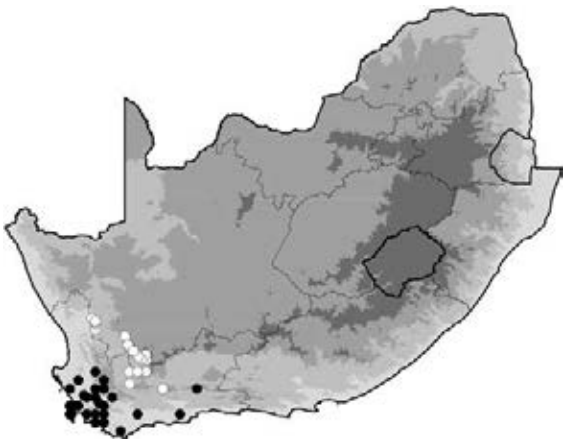
9. **Hesperantha pilosa** *(L.f.) Ker Gawl.* in König & Sims, Annals of Botany 1: 225 (1804a); Goldblatt: 54 (1984). *Ixia pilosa* L.f.: 92 (1782). Type: South Africa, [Western Cape], hills around Cape Town, Sept., *C.P. Thunberg s.n.* [UPS–THUNB 979, lecto., designated by Goldblatt: 54 (1984)].

Plants mostly 100–250 mm high. *Corm* ovoid, ± 6 mm diam.; tunics woody, concentric. *Stem* unbranched, usually sparsely hairy, with minute, scale-like bract in upper ⅓. *Foliage leaves* 3, lower 2 linear to narrowly sword-shaped, plane or with main vein and margins raised, or oval in cross section and ribbed, 1–4 mm wide, hairy to minutely ciliate, cilia horizontal on edges of ribs or margins, margins sometimes slightly winged, upper leaf partly sheathing lower half of stem, usually ribbed. *Spike* (2)3- to 5-flowered, bracts subequal, 8–10 mm long, outer green or becoming ± pale and membranous, inner membranous with 2 green keels, forked at apex or entire. *Flowers* ± salver-shaped, either diurnal and blue or deep pink (rarely white), with darker veins outside OR crepuscular and white to pale pink to lilac with outer tepals dark outside, unscented or with acrid, sour odour; perianth tube 6–8 mm long; tepals 9–16 × 2–5 mm, inner slightly shorter and wider than outer. *Filaments* 2.0–2.5 mm long; anthers (4)5–7 mm long, horizontal or ascending, pale yellow or white; pollen yellow to white. *Style branches* ultimately spreading, 5–9(11) mm long, reaching to middle to upper ⅓ of anthers, sometimes exceeding them, ± white, rarely purple. *Capsules* ± globose, 5–6 × 4–5 mm. *Seeds* angular, ± 1 mm long. *Chromosome number* 2*n* = 26. *Flowering time*: mid-August to late September.

Distribution and ecology: relatively widespread in the South African winter-rainfall region, extending from the Bokkeveld Mtns in Northern Cape to the Cape Peninsula and east to Cloete's Pass and the Swartberg Mtns in Western Cape; on a variety of soils, often in renosterveld.

Diagnosis: variable in flower colour and phenology, *Hesperantha pilosa* can readily be recognised by the sparsely hairy stem and three leaves, the lower two basal and the third largely sheathing the stem. The leaf blades are hairy to minutely ciliate and the stem, usually unbranched, bears a scale-like bract in the upper third. Usually plane and without raised margins, the leaf blades of some interior populations have raised margins or may be ± terete and grooved with minute cilia on the groove edges. Variation in flower pigmentation and timing of opening and closing has resulted in recognition of two subspecies. Subsp. *pilosa* has white (occasionally pale pink or lilac) flowers with dark markings on the reverse of the outer tepals and flowers are crepuscular, opening ± 18:00; and subsp. *bracteolata* has blue or deep pink (or rarely white) flowers often darkly veined on the reverse of the outer tepals and flowers are diurnal, opening in the morning and usually closing in early afternoon. The two subspecies have complimentary geographic ranges.

Hesperantha pilosa is closely related to *H. pseudopilosa* and the two are often so similar that the latter was originally described as subsp. *latifolia* of *H. pilosa.* Both have hairy stems and leaves but very different capsules and seeds and can also be distinguished by leaf width, up to



Distribution of ***Hesperantha pilosa*** subsp. ***pilosa***, ●; subsp. ***bracteolata***, ○.

10 mm in *H. pseudopilosa*, which also has a longer scale-like bract 8–20 mm long on the upper part of the stem.

Key to subspecies

1a Flowers crepuscular, usually white (creamy white) to pale pink or lilac, outer tepals darkly pigmented outside; anthers spreading horizontally over tepals; style branches 5–9 mm long, not reaching beyond middle of anthers in closed flower . . . . . 9a. subsp. *pilosa*

1b Flowers diurnal, usually blue or deep pink (rarely white), outer tepals not or faintly darker outside; anthers ascending; style branches (7)8–9(11) mm long, reaching to upper ⅓ of anthers or exceeding them in closed flower. . . . . 9b. subsp. *bracteolata*

9a. subsp. **pilosa**

Leaf blades plane, sometimes with main vein and margins slightly raised, linear to narrowly lanceolate, hairy to minutely ciliate on veins and margins. *Flowers* white (creamy white) to pale pink of mauve, outer tepals darkly pigmented outside, with sweet or acrid scent, opening ± 18:00 and closing after midnight; perianth tube 6–8 mm long; tepals 9–15 × 2–4 mm. *Filaments* 2.0–2.5 mm long; anthers (4)5–7 mm long, usually horizontal, lying over tepals, white; pollen white. *Style branches* 5–9 mm long, reaching to upper ⅓ of anthers, sometimes exceeding them, in closed flower, white.

Distribution and ecology: extending from the Cederberg to the Cape Peninsula and east along the Swartberg Mtns and Langeberg to near Herbertsdale; usually in sandy or loamy soil.

Diagnosis: subsp. *pilosa* is recognised by the crepuscular flowers, usually white but rarely pale pink to lilac, with the outer tepals darkly pigmented outside. The style branches are somewhat shorter than in subsp. *bracteolata*, 5–9 mm long and reaching only to the middle of the anthers in the closed flower. The leaves are typically plane with slightly raised margins and main vein.

A remarkable collection of what appears to be subsp. *pilosa* from the Hex River Mtns (*Esterhuysen 36196A*, BOL) flowering in December, consists of plants with only two leaves, the lower leaf linear-lorate and 4 mm wide, with an obtuse apex, and the second leaf sheaths the lower ⅔ of the stem. The margins, midrib and secondary veins all bear the long hairs that are diagnostic for *Hesperantha pilosa* but seem unusual in being slightly reflexed. The plants are taller than usual for *H. pilosa* and the spikes bear only one or two flowers. The style branches appear longer than those of any other white-flowered subsp. *pilosa* and in the closed flower reach the top of the anthers. The habitat, cool shaded slopes below a waterfall, is unusual for *H. pilosa*, which normally grows in light bush on exposed slopes and flowers in September and October. It seems possible that the habitat is responsible for the unusual morphology and late flowering time of the population, but it may equally represent a separate taxon.

9b. subsp. **bracteolata** *(R.C.Foster) Goldblatt & J.C.Manning* in Bothalia 43: 149 (2013). *H. bracteolata* R.C.Foster: 6 (1948). Type: South Africa, [Northern Cape], Farm Uitkyk, *Marloth 9907* (B, holo.; PRE, iso.).

Hesperantha puberula Schltr. ex R.C.Foster: 22 (1948). Type: South Africa, [Northern Cape], Oorlogskloof, *Schlechter 10952* (B, lecto., designated by Goldblatt: 57 (1984); B, BOL, G, GRA, K, PRE, US, isolecto.).

Hesperantha ciliolata Goldblatt: 59 (1984). Type: South Africa. [Northern Cape], Roggeveld Escarpment, Farm Geelhoek, 21 Sept. 1953, *Acocks 17176* (PRE, holo.).

Leaf blades either linear to narrowly sword-shaped, blades plane or with main vein and margins raised, or oval in cross section and ribbed, 1–4 mm wide, pubescent or minutely ciliate, cilia horizontal on edges of ribs or margins, margins sometimes ± winged, upper leaf partly sheathing lower half of stem, usually ribbed. *Spike* (2)3- to 5-flowered. *Flowers* blue or pink to purple (rarely white), with slightly darker veining outside, unscented or with acrid, sour or musky odour, opening 10:00 to 11:00 and closing mid-to late afternoon; perianth tube 6–8 mm long; tepals (11–)12–16 × 3–5 mm. *Filaments* 2.0–2.5 mm long; anthers (4–)5–7 mm long, usually ascending to suberect, pale yellow or white; pollen yellow to white. *Style branches* (7)8–9(11) mm long, reaching to upper third of anthers, sometimes exceeding them, ± white, rarely purple.

Distribution and ecology: extending from the Bokkeveld Mtns northwest of Nieuwoudtville through the Roggeveld south into the Klein Roggeveld in Northern Cape and locally in the Voetpadsberg east of Touws River in Western Cape; usually in sandy, stony ground.

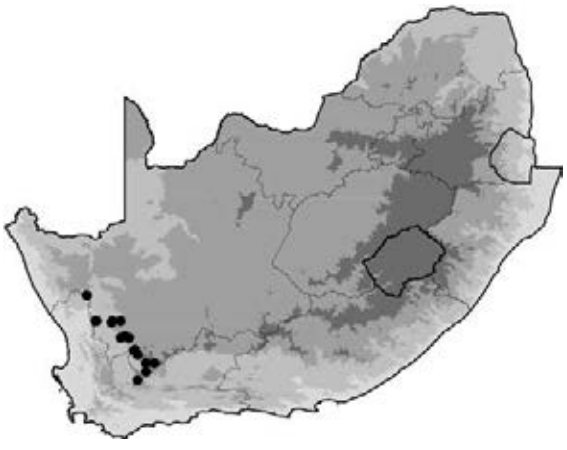
Diagnosis: distinguished from subsp. *pilosa* by the blue or deep pink (rarely white) perianth, the outer or all tepals not or only slightly more darkly pigmented on the reverse, subsp. *bracteolata* also usually has particularly long style branches, up to 11 mm long and reaching the upper third of the anthers when lined up together, or even exceeding them. Some plants may have relatively prominently ribbed leaves, the rib edges with short cilia directed horizontally as well as long hairs on the veins, a feature not seen in subsp. *pilosa*. Flowers are occasionally white or pale blue to almost white but are always diurnal, open during the morning and closing after 12:20, sometimes after 14:00. In contrast, flowers of subsp. *pilosa* are crepuscular, opening in the evening after 17:00 or at sunset, and then strongly scented and the tepals are white (creamy white), rarely pale mauve, with the outer or all tepals darkly pigmented red to brown or purple.

Hesperantha ciliolata was recognised on the basis of its straight, ribbed leaves, oval to terete in transverse section, with fine scabrid cilia on the rib edges.

Similar populations with violet or mauve-pink flowers with such leaves are now also known, all with diurnal flowers. Intermediates between those with truly terete leaves and others with ± plane leaves have resulted in its reduction to synonymy. Plants from the Voetpadsberg east of Touws River have the same general appearance as subsp. *bracteolata* except that the leaves mostly have only two grooves on each surface, or sometimes a pair of secondary veins strongly raised with the edges of the raised parts ciliate-scabrid, as are the edges of the ribs of the sheathing upper leaf. The flowers closely resemble those of other populations of the subspecies in their blue colour but have a light, musky acrid scent. These plants seem best regarded as a minor variant of subsp. *bracteolata*.

10. **Hesperantha pseudopilosa** *Goldblatt* in Journal of South African Botany 53: 461 (1987) as new name for *H. pilosa* subsp. *latifolia* Goldblatt: 56 (1984) [not *H. latifolia* M.P.de Vos (1974)]. Type: South Africa, [Northern Cape], Roggeveld, slopes of Sneeukrans, 22 Sept. 1981, *Goldblatt 6339* (MO, holo.; K, NBG, iso.).

Plants mostly 120–320 mm high. *Corm* ovoid, 7–12 mm diam.; tunics woody, concentric. *Stem* unbranched, usually sparsely hairy, with scale-like leaf in upper third 8–20 mm long. *Foliage leaves* 3, lower 2 narrowly lanceolate, plane, hairy on veins and margins, usually shorter than stem, 4–10 mm wide. *Spike* 1- to 4(–6)-flowered; bracts 8–10 mm long, green or becoming ± pale and membranous distally. *Flowers* crepuscular, white, outer tepals brown to grey outside, salver-shaped, usually sweetly scented; perianth tube 8–11 mm long; tepals mostly 12–5 × 3–5 mm, inner slightly shorter and wider than outer. *Filaments* 2.0–2.5 mm long; anthers (4)5–7 mm long, spreading horizontally, white; pollen creamy white. *Style branches* spreading, 9–10 mm long, reaching upper ⅓ of anthers in closed flower. *Capsules* ± globose, 8–9 mm long. *Seeds* softly angular with loose testa, angles ridged, 2–3 mm long. *Flowering time*: mid-August to late September.



Distribution of ***Hesperantha pseudopilosa***.

Distribution and ecology: extending from interior Namaqualand near the Langberg and the Bokkeveld Mtns and western Karoo in Northern Cape, South Africa to the Laingsburg Karoo and interior of the Klein Swartberg in Western Cape; growing on well-drained, usually stony sand.

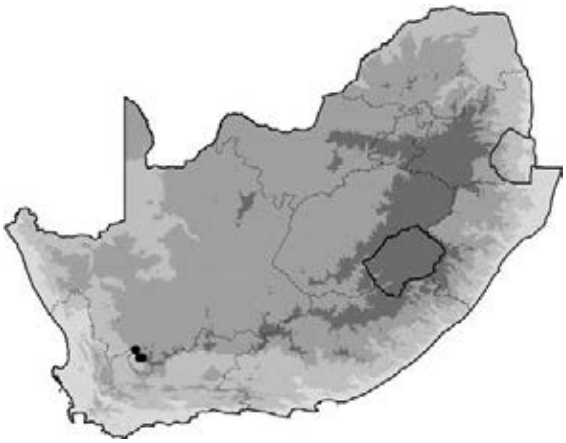
Diagnosis: *Hesperantha pseudopilosa* has the hairy leaves and stem of *H. pilosa* but differs in the broader foliage leaves, up to 10 mm wide, a longer scale-leaf 8–20 mm long. The larger capsules are 8–9 mm long and contain larger seeds, 2–3 mm long, with a loose testa. Capsules of *H. pilosa* are typically 6–8 mm long and the seeds are sharply angular and ± 1 mm diam. The crepuscular white flowers open relatively late in the day, mostly after 18:00, and then produce a strong sweet scent. They are visited by a range of settling moths, mostly of the family Noctuidae.

11. **Hesperantha glabrescens** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 406 (2003). Type: South Africa, Northern Cape, farm Hottentotskloof, ± 15 km SW of Sutherland on Bo-Visrivier road, 2 Oct. 1999, *Goldblatt & Nänni 11190* (NBG, holo.; K, MO, iso.).

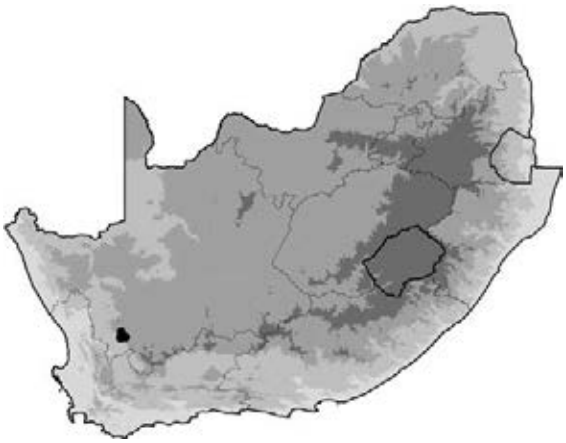
Plants 30–50 mm high. *Corm* ovoid, 4–6 mm diam.; tunics woody, concentric. *Stem* unbranched, smooth, bearing a scale-like bract shortly below spike. *Leaves* 3, lower 2 falcate, upper suberect, largely sheathing, blades 1.0–1.3 mm wide, margins and veins sparsely hairy, margins and main vein slightly thickened. *Spike* 1(2)-flowered; bracts ± 6 mm long, purplish, becoming dry and brown above. *Flowers* diurnal, rotate, magenta, unscented; perianth tube cylindric, expanded near apex, ± 3.5 mm long; tepals subequal, elliptic, 8 × 2 mm, spreading at right angles to tube. *Filaments* suberect, ± 2 mm long; anthers 3 mm long, yellow; pollen yellow. *Style branches* ± 3.5 mm long, purple, spreading. *Flowering time*: late September and early October.

Distribution and ecology: known only from the Roggeveld Escarpment SW of Sutherland in Northern Cape, South Africa; on moist clay flats along watercourses.

Diagnosis: closely related to the widespread *Hesperantha pilosa* and initially appearing to be a depauperate form of that species, *H. glabrescens* can be distinguished from its ally in several features. The leaves are sparsely hairy, unlike the fairly densely hairy or even downy leaves of *H. pilosa*, and the spikes are mostly 1- or rarely 2-flowered, whereas *H. pilosa* typically has several, sometimes up to 10 flowers per spike. Notable is the small size of the plants, only 30–50 mm high, shorter than recorded in *H. pilosa*. The flowers are magenta and quite small, with a perianth tube ± 3.5 mm long and tepals ± 8 mm long. Flowers of *H. pilosa* are always larger, usually white (subsp. *pilosa*) or blue or rarely deep pink (subsp. *bracteolata*), with a perianth tube mostly 6–8 mm long and tepals 9–16 mm long. The decision to recognise *H. glabrescens* was made in part because



Distribution of ***Hesperantha glabrescens***.



Distribution of ***Hesperantha secunda***.

of the consistently different morphology from *H. pilosa* and because *H. pilosa* subsp. *bracteolata* grew nearby and was always taller, up to 120 mm high, and with 2 to 4 flowers per spike. These plants had plane, densely pilose leaf blades, in contrast to those of *H. glabrescens.* The flowers of the two species were, however, nearly identical in pigmentation and almost so in size at this site, although they could be distinguished by differences in perianth tube length.

12. **Hesperantha secunda** *Goldblatt & J.C.Manning* in Bothalia 43:150 (2013). Type: South Africa, [Northern Cape], Roggeveld Escarpment, 56 km from Calvinia on Blomfontein road to Middelpos, 17 Sept. 1980, *Goldblatt 5810* (NBG, holo.; K, MO, PRE, S, US, iso.).

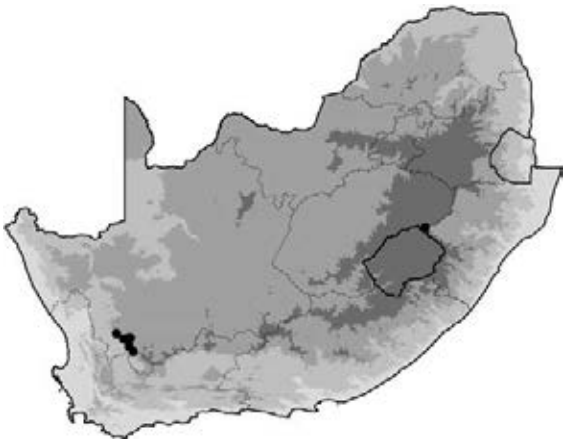
Plants 100–200 mm high. *Corm* ovoid, 7–8 mm diam.; tunics woody, concentric. *Stem* unbranched, smooth, with minute, membranous, scale-like bract up to 3 mm long on upper third of stem. *Foliage leaves* 3, lower 2 basal, linear to narrowly sword-shaped, falcate or straight, finely hairy 2.5–4.0 mm wide, margins raised and winged at 90º to surface, main vein also raised with narrow wings parallel to surface, uppermost leaf sheathing lower part of stem for all or most of its length, several ribbed, finely hairy. *Spike* ± nodding, mostly 3- to 7-flowered; bracts subequal, 7–10 mm long, outer green or becoming ± pale and membranous, inner membranous with 2 green keels. *Flowers* nocturnal, creamy white, outer tepals grey-brown on reverse, nodding, tepals spreading at right angles to tube and vertical, strongly scented; perianth tube cylindric, curving outward, 6–7 mm long; tepals 10–11 × 2.5–3.5 mm, inner slightly shorter and wider than outer. *Filaments* ± 3 mm long; anthers 5–6 mm long, spreading almost parallel to tepals, white; pollen white. *Style branches* ascending, ± 4 mm long, reaching to base or lower fourth of anthers. *Flowering time*: September to mid-October.

Distribution and ecology: known from just three populations in Northern Cape, South Africa, two from the Roggeveld Escarpment west of Middelpos and the other from the southern slopes of the Keiskei Mtns southeast of Calvinia; growing in shallow, fine-grained soil over rocky (?sandstone) pavement.

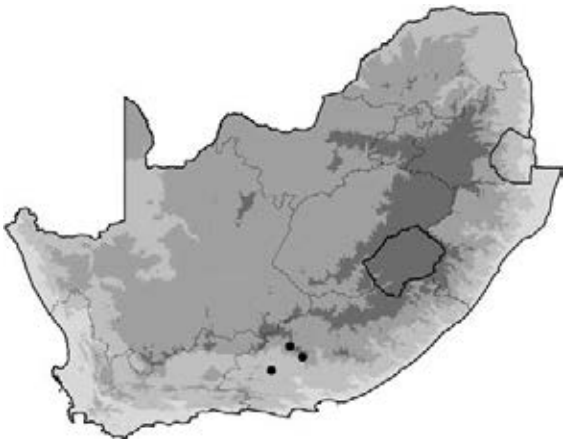
Diagnosis: when first collected, *Hesperantha secunda* was referred to *H. pilosa* because of its pilose leaves and the scale-like bract in the upper third of the stem. However, its unusual, somewhat fleshy leaves with thickened to winged margins and thickened main vein, and nearly secund spike, prompted a reappraisal of its status and it is now regarded as a separate species, perhaps most closely allied to *H. pilosa*. In addition to its unusual leaves, the flowers are nodding on a curved perianth tube and have unusually short, ascending style branches, ± 4 mm long. *Hesperantha pilosa* has plane to ribbed leaves (or rarely terete or with slightly winged margins) and upright flowers with a straight perianth tube, tepals 9–16 mm long vs. 10–11 mm in *H. secunda* and longer style branches, 7–11 mm long, spreading laxly over the tepals. Flowers of *H. secunda* open at sunset, the tepals beginning to unfold at ± 17:00 and fully expanded by 18:00, remaining open until the early hours of the morning. The strong scent has a slightly unpleasant acrid component.

13. **Hesperantha teretifolia** *Goldblatt* in Journal of South African Botany 53: 460 (1987). Type: South Africa, [Northern Cape], Roggeveld Escarpment between Middelpos and Calvinia, 13 Oct. 1983, *Goldblatt 7090* (NBG, holo.; K, MO, PRE, S, STE, WAG, iso.).

Plants 250–500 mm high. *Corm* ± globose, ± 9 mm diam., asymmetric; tunics woody, concentric, splitting into elliptic sections. *Stem* slender, sometimes branched from near base, with short scale-like leaf shortly below spike. *Foliage leaves* 3, lower 2 basal, terete, shallowly grooved, ± half as long as stem, ± 2 mm diam., uppermost leaf sheathing ⅔ of stem with free blade up to 50 mm long. *Spike* flexuose, 6- to 10-flowered; bracts ± membranous, pale, often dry distally, 8–12 mm long. *Flowers* crepuscular, rotate, creamy white, outer tepals flushed brown outside; perianth tube straight, ± cylindric, ± 9.5 mm



Distribution of ***Hesperantha teretifolia***.



Distribution of ***Hesperantha helmei***.

long, slightly wider near apex; tepals subequal, elliptic, ovate, ± 13 × 4 mm, spreading. *Filaments* weakly diverging, ± 2.5 mm long; anthers 6–7 mm long, yellow; pollen yellow. *Style branches* ± 5 mm long, spreading over tepals. *Capsules* obovoid, 6–8 mm long. *Seeds* angular, with loose testa, ridged on angles, light brown. *Chromosome number* 2*n* = 26. *Flowering time*: September to mid-October.

Distribution and ecology: restricted to the Roggeveld Escarpment in Northern Cape, South Africa, and recorded from west of Middelpos and to the south on the farm Uitkyk; growing on rocky ground.

Diagnosis: *Hesperantha teretifolia* is distinctive in the centric, ± terete, minutely grooved, hollow leaves with the surface between the grooves densely covered by minute papillae or extremely short, cilia-like hairs (visible only at 10× magnification). The white flowers open late in the afternoon, mostly after 16:30, and are then sweetly scented. The flowers, typical of the genus in form, are creamy white with a perianth tube 9.5 mm long, slightly shorter than the elliptic tepals.

14. **Hesperantha helmei** *Goldblatt & J.C.Manning* in Bothalia 37: 179 (2007). Type: South Africa, Eastern Cape, ± 50 km E of Graaff-Reinet, upper northern slopes of Nardousberg, 1 km N of main peak, Annex Stijlfontein 250, 700 m, 19 Nov. 2004, *Helme 3144* (NBG, holo.).

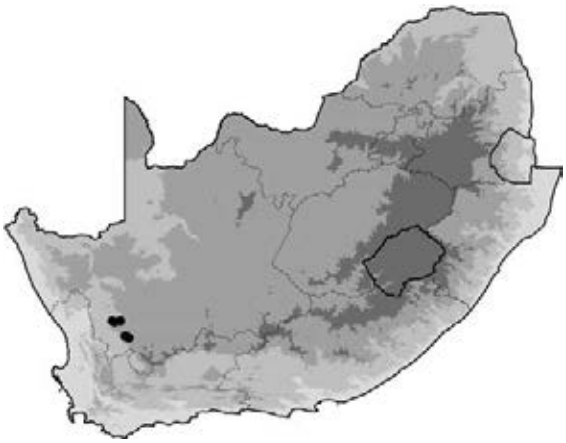
Plants 180–250 mm high. *Corm* ± globose, ± 9 mm diam., asymmetric; tunics woody, concentric. *Stem* slender, unbranched, with short scale-like leaf in upper fourth. *Leaves* 3, lower 2 terete, strongly grooved, blades 8–15 × 1.2 mm, uppermost leaf sheathing lower ½–⅔ of stem. *Spike* 1- or 2-flowered; bracts green, ± 9 mm long, inner forked at apex. *Flowers* pale mauve, darker at mouth of tube, probably diurnal, outer tepals with broad purple streak on reverse; perianth tube straight, 6–8 mm long, slender, widening near apex; tepals subequal, narrowly ovate, ± 8.0 × 2.5 mm, outer slightly larger than inner, spreading slightly above horizontal. *Filaments* weakly diverging, exserted ± 2 mm; anthers ± 4 mm long, yellow; pollen yellow. *Style branches* ± 3.5 mm long, ascending, ultimately reaching to ± middle of anthers in closed flower. *Flowering time*: November and probably December.

Distribution and ecology: apparently restricted to the southern edge of the Great Escarpment around Graaff-Reinet in Eastern Cape, South Africa, where it has been recorded from the Onder-Sneeuberg and the Sneeuberg; in rocky grassland among dolerite boulders. The habitat burns regularly every few years during the dry season and is covered with snow in winter.

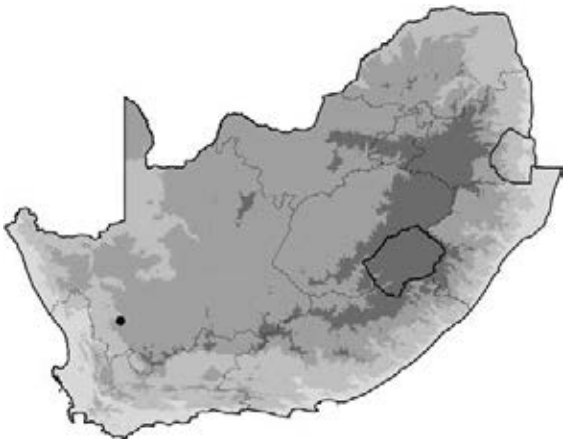
Diagnosis: *Hesperantha helmei* is distinctive in its terete, finely ribbed, smooth leaves, and relatively small, pale mauve flowers with a perianth tube 6–8 mm long and narrow tepals ± 8.0 × 2.5 mm. Another unusual attribute of the species is the small sheathing scale-like leaf in the upper part of the stem, a characteristic feature of a small group of species allied to *H. pilosa*. Among these species *H. helmei* is perhaps most closely related to *H. teretifolia*, which also has terete, prominently ridged leaves, the grooves lined with fine ciliate hairs, a feature lacking in *H. helmei*. The flowers of *H. teretifolia* are creamy white and larger than those of *H. helmei,* with a perianth tube ± 8 mm long and tepals ± 10 mm long but the two species are broadly similar in general appearance. The scale-like bract of *H. helmei* is 8–10 mm long vs. 2–4 mm in *H. teretifolia*.

15. **Hesperantha quadrangula** *Goldblatt* in Journal of South African Botany 50: 62 (1984). Type: South Africa, [Northern Cape], Hantamsberg, slopes below the summit cliffs, 16 Sept. 1980, *P. Goldblatt 5795* (MO, holo.; NBG, iso.).

Plants 100–300 mm high. *Corm* ± globose, 6–8 mm diam.; tunics woody, concentric, brown, outer layers breaking into irregular sections. *Stem* slender, unbranched, sheathed basally by brittle, dark brown cataphylls. *Leaves* 3, all ± basal, lower 2 up to 100 × 3–7 mm, plane, falcate or ± oblong, obtuse, uppermost leaf sheathing lower ½–⅔ of stem, quadrangular in



Distribution of ***Hesperantha quadrangula***.



Distribution of ***Hesperantha filiformis***.

section, free in upper 10 mm. *Spike* (1–)3- to 7-flowered; bracts green below, pale and membranous distally, 7–9 mm long. *Flowers* diurnal, ± rotate, white, outer tepals flushed or speckled dull pink to red outside, sweetly scented; perianth tube straight, 2–3 mm long, cylindric, included in bracts; tepals subequal, narrowly obovate, 9–12 × ± 3 mm, spreading. *Filaments* weakly diverging, ± 3 mm long; anthers 3–4 mm long, white; pollen white. *Style branches* ± 5 mm long, ascending, reaching to ± middle of anthers in closed flower. *Capsules* ± barrel-shaped, ± 6 mm long. *Seeds* unknown. *Flowering time*: late August and September.

Distribution and ecology: restricted to the western Karoo in Northern Cape, South Africa, and recorded only from the Hantamsberg at Calvinia and on the Roggeveld Escarpment northwest of Middelpos; on rocky dolerite or sandstone slopes and plateaus.

Diagnosis: *Hesperantha quadrangula* is reliably identified by the distinctive chestnut-brown cataphylls and white flowers with a particularly short perianth tube, 2–3 mm long. Plants consistently have two spreading, pale, relatively broad basal leaves and a largely sheathing upper leaf which is quadrangular in cross section. Observations on one population indicates that the flowers open at 16:00–16:30 and then produce a sweet, rose-like fragrance but the tepals close again at nightfall, and the flowers are completely closed by 19:30. The flowers are visited by a range of large-bodied bees and the occasional hopliine scarab beetle.

16. **Hesperantha filiformis** *Goldblatt & J.C.Manning* in Journal of South Africa Botany 98: 117 (2015). Type: South Africa, Northern Cape, Calvinia District, Farm Vanrhynshoek, Hantamsberg plateau, in wet red clay among dolerite boulders, 1 575 m, 25 Sept. 2014, *Goldblatt & Porter 14010* (NBG, holo.).

Plants 90–150 mm high, with short membranous sheathing cataphyll. *Corm* broadly ovoid, flattened on one side in lower ⅓, 8–10 mm diam.; tunics woody, dark brown, notched below into sections. *Stem* erect, simple. *Leaves* 3, lower 2 basal, lanceolate to falcate, up to 50 mm long, mostly 3–6 mm wide, firm, margins and main veins slightly thickened, appearing raised when dry, uppermost leaf subbasal, partly sheathing stem, free in upper half. *Spike* lax, 1- to 3-flowered, spaced 9–12 mm apart; bracts green with membranous upper margins, outer ± 10 mm long, inner slightly shorter. *Flowers* crepuscular, salver-shaped, white, reverse of outer tepals mottled grey-brown along midline, opening after 19:00, tepals then outspread, sweetly scented; perianth tube cylindric, ± 12 mm long, well exserted from bracts; tepals subequal, elliptic, ± 11 × 5 mm. *Filaments* erect, ± 2 mm long; anthers held horizontally, ± 5 mm long, white; pollen white. *Style branches* ± 4 mm long, ascending, reaching to ± middle of anthers in closed flower. *Capsules* ± ovoid-elliptic, obtuse, smooth, ± 11 mm long. *Seeds* unknown. *Flowering time*: September.

Distribution and ecology: known only from the Hantamsberg plateau near Calvinia, Northern Cape, South Africa; in moist red clay among dolerite boulders.

Diagnosis: small and inconspicuous *Hesperantha filiformis* stands up to 150 mm high and has lax spikes of 1 to 3 small flowers with a particularly slender perianth tube about 12 mm long and tepals about 11 × 5 mm. Plants consistently have only three leaves, the lower two basal and the uppermost inserted in the lower third of the stem and sheathing for about half its length. The white flowers are closed during daylight hours so that only the dull grey-brown reverse of the outer tepals is then visible. The flowers open after dark between 19:00 and 19:30 and then have a mild, sweet odour. The ovoid corms are slightly asymmetric, being flattened on one side, with the woody, dark brown tunics typical of sect. *Concentricae*. Its relationships are uncertain but possibly lie with the Namaqualand species *H. flexuosa*, which also consistently has three leaves, the uppermost partly sheathing the stem, but the somewhat fleshy leaves of this species are linear and no more than 1.5 mm wide. The firm-textured leaves of *H. filiformis* are 3–5 mm wide and have thickened margins and main vein, very

different from those of *H. flexuosa*. Capsules of *H. filiformis* are surprisingly long for so small a plant, 10–11 mm long, but seeds are so far unknown.

17. **Hesperantha flexuosa** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 394 (1882); Goldblatt: 63 (1984). Type: South Africa, [Northern Cape], Namaqualand, Kamiesberg, Elboogfontein, Aug.–Sept. 1830, *J. F. Drège 2639* (B: Herb. Lubeck, holo.; G, P, iso.).

Hesperantha namaquensis Baker: 149 (1892). Type: South Africa, [Northern Cape], 'Namaqualand', *Scully 50* (K, holo.).

Hesperantha bolusii R.C.Foster: 6 (1948). Type: South Africa, [Northern Cape], Namaqualand, near Nababeep, Sept. 1883, *H. Bolus s.n. sub Herb. Norm. Austr. Africae 694* (G, holo.; B, BOL, G, K, PRE, SAM, UPS).

Plants (60–)100–200 mm high, slender. *Corm* ± ovoid, 3–6 mm diam., asymmetric with well-developed lateral ridge; tunics woody, dark brown, concentric, fragmenting vertically into elliptic sections. *Stem* slender, rarely with 1 branch. *Leaves* 3, lower 2 ± basal, linear, ± plane but wider in midline, up to half as long as stem, 0.5–1.5 mm wide, upper leaf cauline, lower half sheathing stem, with long free apex. *Spike* flexuose, 4- to 7-flowered; bracts ± membranous, often dry near tips, 7–10 mm long. *Flowers* crepuscular, ± rotate, white, outer tepals often flushed brown outside; perianth tube straight, 6–10 mm long, cylindric, wider near apex; tepals subequal, obovate, 8–13 × 3.5–5.0 mm, spreading. *Filaments* ± 3 mm long; anthers 4.5–6.0 mm long, held horizontally, white; pollen white. *Style branches* ± 7 mm long, ascending, reaching to ± middle of anthers in closed flower. *Capsules* ovoid, 5–6 mm long. *Seeds* angular-prismatic. *Chromosome number* 2*n* = 26. *Flowering time*: August to September, also October at higher elevations.

Distribution and ecology: relatively common and widespread in central and northern Namaqualand in Northern Cape, South Africa, extending from near Springbok in the north to middle elevations in the Kamiesberg; occurring on gritty, granitic sand on slopes and flats.

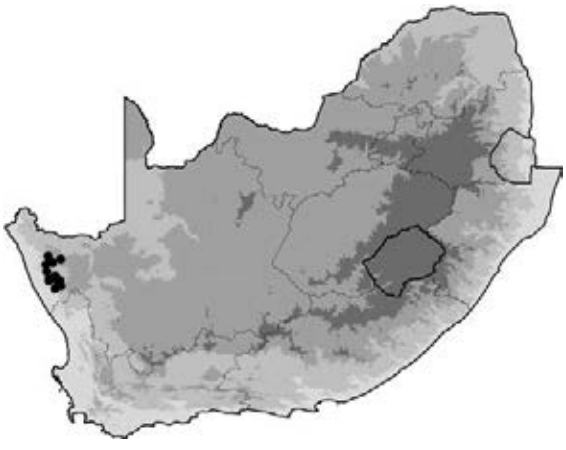
Diagnosis: white-flowered *Hesperantha flexuosa* is a relatively slender plant with somewhat succulent leaves with blades up to 1.5 mm wide. The lower two leaves are basal and have long blades and the upper leaf sheaths the stem in the lower half. The flowers are typical of the genus in the narrow, straight perianth tube with spreading tepals slightly longer than the tube. As with most white-flowered species of the genus from the winter-rainfall zone, the flowers are crepuscular, opening in the late afternoon and closing well after nightfall.

18. **Hesperantha minima** (*Baker*) *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 135: 77 (1941); Goldblatt: 65 (1984). *Geissorhiza minima* Baker: 239 (1876a). Type: South Africa, [Northern Cape], Namaqualand, Kamiesberg, 'Modderfonteinsberg,' Oct. 1830, *J. F. Drège 2632* (K, lecto., designated by Foster: 77 (1941); B, G, K, L, MO, P, S, isolecto.).

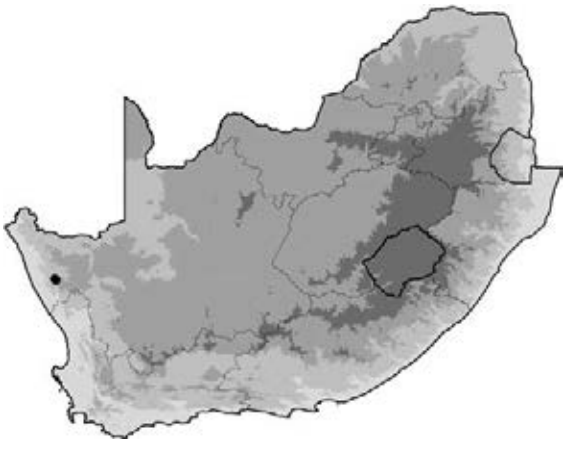
Plants 40–50 mm high. *Corm* ± ovoid, 4–5 mm diam., asymmetric; tunics woody, concentric, dark brown. *Stem* slender, sometimes 1-branched. *Leaves* 3, lower 2 ± basal, falcate, 20–30 × < 1 mm, upper leaf cauline, sheathing lower half of stem. *Spike* 1- to 3-flowered; bracts green, becoming pale and membranous distally, 3–5 mm long. *Flowers* crepuscular, ± rotate, white, outer tepals brown outside; perianth tube straight, 4–5 mm long, cylindric; tepals subequal, narrowly ovate, 5–6 × ± 2 mm, spreading. *Filaments* weakly diverging, ± 1 mm long; anthers 2–3 mm long, white; pollen white. *Style branches* ± 3 mm long, ascending, reaching to ± middle of anthers in closed flower. *Flowering time*: October and probably also early November.

Distribution and ecology: known only from the slopes of Sneeuberg in the Kamiesberg of Northern Cape, South Africa; growing in wet moss pads on granite pavement.

Diagnosis: immediately recognised by it small size, up to 50 mm high, and narrow leaves less than 1 mm wide,



Distribution of ***Hesperantha flexuosa***.



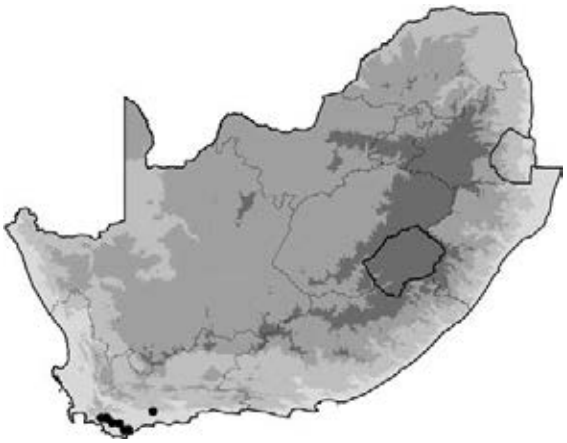
Distribution of ***Hesperantha minima***.

Hesperantha minima has white, crepuscular flowers about 12 mm diam. with a perianth tube 4–5 mm long and ± as long as the tepals. The tiny plants, smallest in the genus, have three leaves, the uppermost partly sheathing the stem. Its relationships are uncertain but the concentric corm tunics place the species in sect. *Concentricae*.

19. **Hesperantha fibrosa** *Baker*, Handbook of the Irideae: 149 (1892); Goldblatt: 66 (1984). Type: South Africa, [Western Cape], Klein River Mtns, Aug., *C.L. Zeyher 3960* (K, lecto., designated by Goldblatt: 66 (1984); B, G, S, SAM, W, Z, isolecto.).

Plants 80–300 mm high. *Corm* ± ovoid, 8–12 mm diam., asymmetric with oblique flat side; tunics woody, concentric, dark brown, outer layers fragmenting into elliptic sections drawn into persistent fibres above, these forming a collar around base. *Stem* slender, unbranched, sheathed at base by ± dry, brown cataphylls and collar of fibres. *Leaves* 3, lower 2 ± basal, blades narrowly lanceolate, slightly succulent with main veins and margins thickened, ± half as long as stem, 2–4 mm wide, upper leaf cauline and sheathing lower half of stem. *Spike* flexuose, mostly 3- to 6-flowered; bracts green, 9–14 mm long. *Flowers* diurnal, ± salver-shaped, pale to deep pink to violet-purple; perianth tube straight, 7–10 mm long, cylindric, wider near apex; tepals subequal, elliptic, ± 10 × 3 mm, spreading. *Filaments* diverging, 3–4 mm long; anthers ± 4 mm long, light purple-brown; pollen ?yellow. *Style branches* ± 6 mm long, ascending, ultimately reaching to ± middle of anthers in closed flower. *Capsules* ovoid, 6–8 mm long. *Seeds* unknown. *Chromosome number* 2*n* = 26 *Flowering time*: mainly August and September, occasionally in early October.

Distribution and ecology: occurring in southern Western Cape, South Africa, extending from Houw Hoek in the west to Heidelberg in the east (a record from 'Elandskloof' in the Cold Bokkeveld to the north is erroneous); occurring on lower mountains slopes and hills in clay ground.



Distribution of ***Hesperantha fibrosa***.

Diagnosis: fairly poorly known, the southern Cape *Hesperantha fibrosa* is recognised by the corm tunics extended upward as a collar of fibres around the base and by the somewhat fleshy leaf blades with thickened and raised margins that arch over the blade surface. Plants consistently have just three leaves, the lower two with long blades and the upper largely sheathing but with a short free apex. The flowers are typical of the genus but have relatively narrow tepals. The pale to deep pink or purple flowers are evidently diurnal.

20. **Hesperantha cucullata** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 393 (1882); Goldblatt: 72 (1984). Type: South Africa, [Northern Cape], Hantam Mtns, Aug., *H. Meyer 9* (B, lecto., designated by Goldblatt: 72 (1984); S, possible isolecto.).

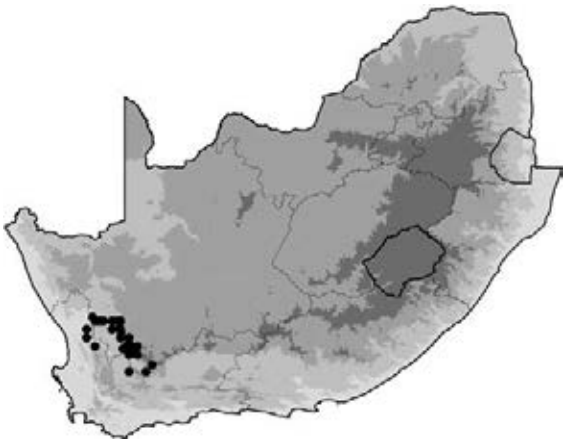
Antholyza hantamensis Klatt: 228 (1894), as new name for *Hesperantha montana* Klatt: 393 (1882) [not *A. montana* (L.f.) Ker Gawl. (1804a)]. Type: South Africa, [Northern Cape], Hantam Mtns, *Meyer* 21 (B, lecto., designated by Goldblatt: 72 (1984); S, isolecto.).

Hesperantha buhrii L.Bolus: 13 (1931a). Type: South Africa, [Northern Cape], Nieuwoudtville, *L. Buhr s.n.* (BOL 18964, lecto., designated by Goldblatt: 72 (1984); GRA, K, isolecto.).

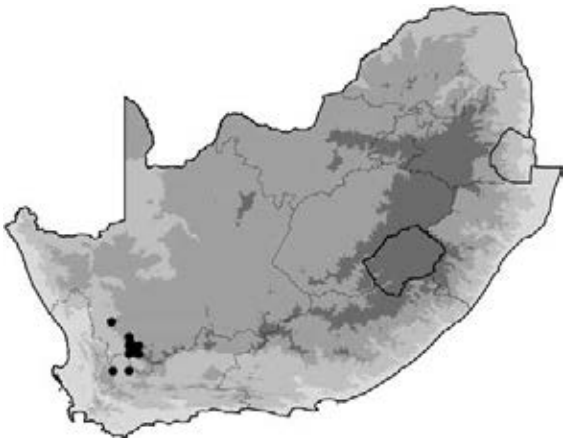
Plants (40–)150–300 mm high. *Corm* ± ovoid, mostly 7–14 mm diam., asymmetric with oblique base; tunics woody, imbricate, dark brown, regularly notched along lower margin. *Stem* simple or branched from near base (rarely also from axil of cauline leaf). *Leaves* 3 or 4 (more if branched), lower 2 or 3 ± basal, blades plane, sword-shaped to falcate, ± ⅓–½ as long as stem, 5–10 mm wide, upper leaf cauline, sheathing lower half of stem. *Spike* slightly flexuose, mostly 2- to 10-flowered; bracts green below, pale and membranous distally, 10–15 mm long. *Flowers* crepuscular, salver-shaped, white, outer tepals red (rarely glossy brown) outside, sweetly scented; perianth tube straight, ± 6–10(–12) mm long, cylindric, wider near apex; tepals subequal, obovate to elliptic, 12–20 × 4–10 mm, spreading. *Filaments* weakly diverging, mostly 4–5 mm long; anthers (4.0–)6.5–8.5 mm long, white or pale yellow; pollen white. *Style branches* 4–8 mm long, ascending, reaching to base or middle (rarely to tips) of anthers in closed flower. *Capsules* ovoid-ellipsoid, 10–12 mm long. *Seeds* dark brown, globose to softly angular. *Chromosome number* 2*n* = 26. *Flowering time*: mostly mid-August to late September, sometimes in October.

Distribution and ecology: relatively widespread in the western Karoo in Northern Cape, South Africa, extending from the Bokkeveld Mtns in the north to the Roggeveld and in the Tanqua and Doorn River basins, the northern Cederberg and Gifberg Mtns in Western Cape; in stony sandy or clay ground.

Diagnosis: *Hesperantha cucullata* is distinguished by the relatively large, white flowers mostly with the outer



Distribution of ***Hesperantha cucullata***.



Distribution of ***Hesperantha palustris***.

tepals red outside and usually 12–20 × 6–10 mm, and the large asymmetric corms up to 14 mm diam. with imbricate tunics. The flowers are crepuscular, usually opening after 16:30 and then sweetly scented. Well-grown plants have at least four leaves, the lower three basal and with long, plane blades up to 10 mm wide.

Populations from the Bokkeveld Mtns growing on sandstone pavement are often shorter in stature, with a slightly longer perianth tube, 10–12 mm vs. 6–10 mm, and shorter anthers, 4–5 mm vs. 6.0–8.5 mm, and perhaps merit taxonomic recognition. The style branches reach the tips of the anthers in these plants because the anthers are relatively short, whereas the style branches reach to between the base and middle of the anthers in other populations.

Plants from the southern Roggeveld with spikes of fewer flowers (mostly two or three) and the outer tepals brown outside (red elsewhere), and growing in wet habitats are referred to *Hesperantha palustris*.

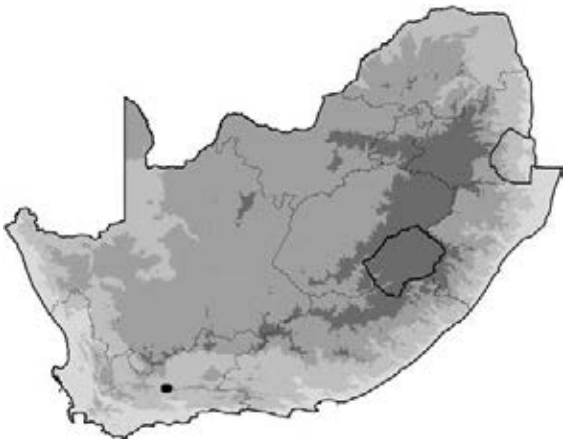
21. **Hesperantha palustris** *Goldblatt & J.C.Manning* in Journal of South African Botany 98: 116 (2015). Type: South Africa, Northern Cape, Calvinia District, Tierkloof, *Bulbinella* marsh on dolerite sill NW of farm houses,), *Goldblatt & Porter 14040* (NBG, holo.; MO, PRE, iso.).

Plants 350–480 mm high, evidently lacking basal sheathing cataphylls at flowering. *Corm* broadly ovoid, flattened in lower ⅓ on one side, 12–14 mm diam.; tunics woody ± black, notched below into sections. *Stem* suberect, usually 2- or 3-branched from near base or simple, branches laxly arching outward. *Leaves* 4 or 5, mostly basal, ± linear, mostly 6–8 mm wide, soft and ± succulent, uppermost sometimes inserted shortly above ground, partly sheathing stem. *Spike* lax, 1- to 3-flowered, spaced 25–35 mm apart; bracts green, soft to ± membranous, 12–15 mm long, inner narrower, with membranous margins. *Flowers* crepuscular, rotate, white, middle ½–⅔ of outer tepals mottled grey-brown outside, opening after 19:00, tepals then outspread, evidently unscented [or faintly scented]; perianth tube ± cylindric, ± 8 mm long, reaching to ± top of bracts; tepals subequal, elliptic, 16 × 4 mm. *Filaments* erect, ± 6 mm long; anthers held horizontally, 6–7 mm long, white; pollen white. *Style branches* ± 5 mm long, ascending, reaching to lower ⅓ anthers in closed flower. *Capsules* ± ovoid-elliptic, obtuse, smooth, 12–14 × 6–7 mm. *Seeds* ± 2 mm long, irregularly angled by pressure, with light brown, loose testa. *Flowering time*: September to mid-October.

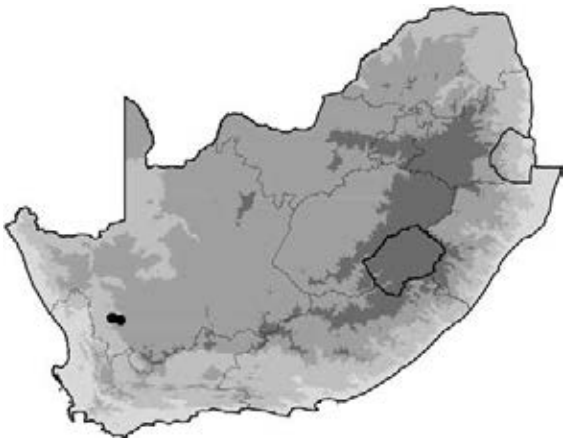
Distribution and ecology: extending from high elevations in the Hantamsberg near Calvinia through the Roggeveld to Verlatekloof, Northern Cape, South Africa; in a seasonal marshes and seeps, often among dense *Bulbinella* vegetation.

Diagnosis: *Hesperantha palustris* is distinctive in the marshy habitat, unique for the genus, and also stands out in its tall stature, up to 480 mm high, the long, linear, soft-textured leaves, and the unusually lax spikes of only one to three flowers. The flowers are white with the outer tepals coloured grey-brown in the middle section and the tepals are narrowly elliptic, ± 16 × 4 mm. Flowers open after dark, 19:00 and appear unscented or at best weakly scented. The capsules are unusually large, up to 14 mm long. *Hesperantha palustris* is perhaps most closely related to the widespread *H. cucullata*, a shorter species with firm to almost leathery leaves and the outer tepals of the white flowers usually bright, glossy red outside, with the dark pigment usually covering the entire outer surface. Flowers of *H. cucullata* open well before sunset, mostly 16:00–16:30, and then produce a strong, sweet odour. The tepals are relatively broader than in *H. palustris*, usually 12–16 mm long and at least a third to nearly half as wide.

22. **Hesperantha truncatula** *Goldblatt* in Journal of South African Botany 53: 461 (1987). Type: South Africa, [Western Cape], northern foothills of Klein Swartberg Mtns, Farm Vleiland, 10 Sept. 1983, *J.H.J. Vlok 662* (NBG, holo.; MO, PRE, iso.).



Distribution of ***Hesperantha truncatula***.



Distribution of ***Hesperantha purpurea***.

Plants 100–160 mm high. *Corm* ± ovoid, 7–9 mm diam., asymmetric; tunics woody, imbricate, dark brown. *Stem* slender, unbranched, with short scale-like leaf in upper fourth. *Leaves* 3, lower 2 ± basal, blades plane, unusually short and ± obtuse, 12–20 × 4–8 mm, upper leaf sheathing lower ½–⅔ of stem, 40–80 mm long, slightly inflated. *Spike* 1- to 5-flowered; bracts green below, pale and membranous distally, 8–12 mm long. *Flowers* crepuscular, ± rotate, pale blue-purple, pale in throat and tube, outer tepals with broad purple streak on reverse; perianth tube straight, ± 7 mm long, cylindric, wider near apex; tepals subequal, narrowly ovate, 11–13 × ± 5 mm, spreading. *Filaments* weakly diverging, ± 3 mm long; anthers 5.5–6.0 mm long, ?yellow; pollen ?yellow. *Style branches* ± 7 mm long, ascending, ultimately reaching to ± middle of anthers in closed flower. *Flowering time*: September and probably also late August.

Distribution and ecology: a narrow endemic of the northern foothills of the Klein Swartberg in Western Cape, South Africa; occurring on south-facing clay slopes and currently known only from the Farm Vleiland.

Diagnosis: *Hesperantha truncatula* is distinguished by its unusually short, relatively broad basal leaves with blades no more than 20 mm long and up to 8 mm wide. The upper, cauline leaf is slightly inflated, up to 80 mm long and sheaths the stem for its entire length. The stem also bears a short, scale-like bract shortly below the spike, a feature of *H. pilosa* and several related species, all of which differ from *H. truncatula* in their longer leaves, usually hairy or ciliate. The flowers, typical of the genus, have a relatively short perianth tube ± 7 mm long and tepals 1.5× as long as the tube. The pale blue-purple flowers are crepuscular, opening in the late afternoon and closing after dark.

23. **Hesperantha purpurea** *Goldblatt* in Journal of South African Botany 50: 85 (1984). Type: South Africa, [Northern Cape], Farm Perdekraal, NW of Calvinia, 12 Sept. 1981, *P. Goldblatt 6246* (MO, holo.; K, NBG, PRE, S, iso.).

Plants 80–250 mm high. *Corm* ± globose, 8–12 mm diam., asymmetric with oblique flat side; tunics woody, imbricate, dark brown, outer layers V-notched on lower margins. *Stem* slender, simple or 1-branched from near base. *Leaves* 4 or 5, all ± basal or uppermost cauline, blades plane, ± falcate, ± half as long as stem, 7–10 mm wide, uppermost leaf sheathing lower ⅓ of stem. *Spike* 1- to 3-flowered; bracts green, 15–20 mm long. *Flowers* diurnal, salver-shaped, dark red-purple, darker purple at bases of tepals, white in throat; perianth tube straight, ± 20 mm long, cylindric, wider near apex; tepals subequal, elliptic, 16–20 × 5–7 mm, spreading. *Filaments* suberect, ± 1.7 mm long; anthers 5–6 mm long, purple; pollen purple. *Style branches* 10–14 mm long, spreading, exceeding anthers in closed flower. *Capsules* ovoid-oblong, 10–14 mm long. *Seeds* unknown. *Chromosome number* 2*n* = 26 (also 39). *Flowering time*: August to mid-September.

Distribution and ecology: poorly documented and known for certain only from the farm Perdekraal, northwest of Calvinia in Northern Cape, South Africa; on dolerite outcrops in heavy red clay.

Diagnosis: *Hesperantha purpurea* is readily recognised by the red-purple flowers, the lower tepals with even darker markings, and slender perianth tube ± 20 mm long. The relatively large asymmetric corms with overlapping tunics suggest a relationship with *H. cucullata*. The flowers have the typical adaptations for pollination by long-proboscid *Prosoeca* flies.

24. **Hesperantha vaginata** *(Sweet) Goldblatt* in Journal of South African Botany 36: 298 (1970); Goldblatt: 72 (1984). *Geissorhiza vaginata* Sweet: t. 138 (1836). Type: South Africa, without precise locality, Sweet: t. 138 (1836).

Hesperantha metelerkampiae L.Bolus: 114 (1927). Type: South Africa, [Northern Cape], near Nieuwoudtville, *Metelerkamp s.n.* (BOL 18555, holo.).

Hesperantha stanfordiae L.Bolus: 282 (1931b). *Hesperantha inflexa* var. *stanfordiae* (L.Bolus)

R.C.Foster: 17 (1948). Type: South Africa, [Northern Cape], near Nieuwoudtville, ex hort. Stanford, *Buhr. s.n.* (BOL [*BOL 19980*], lecto., designated by Goldblatt: 76 (1984); K, S, isolecto.).

Plants (50–)120–180 mm high. *Corm* ± globose, 10–14 mm diam., asymmetric with oblique flat side; tunics woody, imbricate, dark brown, outer layers V-notched on lower margins. *Stem* simple or 1- or 2(3)-branched from near base. *Leaves* 4 or 5, all ± basal or uppermost cauline, blades plane, ± falcate, ± half as long as stem, 7–10 mm wide, uppermost leaf sheathing lower ⅓ of stem. *Spike* 1- to 3-flowered; bracts green, 15–20 mm long. *Flowers* diurnal, rotate, yellow, usually with large ± black centre and dark brown on upper ⅓ of outer or all tepals, rarely uniformly yellow; perianth tube funnel-shaped, 5–8 mm long; tepals subequal, obovate-elliptic, 30–35 × 12–17 mm, widely cupped. *Filaments* suberect, ± 3 mm long; anthers 11–15 mm long, yellow; pollen yellow. *Style branches* ± 6 mm long, diverging, reaching ± middle of anthers in closed flower. *Capsules* ovoid-oblong, 9–10 mm long. *Seeds* softly angular, yellow-brown. *Chromosome number* 2*n* = 26. *Flowering time*: mid-August to mid-September.

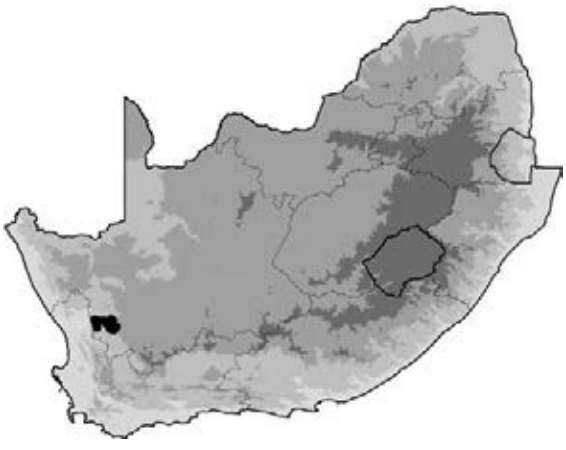
Distribution and ecology: fairly widespread in the Bokkeveld Mtns and Plateau in Northern Cape, South Africa, from near Nieuwoudtville in the west to the slopes of the Hantamsberg at Calvinia in the east, to near Loeriesfontein in the north and to the south on the Keiskie Mtns and Driefontein-se-Berg; mostly on dolerite-derived red clay and among dolerite rocks, occasionally on sandy ground in the west of its range.

Diagnosis: *Hesperantha vaginata* is immediately recognised by the large yellow, cup-shaped flowers, in most populations strikingly marked with large brown markings on the tepals. Occasional populations are known with uniformly yellow flowers (matching the type of *H. stanfordiae*) or with both marked and unmarked flowers. The perianth tube is relatively short, 5–8 mm long, but the tepals, 30–35 × 12–17 mm, are among the largest in the genus. The tepals unfold in the early afternoon after 14:30 on warm sunny days and close about three hours later. Closely related *H. karooica* also has bright yellow flowers but never with contrasting markings, and the tepals are considerably smaller, ± 20 × 9–10 mm. Usually a smaller plant, *H. karooica* seldom exceeds 80 mm unless growing through bush, and has narrower leaves 3–4 mm wide vs. 7–10 mm in *H. vaginata*.

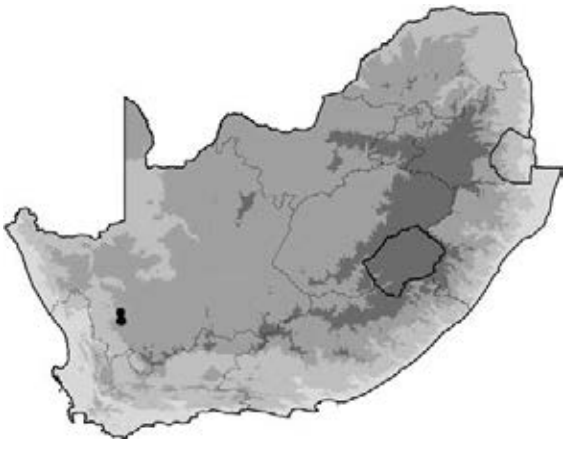
Hesperantha vaginata is the only species of the genus known to be pollinated exclusively by hopliine scarab beetles, Scarabaeidae: Hopliini. The unscented, yellow flowers are conspicuously patterned with chocolate-brown markings in most populations. In the Nieuwoudtville area, flowers are visited by *Clania glenlyonensis* beetles, which use the flowers as sites for assembly, mate selection, and copulation, but they also consume pollen, which does not seem to affect the reproductive success of the species as ample seeds are produced.

25. **Hesperantha karooica** *Goldblatt* in Journal of South African Botany 50: 79 (1984). Type: South Africa, Northern Cape, Calvinia, foot of the Hantamsberg, 25 Aug. 1968, *F.J. Stayner s.n.* (NBG 87606, holo.; NBG, iso.).

Plants 35–100(–160) mm high. *Corm* ± globose, 10–14 mm diam., asymmetric with oblique flat side; tunics woody, imbricate, dark brown, outer layers V-notched on lower margins. *Stem* simple or 1- or 2-branched from near base. *Leaves* 3 or 4, all ± basal or uppermost cauline and largely sheathing, blades plane, ± falcate, ± ½ as long as stem, 3–4 mm wide. *Spike* 1- or 2-flowered; bracts green, becoming pale and membranous above, 12–15 mm long. *Flowers* diurnal, rotate, yellow, outer tepals shaded brown outside; perianth tube funnel-shaped, 5–7 mm long; tepals subequal, obovate-elliptic, ± 20 × 9–10 mm, widely cupped. *Filaments* suberect, ± 3 mm long; anthers 9–10 mm long, yellow; pollen yellow. *Style branches* ± 9 mm long, diverging, reaching ± middle of anthers in closed flower. *Flowering time*: mid-August (to early September).



Distribution of ***Hesperantha vaginata***.



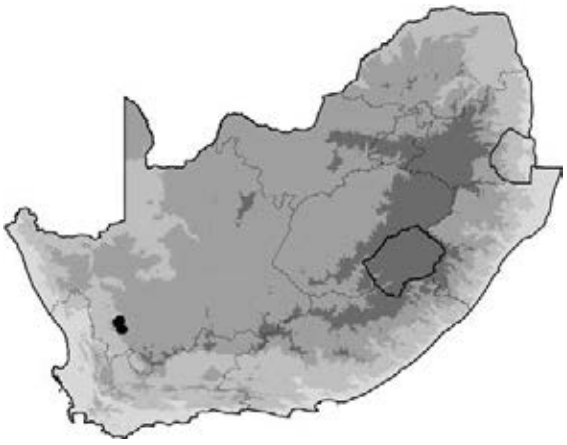
Distribution of ***Hesperantha karooica***.

Distribution and ecology: restricted to base of the Hantamsberg near Calvinia in Northern Cape, South Africa, recorded south and east of the range; in heavy red clay usually among dolerite rocks.

Diagnosis: still incompletely known, *Hesperantha karooica* is distinguished by the large, ± globose corm with overlapping tunics, a low stature, seldom exceeding 80 mm in open sites, narrow leaves, 3–4 mm wide, and relatively large, uniformly yellow flowers, with tepals ± 20 × 9–10 mm. The general appearance and yellow flowers recall *H. vaginata*, also restricted to the Calvinia District, but this taller species has broader leaves, 7–10 mm wide, and the flowers usually have large, dark brown makings on larger tepals, 30–35 × 12–17 mm.

26. **Hesperantha hantamensis** *Schltr. ex R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 166: 15 (1948); Goldblatt: 84 (1984). Type: South Africa, [Northern Cape], Calvinia, dolerite hills, Aug. 1921, *R. Marloth 10262* (B, holo.; NBG, PRE, iso.).

Plants ± acaulescent, up to 60 mm high. *Corm* ± ovoid, 12–15 mm diam., asymmetric with oblique flat base; tunics woody, imbricate, dark brown, outer layers V-notched on lower margins. *Stem* rarely emerging above ground, simple or with one branch from near base, sheathing cataphyll often brown above ground. *Leaves* 3 or 4, all ± basal, plane, ± falcate, 20–40 × 5–6 mm. *Spike* 1- to 3-flowered; outer bract green, leaf-like, folded in midline, 15–25 mm long. *Flowers* crepuscular, salver-shaped, white, outer tepals shaded purple-brown outside, evidently odourless; perianth tube cylindric, filiform, 14–20 mm long, widening near apex; tepals subequal, ± elliptic, 8–12 × 4–5 mm, spreading. *Filaments* suberect, 3–5 mm long; anthers 5–6 mm long, held horizontally over tepals, white; pollen white. *Style branches* ± 9 mm long, spreading over tepals, slightly exceeding anthers in closed flower. *Capsules* ellipsoid, often flushed dull red, ± 12 mm long. *Seeds* softly angular, dull yellow. *Flowering time*: July to early August.



Distribution of ***Hesperantha hantamensis***.

Distribution and ecology: evidently a very narrow endemic, known from the southern and eastern foot and lower slopes of the Hantamsberg and the adjacent Keiskieberge near Calvinia, Northern Cape, South Africa; usually on heavy red clay on stony flats or along washes.

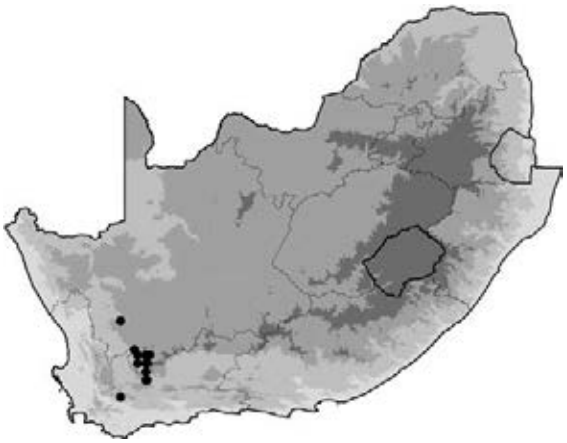
Diagnosis: one of three closely allied acaulescent species of the western Karoo, *Hesperantha hantamensis* has white flowers with a slender perianth tube 14–20 mm long and spreading tepals 8–12 mm long. The flowers are crepuscular, opening in the late afternoon, 16:30 and strongly fragrant, closing after dark. Related *H. flava* has larger, yellow flowers and *H. humilis* even larger, pink to rose flowers with a dark throat.

27. **Hesperantha humilis** *Baker* in Journal of Botany, British and foreign 14: 239 (1876a); Goldblatt: 80 (1984). Type: South Africa, [Northern Cape], Roggeveld near Jakkalsfontein, 7 Aug. 1811, *W.J. Burchell 1320* (K, holo.).

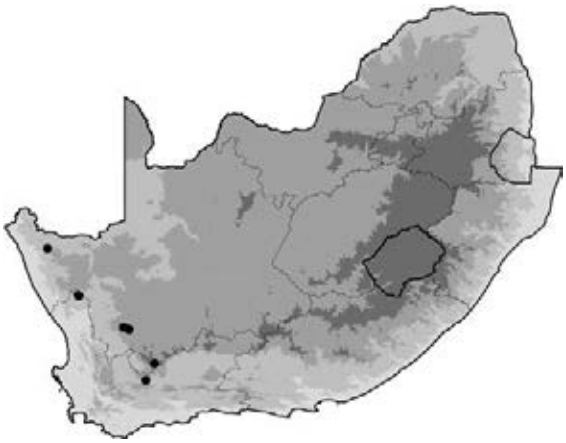
Plants mostly subacaulescent, 30–80 mm high. *Corm* ± obovoid, 12–16 mm diam., asymmetric with oblique flat side; tunics woody, imbricate, dark brown, outer layers V-notched on lower margins. *Stem* rarely emerging more than 20 mm above ground, simple or with one branch from near base, sheathing cataphyll often turning brown above ground. *Leaves* (2)3, all ± basal, plane, ± falcate, 20–70 × 6–8 mm. *Spike* 1- or 2(3)-flowered; bracts dimorphic, outer leaf-like, green, 20–30 mm long, inner ± half as long, concealed, membranous. *Flowers* diurnal, salver-shaped, pink, dark in throat, sometimes dark red at base of tepals, shaded dull red outside, unscented (when dry inner tepals often paler than outer); perianth tube cylindric, 17–24 mm long, occluded below by the style; tepals subequal, obovate-elliptic, 17–25 × 8–11 mm, spreading. *Filaments* suberect, 3–4 mm long; anthers 4.5–8.0 mm long, held horizontally over tepals, usually red-brown; pollen red-brown. *Style branches* 10–12 mm long, spreading over tepals. *Capsules* ellipsoid, 15–20 mm long. *Seeds* softly angular, dull yellow. *Chromosome number* $2n = 26$. *Flowering time*: July to August (to early September at higher elevations).

Distribution and ecology: extending from the slopes of the Hantamsberg at Calvinia through the Roggeveld in the western Karoo, Northern Cape, South Africa, to the high country between Whitehill and the Rooihoogte north of Koo in Western Cape; in rocky sites with thin soil, often in dolerite outcrops.

Diagnosis: *Hesperantha humilis* is readily recognised by the ± acaulescent habit and 1- to 3-flowered spike of deep pink flowers with an elongate perianth tube up to 24 mm long. The flowers are relatively large with tepals 17–25 mm long, the open flower thus up to 50 mm diam. As in other species of the genus with a similarly coloured perianth, the flowers are open during the day and close in the mid- to late afternoon. The long perianth tube suggests that the flowers are adapted for pollination by a



Distribution of ***Hesperantha humilis***.



Distribution of ***Hesperantha flava***.

long-tongued insect but the tube is very slender with the walls tightly clasping the style, leaving no room for an insect's tongue. The small quantity of nectar produced is forced into the top of the tube and is accessible to insect visitors, mostly large bees, with mouth parts no more than 5 mm long.

28. **Hesperantha flava** *G.J.Lewis* in South African Gardening and Country Life 23: 255 (1933); Goldblatt: 82 (1984). Type: South Africa, [Western Cape], Whitehill, 31 July 1937, *R.H. Compton 4276* (BOL, lecto., designated by Goldblatt: 82 (1984); K, isolecto.).

Plants mostly acaulescent, up to 60 mm high, including flowers. *Corm* ± ovoid, 12–15 mm diam., asymmetric with oblique flat side; tunics woody, imbricate, dark brown, outer layers V-notched on lower margins. *Stem* rarely emerging up to 12 mm above ground, unbranched. *Leaves* usually 2(3), basal, plane, ± falcate, obtuse at apex, lowermost 25–40 × 4–10 mm, upper 10–20 mm long. *Spike* 1- or 2-flowered; bracts dimorphic, outer leaf-like, green, 15–20 mm long, inner ± as long, concealed, membranous. *Flowers* crepuscular, salver-shaped, yellow, outer tepals dark brown outside, sweetly scented; perianth tube cylindric, 18–28 mm long; tepals subequal, obovate-elliptic, spreading, outer 13–15 × 5–8 mm, inner 1–2 mm shorter. *Filaments* suberect, ± 3 mm long; anthers 5–7 mm long, held horizontally, usually yellow; pollen yellow. *Style branches* 4–8 mm long, ascending. *Capsules* ellipsoid, 15–25 mm long. *Seeds* softly angular, dull yellow. *Chromosome number* 2*n* = 26. *Flowering time*: July to August.

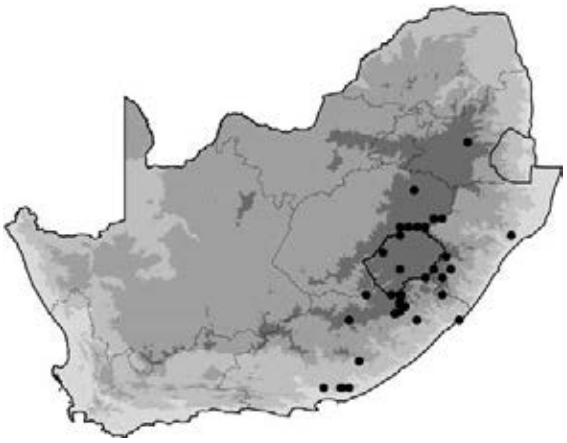
Distribution and ecology: extending from northern Namaqualand and the margins of the western Karoo in Northern Cape, South Africa to the Laingsburg Karoo in Western Cape near Matjiesfontein, in a narrow band along the interior edge of the winter-rainfall zone; occurring mostly on clay soils.

Diagnosis: *Hesperantha flava* is readily recognised by the acaulescent habit and long-tubed, yellow flowers that open in the late afternoon. The flowers are relatively large with a perianth tube 18–28 mm long and outer tepals mostly 13–15 mm long. The large corms with overlapping tunics and the acaulescent habit are shared with *H. hantamensis* and *H. humilis*, both western Karoo species, the former having white flowers and the latter larger, pink to rose flowers. Vegetatively they are difficult to distinguish from one another but flower size, colour and phenology differ in all three.

29. **Hesperantha candida** *Baker*, Handbook of the Irideae: 151 (1892); Goldblatt: 410 (2003). Type: South Africa, [Free State], 1861, *Cooper 746* (K, holo.; E, G, NH, PRE, Z, iso.).

Hesperantha vernalis Hilliard & B.L.Burtt: 279 (1982); Hilliard & Burtt: 423 (1986). Type: South Africa, [KwaZulu-Natal], Estcourt, S side of Kamberg, 9 Sept. 1973, *F.B. Wright 1530* (E, holo.; MO, NU, iso.).

Plants 40–150(–300) mm high. *Corm* ovoid, slightly asymmetric, ± 10 mm diam.; tunics dark brown, ± concentric, splitting below into sections. *Stem* simple or branched from near base, weak, often curved. *Leaves* usually 4, lower 2 basal, third subbasal and uppermost short, entirely sheathing stem, blades lanceolate to ± ovate, usually ± as long as stem, sword-shaped to ± linear or falcate, mostly (2–)3–6 mm wide, leathery, main vein and margins thickened, often dry and broken (or burned) at flowering. *Spike* (1–)3- to 6-flowered; outer bract green, 8–18 mm long, inner bract partly membranous. *Flowers* diurnal, ± salver-shaped, pale pink, pale lilac or white, outer tepals flushed brown to greenish purple outside; scent not recorded; perianth tube cylindric, widening near mouth, mostly 7–12(–14) mm long; tepals mostly 15–20 mm long, elliptic, spreading. *Filaments* ± erect, ± 3 mm long; anthers 5.0–7.5 mm long, ?white; pollen ?white. *Style branches* spreading. *Capsules* oblong-ellipsoid, 7–10 mm long. *Seeds* light brown, softly angular, with loose testa. *Flowering time*: mostly August to October.



Distribution of ***Hesperantha candida***.

Distribution and ecology: with a relatively wide distribution in South Africa, extending from near Carolina in southern Mpumalanga through eastern Free State and adjacent KwaZulu-Natal to the Eastern Cape near Grahamstown and in Lesotho; in grassland, often stony sites.

Diagnosis: *Hesperantha candida* is recognised by the moderate-sized to fairly large usually pink to mauve-pink but occasionally white flowers with tepals mostly 15–20 mm long, perianth tube 7–12(–14) mm long, and anthers 5.0–7.5 mm long. At flowering time in late winter or early spring the leaves are sometimes dry at the tips or scorched by veld fires. The flowering time is important in distinguishing the species, although the somewhat fleshy leaves, often with obtuse tips, aid identification. *Hesperantha candida* is separated from the late winter–spring-blooming *H. longituba* by its shorter perianth tube and diurnal flowers. In *H. longituba* the perianth tube is 14–22 mm long and the apparently consistently white flowers are crepuscular. The leaves of *H. candida* are typically sword-shaped with a raised main vein and margins and an otherwise smooth surface but some collections from Eastern Cape have oblong to nearly ovate leaves that appear to lack thickened margins, whereas other collections from the area are intermediate, having the lowermost leaf sword-shaped and the other basal leaves oblong, leaving no doubt that broader-leaved plants are *H. candida*. Whatever the shape of the leaves, the surface between the margins and midrib is always plane and smooth, with secondary veins not visibly thickened. Plants from Grahamstown, at the southwestern extremity of the range, have the smallest flowers in the species, tepals ± 12 × 6 mm, and some specimens from there also have more flowers per spike than recorded elsewhere. They have 4 to 6 flowers per spike instead of the more usual 1 to 3 in populations further north. These plants are puzzling but more likely represent a southern and lower elevation morph of *H. candida* than an undescribed species.

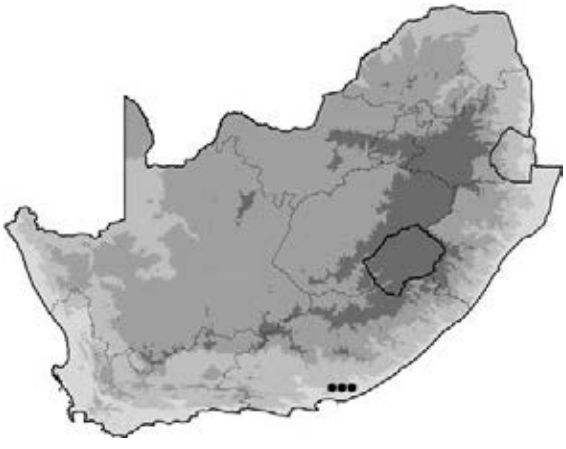
The name *Hesperantha candida* has been mistakenly associated with the narrow-leaved but summer-blooming *H. leucantha*. This fairly slender, pale pink–mauve-flowered species of the Drakensberg and nearby has, like *H. candida*, diurnal but generally smaller flowers, with tepals 12–15 × 3–5 mm long and anthers 4.5–5.5 mm long, whereas those of *H. candida* have tepals mostly 15–20 × 6–9 mm and anthers 5.0–7.5 mm long. Leaves of *H. leucantha* are usually quite slender, mostly 1.5–2.5 mm wide, with only lightly thickened midribs and margins.

30. **Hesperantha debilis** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 411 (2003). Type: South Africa, [Eastern Cape], Grahamstown Nature Reserve, W of Dassie Krantz, Oct. 1951, *A.R.H. Martin s.n. as RUH 9554* (GRA, holo.).

Plants 100–150 mm high. *Corm* ovoid, 4–5 mm diam.; tunics woody, concentric. *Stem* smooth, slender, usually branched at uppermost node, sometimes at next node below. *Leaves* 4, lower 2 basal, linear, third partly sheathing, free in upper half, uppermost largely sheathing, 15–20 mm long, inserted in upper ⅓ of stem, blades 1–2 mm wide, margins and midrib lightly thickened. *Spike* 1- or 2-flowered; bracts 8–11 mm long, green or flushed purplish, margins and apices membranous. *Flowers* ?crepuscular, rotate, white, outer tepals flushed red outside, scent unknown; perianth tube cylindric, expanded near apex, 4–6 mm long; tepals subequal, elliptic, spreading, 12–14 × ± 5 mm. *Filaments* 2.5–3.0 mm long; anthers ± 5 mm long, ?yellow; pollen ?yellow. *Style branches* ± 10 mm long, spreading, exceeding anthers by up to 2 mm in closed flower. *Capsules* globose, ± 3 mm long. *Seeds* unknown. *Flowering time*: October.

Distribution and ecology: restricted to the Suurberg and Grahamstown area of Eastern Cape, South Africa; occurring on sandy slopes.

Diagnosis: a slender, rather delicate plant, *Hesperantha debilis* is recognised by the small corms 4–5 mm diam., soft-textured, linear leaves 1–2 mm wide, and a slender, branched stem bearing one or two flowers per branch.



Distribution of ***Hesperantha debilis***.

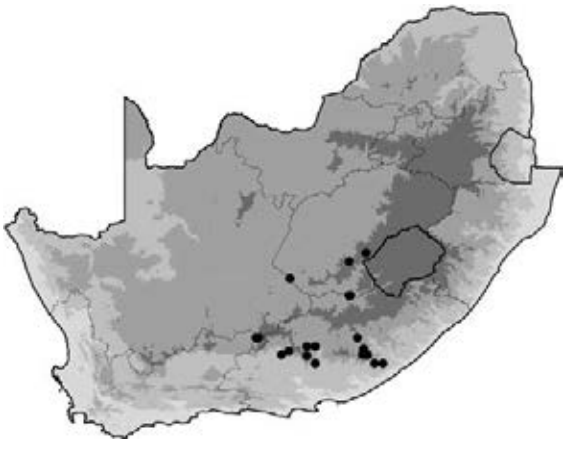
The white flowers have a short, straight perianth tube 4–5 mm long, and spreading tepals 12–14 mm long, thus more than twice as long as the tube. The relationships of *H. debilis* are uncertain.

31. **Hesperantha longituba** *(Klatt) Baker* in The Gardeners' Chronicle 7: 652 (1877); Goldblatt: 69 (1984). *Geissorhiza longituba* Klatt: 383 (1867). Type: South Africa, [Eastern Cape], Somerset East, date unknown, *J.H. Bowker s.n.* (K, lecto., designated by Goldblatt: 69 (1984); K, S, isolecto.).

Hesperantha candida var. *bicolor* Baker: 63 (1896). *H. bicolor* (Baker) R.C.Foster: 5 (1948). Type: South Africa, [Eastern Cape], Somerset East, Boschberg, *P. MacOwan s.n.* (K, lecto., designated by Foster: 5 (1948); BOL, G, GRA, M, WU, Z, isolecto.).

Plants (60–)150–300 mm high. *Corm* ± ovoid, 10–18 mm diam.; tunics of dark brown, overlapping fibres notched below into sections. *Stem* simple or 1-branched from near base, sometimes with a short, sheathing bract-like leaf in upper half. *Leaves* 3 or 4, all basal or uppermost inserted in lower ⅓ of stem and sheathing part of stem, blades ± lanceolate, reaching to ± base of spike, (3–)5–9 mm wide, leathery, often dry or torn distally, margins slightly raised, hyaline when dry. *Spike* lightly flexuose, (1)2- to 6-flowered; outer bract green, 12–20(–30) mm long, inner bract ± membranous, shorter than outer. *Flowers* crepuscular, salver-shaped, white, outer tepals flushed pink to red or brown outside, sweetly scented; perianth tube mostly 14–22 mm long; tepals elliptic, spreading, 15–22 × 8–10 mm. *Filaments* 5–8 mm long; anthers 8–12 mm long, ?white; pollen ?white. *Style branches* 12–16 mm long, spreading, reaching to near anther tips in closed flower. *Capsules* ovoid-elliptic, ± 8 mm long. *Seeds* unknown. *Flowering time*: (mid-July) August and September.

Distribution and ecology: largely a species of the southern Karoo and adjacent interior mountains of Eastern Cape, South Africa, extending from Somerset East, Murraysburg and Graaff-Reinet eastward to Grahamstown and into western Free State and as far north as De Aar in Northern Cape; flowering in spring in rocky grassland when the veld is usually dry.



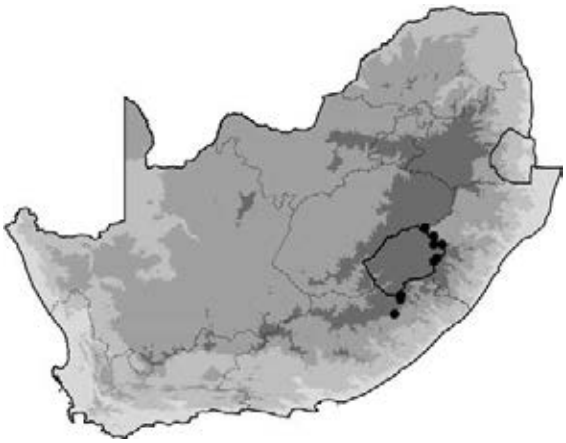
Distribution of ***Hesperantha longituba***.

Diagnosis: recognised by the relatively large white flowers that open in the late afternoon and close after dark, *Hesperantha longituba* has tepals 15–22 mm long and a perianth tube usually 14–22 mm long. The leaves are broad and leathery with prominent, raised margins and midrib. The large corms, up to 18 mm diam., have overlapping tunics notched into segments below, like those of several western Karoo species, including *H. cucullata, H. humilis* and *H. vaginata* and on this basis *H. longituba* appears allied to these species rather than to those of eastern southern Africa.

Hesperantha longituba is sometimes confused with a second spring-flowering species from eastern southern Africa, *H. candida*, and has at times been included in that species. The two differ mainly in the length of the perianth tube, mostly 14–22 mm long in *H. longituba* vs. 10–12 mm long in *H. candida*. The flowers of the latter, as far as are known, are diurnal (confirmed by notes on some herbarium collections) whereas those of *H. longituba* are crepuscular. Plants from the Aliwal North and Stutterheim areas of Eastern Cape are intermediate in perianth tube length and make the distinction between the two species sometimes seem arbitrary but those from further west, at Cradock, Somerset East, and Graaff-Reinet always have a longer perianth tube, up to or even exceeding 22 mm.

32. **Hesperantha schelpeana** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 37: 302 (1979); Hilliard & Burtt: 434 (1986). Type: Lesotho, Black Mtns between Sani and Mokhotlong, 5 Nov. 1973, *Hilliard & Burtt 7075* (E, holo.; NU, iso.).

Plants 40–150 mm high, acaulescent, flowering without leaves. *Corm* ovoid-oblong, 10–15 mm diam.; tunics of relatively soft, brown, overlapping layers splitting above into slender cusps and below into segments. *Stem* underground, unbranched, sheathed. *Leaves* of flowering stem dry and often broken or lacking, foliage leaves produced after flowering on separate shoot, ultimately 2 or 3, basal leaf or leaves solitary or 2, falcate, ultimately 80–100 × 2–3 mm, probably centric and oval in section when alive, when dry main vein and margins appearing thickened, uppermost leaf entirely sheathing or with short unifacial tip. *Spike* 1- or 2(3)-flowered; bracts 10–22 mm long, green, often flushed purple. *Flowers* diurnal, salver-shaped, white to pink with dark throat, outer tepals sometimes tipped purple, feathered to uniformly red-purple to brown outside; perianth tube 5–10 mm long, narrowly funnel-shaped; tepals spreading, elliptic-ovate, 14–22 × 6–8 mm. *Filaments* erect, ± 1.5–3.0 mm long; anthers diverging, 6–8 mm long, yellow; pollen yellow. *Style branches* reaching to tips of anthers in closed flower. *Capsules* ovoid-oblong, 6–8 × 4–6 mm. *Seeds* flattened,



Distribution of ***Hesperantha schelpeana***.

narrowly winged, ± 2 × 1 mm. *Flowering time*: late September to mid-November.

Distribution and ecology: occurring in Lesotho and in South Africa in Eastern Cape, Free State and KwaZulu-Natal; in open places in wet turf and stony ground at higher elevations in the Drakensberg.

Diagnosis: *Crocus*-like *Hesperantha schelpeana* typically flowers on a short stem, the leaves of which are dry or absent, and is distinguished in addition by the short-tubed, relatively small flowers that appear in dry grassland. The perianth tube is up to 10 mm long and the tepals 14–22 mm long, thus ± twice as long as the tube. The flowers are usually white or pale pink with the outer tepals feathered red-purple outside but plants from The Sentinel on the Free State–Lesotho Border in the Drakensberg, at the northern limit of the species, have pink flowers, shading darker at the tips of the tepals and with the throat dark brown, providing a stark contrast to the deep yellow anthers and pollen. The reverse of the outer tepals is so strongly feathered with brown as to appear nearly uniformly pigmented.

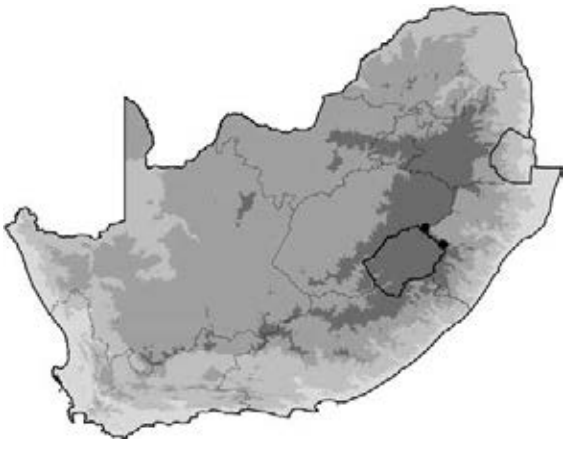
New, green leaves are sometimes emergent at flowering, usually two in number and produced on a shoot separate from the flowers. The leaf blades are solid and oval in cross section when alive but appear flat with a prominent main vein when dry. The occasional presence of leaves at flowering time makes it possible to confuse *Hesperantha schelpeana* with *H. candida*, which flowers at the same time of year and has living, green leaves present on the flowering stem (unless destroyed by fire or grazing). Properly developed plants of *H. candida* have four leaves, two basal, a third subbasal and partly sheathing, and a short, sheathing leaf in the upper part of the stem. *Hesperantha schelpeana*, however, never has more than three leaves, the lowermost slender and exceeding the stem (when still present at flowering and then dry), the second much shorter, often largely sheathing, and a third, short, sheathing leaf usually present on the upper part of the stem. The leaf blades also differ, those of *H. candida* fairly broad and plane with thickened and raised margins and midrib.

33. **Hesperantha altimontana** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 414 (2003). Type: South Africa, [Free State], Drakensberg Mtns, The Sentinel, ± 2 500 m, 10 Oct. 1979, *G. Cubitt s.n.* (NBG, holo.).

Plants acaulescent, 100–120 mm high, flowering before leaves emerge. *Corm* ± globose, 10–15 mm diam.; tunics of relatively soft, imbricate layers. *Stem* unbranched, at flowering foliage leaves dry or lacking. *Leaves* (of the flowering stem) 2, entirely sheathing, 25–35 mm long; green foliage leaf produced later in season, solitary, falcate, 60–80 mm long, 3–4 mm wide, leathery, main vein hyaline but not raised when alive. *Spike* 1-flowered; bracts ± 20 mm long, green, flushed with purple, inner slightly shorter than outer. *Flowers* salver-shaped, uniformly creamy white, shading to pale yellow both inside and outside tube; perianth tube 20–27 mm long, cylindric, expanded near mouth; tepals spreading, elliptic-ovate, 20–23 × 9–10 mm, subacute. *Filaments* erect, ± 3 mm long; anthers diverging, ± 10 mm long, yellow; pollen yellow. *Style branches* ± 10 mm long, reaching to upper ⅓ of anthers in closed flower. *Flowering time*: October.

Distribution and ecology: occurring in Lesotho and in South Africa in Free State and KwaZulu-Natal; on stony, open ground in the high Drakensberg.

Diagnosis: *Hesperantha altimontana* is evidently allied to the two other southern African Drakensberg species that flower early in the season at which time the foliage leaves are dry or withered, with the new season's leaves appearing on separate shoots later in the year, *Hesperantha crocopsis* and *H. schelpeana*. It is most like *H. schelpeana* in its fairly large flowers but differs in having a perianth tube 20–27 mm long and uniformly creamy white perianth, whereas *H. schelpeana* has whitish or pink flowers with the outer tepals flushed to uniformly darker pink to purple on the outside, and a perianth tube 5–10 mm long. *Hesperantha crocopsis* has smaller flowers, the tepals only 6–7 mm long but a perianth tube 9–14 mm



Distribution of ***Hesperantha altimontana***.

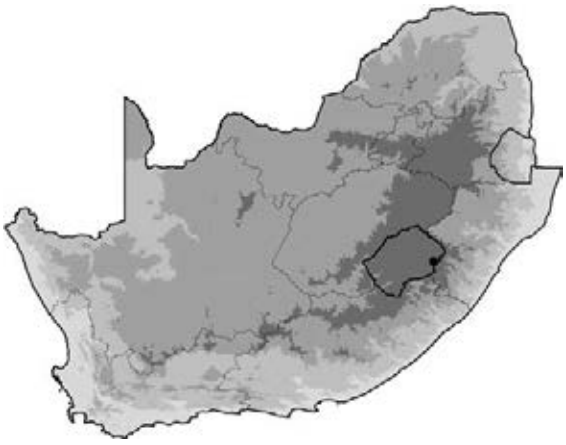
long, and like *H. schelpeana*, the outer tepals are red to purple on the outside. Foliage leaves are lacking on flowering specimens, but plants from ridges west of Thaba Ntlenyana in Lesotho that appear to be *H. altimontana* have a distinctive, falcate leaf with a plane blade like no other known member of the genus.

34. **Hesperantha crocopsis** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 37: 302 (1979); Hilliard & Burtt: 435 (1986). Type: Lesotho, Mokhotlong District, above Mashai Pass, 7 Nov. 1977, *O.M. Hilliard & B.L. Burtt 10489* (E, holo.; NU, iso.).

Plants acaulescent, up to 30 mm high at flowering, blooming with leaves emergent. *Corm* depressed-globose, ± 5 mm diam.; tunics papery, splitting above into narrow cusps and below into oblong sections. *Stem* unbranched, emerging above ground only in fruit, then up to 60 mm high, sheathed by membranous cataphylls, uppermost up to 55 mm long. *Leaves* 1 or 2, elongating after flowering, from separate shoot, blades linear, ultimately up to 70 × ± 1.5 mm; leaves of flowering stem dry and decayed at flowering. *Spike* 1(2)-flowered; bracts up to 5 mm long, united at base, membranous, hidden within cataphylls. *Flowers* diurnal, white with outer tepals pink to purple outside; perianth tube 9–14 mm long, cylindric, expanded near mouth; tepals spreading, elliptic-ovate, 6–7 × 2–3 mm. *Filaments* ± erect, 1.5–2.5 mm long; anthers diverging, 2.25–3.50 mm long, yellow. *Style branches* ± 4.5 mm long, reaching to lower ⅓ of anthers. *Capsules* oblong, ± 5 mm long. *Seeds* softly angular, ± 1.5 × 1 mm. *Flowering time*: November, probably also October.

Distribution and ecology: Lesotho and probably also adjacent Free State and KwaZulu-Natal in South Africa, in the high Drakensberg, 2 800–3 100 m; in stony, open sites on shallow ground in short, wet turf and silty streambanks.

Diagnosis: the *Crocus*-like *Hesperantha crocopsis* is one of three spring-blooming species of the genus from eastern southern Africa that have the flowers borne at ground level. It is distinguished by the small white flowers, the tepals 6–7 mm long and shorter than the perianth tube. The two leaves are emergent at flowering and are produced from a new shoot, ultimately reaching up to 70 mm long. Leaves of the short flowering stem are usually absent or represented by dry fragments attached to the stem. The two other species with this growth habit have considerably larger flowers with tepals 14–20 mm long in *H. schelpeana* and ± twice as long as the perianth tube, and tepals 20–23 mm long in *H. altimontana* and ± as long as the tube.



Distribution of ***Hesperantha crocopsis***.

35. **Hesperantha bachmannii** *Baker* in Bulletin de l'Herbier Boissier, sér. 2, 1: 863 (1901); Goldblatt: 90 (1984). Type: South Africa. [Western Cape], near Hopefield, Aug. 1885, *Bachmann 1177* (Z, lecto., effectively designated by Foster: 4 (1948) [not G as indicated elsewhere]; K, isolecto.).

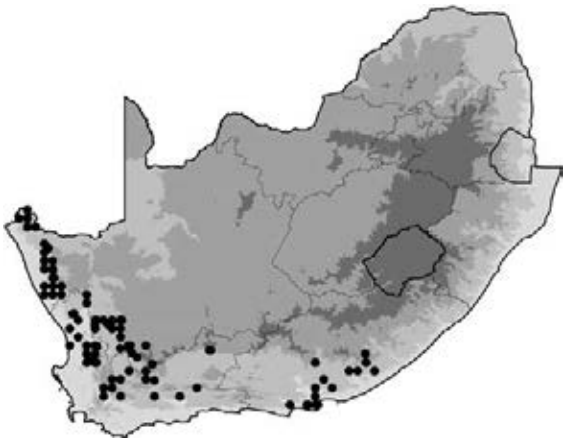
[*Hesperantha virginea* Ker Gawl.: 225 (1804a), invalid name without description.]

[*Ixia virginea* Sol. ex Ker Gawl.: 225 (1804a), invalid name only in synonymy.]

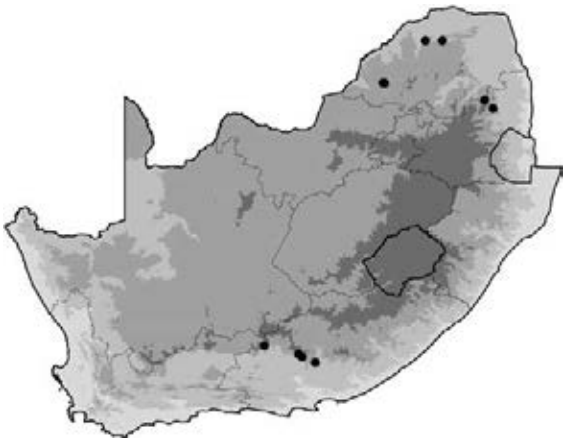
Plants 150–300 mm high. *Corm* globose to ovoid, with flattened oblique base, 6–8 mm diam., bearing small cormlets at base; tunics woody, imbricate, splitting from base into sections. *Stem* simple or 1- or 2-branched from near base or aerial node. *Leaves* 3 or 4, lower 2 or 3 basal, with well-developed, soft-textured blades reaching to base of spike, plane, (2)3–7 mm wide, sword-shaped to falcate, upper leaf sheathing or unifacial distally, margins and main vein hardly thickened. *Spike* flexuose, mostly 3- to 7(–9)-flowered; bracts mostly 12–20 mm long, green with transparent margins. *Flowers* crepuscular, nodding to pendent, white, flushed red to purple outside, sweetly scented; perianth tube ± 10 mm long, cylindric, curved in upper half; tepals ovoid to elliptic, 14–20 × 5–8 mm, spreading to slightly reflexed. *Filaments* horizontal, 5–6 mm long; anthers 6–8 mm long, decumbent, yellow; pollen yellow. *Style branches* 7–8 mm long, reaching to upper ⅓ of anthers in closed flower. *Capsules* ± ovoid-oblong, ± 6 mm long. *Seeds* light brown, angular. *Chromosome number* 2*n* = 26. *Flowering time*: July to September, or in October in the east of its range and at higher elevations.

Distribution and ecology: widespread in South Africa, extending from the Richtersveld in Northern Cape though Western Cape to East London in Eastern Cape; most often on S-trending clay or clay loam slopes.

Diagnosis: the relatively common *Hesperantha bachmannii* is recognised by the unusually small corm, up to 8 mm diam., usually bearing several small cormlets at base, soft-textured leaves, and white flowers with a curved perianth tube ± 10 mm long. The flowers are thus nodding to almost pendent and have horizontally oriented stamens and nearly pendent style branches. Related



Distribution of ***Hesperantha bachmannii***.



Distribution of ***Hesperantha bulbifera***.

H. bulbifera has almost identical but somewhat to considerably larger flowers, with a perianth tube 9–15 mm long and tepals 16–20 mm long vs. tube ± 10 and tepals 14–20 mm long. In adition, *H. bulbifera* always has a conspicuous cormlet in some or all of the leaf axils, not present in *H. bachmannii*. The flowers produce a strong sweet fragrance when open after 16:00 or sometimes after 17:00.

36. **Hesperantha bulbifera** *Baker* in Journal of Botany, British and foreign 14: 183 (1876b); Goldblatt: 95 (1984). Type: South Africa, [Eastern Cape], Somerset East, Boschberg, Nov. 1876, *MacOwan 2215* (K, lecto., designated by Goldblatt: 95 (1984); BOL, G, K, PRE, WU).

Hesperantha sabiensis N.E.Br. ex R.C.Foster: 23 (1948). Type: South Africa, [Mpumalanga], Sabie, *Cunliffe s.n.* (K, lecto., designated by Goldblatt: 95 (1984); PRE, Z, isolecto.).

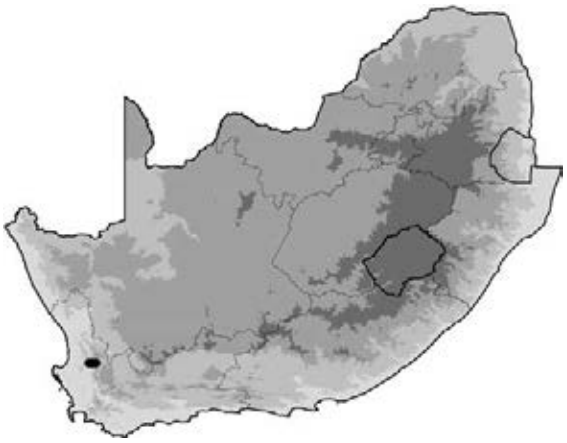
Plants 200–300 mm high. *Corm* globose with flattened oblique base, 8–10 mm diam.; tunics woody, imbricate, splitting from base into sections. *Stem* often inclined to trailing, simple or branched from axil of cauline leaf, bearing cormlets in some or all leaf axils. *Leaves* 3 to 5, lower 2 or 3 basal, with well-developed blades ± reaching spike apex, plane, sword-shaped to falcate, 3–7 mm wide, upper leaves cauline, sheathing or free and unifacial distally, soft-textured, margins and main vein hardly thickened. *Spike* flexuose, 2- to 6-flowered; bracts mostly 15–25(–30) mm long, green with transparent margins. *Flowers* evidently crepuscular, nodding to pendent, white, sweetly scented; perianth tube 9–15 mm long, cylindric, curved in upper half; tepals ovoid to elliptic, 16–20 × 5–8 mm, spreading to slightly reflexed. *Filaments* ± horizontal, 6–7 mm long; anthers ± 8 mm long, white; pollen white. *Style branches* 12–14 mm long, ± pendent, reaching close to anther tips. *Capsules* ± ovoid–oblong, 7–8 mm long. *Seeds* unknown. *Flowering time*: September and October in the south, May to July and October in the east and north of its range.

Distribution and ecology: with a widespread but scattered range in South Africa, recorded from the mountains above Somerset East in Eastern Cape to the Blouberg, Soutpansberg and Wolkberg in Limpopo; always in wet sites, usually on cliffs or near waterfalls.

Diagnosis: allied to the largely western southern African *Hesperantha bachmannii*, *H. bulbifera* has similar white flowers with curved perianth tube but these are somewhat larger, with a perianth tube 9–15 mm long and tepals 16–20 mm long vs. tube ± 10 mm long and tepals 14–20 mm long in *H. bachmannii*. In addition, *H. bulbifera* always has larger corms, 8–10 mm diam. vs. 6–8 mm, with a conspicuous cormlet in the lower leaf axils not present in *H. bachmannii*.

37. **Hesperantha pallescens** *Goldblatt* in Journal of South African Botany 50: 88 (1984). Type: South Africa, [Western Cape], below Piekenierskloof Pass, 3 Sept. 1980, *Goldblatt 5645* (MO, holo.; B, BOL, C, K, M, NBG, P, PRE, S, US, WAG, iso.).

Plants 100–200 mm high. *Corm* globose to ovoid, with flattened oblique base, 3–6 mm diam., bearing small cormlets at base; tunics woody, imbricate, splitting from below into sections. *Stem* simple or 1- or 2-branched from axils of upper leaves. *Leaves* 4 or 5, lower 2 or 3 basal, with well-developed, soft-textured, ± flaccid blades reaching up to ± base of spike, plane, 2–3 mm wide, ± linear, upper 1 or 2 leaves cauline, uppermost largely sheathing, margins and main vein hardly thickened. *Spike* flexuose, mostly 2- to 4-flowered; bracts pale green, margins membranous, outer 12–16 mm long, inner slightly shorter. *Flowers* diurnal, salver-shaped, pale yellow, odourless; perianth tube (12–)16–22 mm long, cylindric, widening slightly above; tepals elliptic, 15–26 × ± 5.5 mm, slightly cupped. *Filaments* suberect, ± 5 mm long; anthers diverging, 5–6 mm long, yellow; pollen yellow. *Style branches* 10 mm long, ± spreading, reaching close to anther tips in closed flower. *Capsules* obovoid, ± 10 mm long. *Seeds* unknown. *Chromosome number* 2*n* = 26. *Flowering time*: August to mid-September.



Distribution of ***Hesperantha pallescens***.

Distribution and ecology: a narrow endemic, known only from the southwestern slopes of the Olifants River Mtns near Piekenierskloof Pass in Western Cape, South Africa; on clay banks and slopes in renosterveld.

Diagnosis: *Hesperantha pallescens* is distinguished by the pale yellow, diurnal flowers with a relatively long perianth tube mostly 16–22 mm long, and narrow tepals that remain slightly cupped even when fully open. The small corms, up to 6 mm diam. and with several small cormlets at the base, mostly closely resemble those of *H. bachmannii* and the two species also share soft-textured, slightly flaccid leaves. On this basis we consider them to be closely related. The crepuscular flowers of *H. bachmannii* are, however, very different, with white tepals and a curved perianth tube, thus facing toward the ground. The flowers of *H. pallescens* open shortly after 12:00 and close after 17:30, and have been found to be self-compatible, but pollination of the species remains to be studied.

38. **Hesperantha baurii** *Baker* in Journal of Botany, British and foreign 14: 182 (1876b); Hilliard & Burtt: 426 (1986). Type: South Africa. [Eastern Cape], Transkei, Baziya Mtn, Mar., *Baur 628* (K, holo.; BOL, iso.).

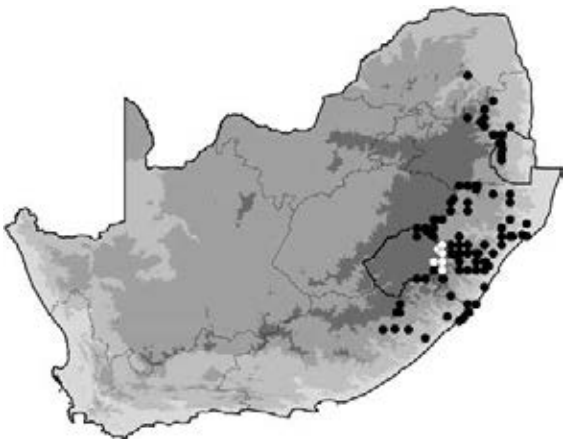
Plants mostly 150–500 mm high. *Corm* ± globose, slightly asymmetric with obliquely flattened side, 19–15 mm diam.; tunics woody, imbricate, splitting from base into truncate sections. *Stem* simple or sometimes branched from near base. *Leaves* usually 4, sometimes 5 or only 3, lower 2(3) basal, with well-developed blades reaching up to base of spike, (3)4–7 mm wide, sword-shaped to falcate, margins and main vein visibly thickened; upper 2 leaves cauline and largely or completely sheathing. *Spike* flexuose, mostly 3- to 12(–18)-flowered; bracts mostly 10–15 mm long, sometimes flushed red distally. *Flowers* diurnal, pale to deep pink, not scented; perianth tube (6.5–)8.0–12.5 mm long, cylindric, dilated at throat; tepals 12–21 × 5–6 mm, elliptic to obovate, spreading. *Filaments* ascending, ± 2.5 mm long, inserted at base of outer tepals; anthers 6–8 mm long, yellow; pollen yellow. *Style branches* 8–10 mm long, spreading, reaching to upper ⅓ or shortly beyond anthers in closed flower. *Capsules* ± ovoid–oblong, 8–9 × ± 5 mm. *Seeds* light brown, angular, angles narrowly ridged, pale. *Flowering time*: December to March.

Distribution and ecology: widespread in southern Africa, extending from northern Eastern Cape to Mpumalanga in South Africa, Lesotho and Eswatini; in well-watered grassland, mainly above 600 m.

Diagnosis: the tallest and most robust of the short-tubed, eastern southern Africa species of the genus, *Hesperantha baurii* is unusually variable. Populations from high elevations in the Drakensberg, with four (occasionally three) leaves, and spikes of up to 4(–6) large, deep pink (also described as magenta) flowers with tepals 12–21 mm long, up to 3 times as long as the tube, are recignised as subsp. *formosa.* Typical *H. baurii* has four or five leaves, and spikes of up to 12(–18) flowers with tepals 12–18 mm long, up to 1.5 times as long as the tube. The stems of subsp. *baurii* are up 400 mm tall and sometimes branched but those of subsp. *formosa* seldom reach 300 mm and are always unbranched. Populations at lower elevations in the Drakensberg may be intermediate between the two subspecies, a situation not unexpected in subspecies.

Hesperantha baurii can be recognised by the relatively short perianth tube, mostly 7–12 mm long, tepals 12–18(–21) mm long, and (three) four (five) leaves, the lower two largest and basal, the third leaf sheathing in the lower half, and the uppermost leaf usually short, inserted in the middle of the stem and entirely sheathing. Only the most robust individuals may have a single branch. The spike ranges from weakly to markedly flexuose and in subsp. *baurii* bears up to 15 flowers, occasionally more, and spikes with as many as 18 flowers have been recorded.

Hesperantha baurii is most easily confused with pale pink-flowered *H. leucantha*, but this is a more slender,



Distribution of *Hesperantha baurii* subsp. **baurii**, ●; subsp. **formosa**, ○.

often trailing plant, with spikes of 2 to 6 flowers, the the filaments inserted just below the mouth of the perianth tube and 4–5 mm long, ± as long as the anthers. In *H. baurii* the filaments are inserted at the base of the outer tepals and ± 2.5 mm long, thus less than half as long as the anthers, 6–8 mm long.

Key to subspecies

1a Tepals mostly 12–18 × 4–5 mm; foliage leaves mostly at least 200 mm long . . . . . 38a. subsp. *baurii*
1b Tepals mostly 15–21 × 5–9 mm; foliage leaves mostly 35–150 mm long . . . . . 38b. subsp. *formosa*

38a subsp. **baurii**

Hesperantha rubella Baker: 239 (1876a). Type: South Africa, [Free State], without precise locality, *Cooper 1027* (K 000320587, lecto., designated here; E, K isolecto.).

Hesperantha disticha Klatt: 393 (1882). Type: South Africa, [KwaZulu-Natal], valley near Botha's Hill, 2 000 ft [600 m], 6 Oct., *Wood 4543* (K, holo.; NH, iso.).

Hesperantha bifolia Baker: 865 (1901). Type: South Africa, [KwaZulu-Natal], mtns near Howick, 1 000 m, *Junod 374* (Z, holo.).

Plants up to 500 mm high. *Leaves* 4 or 5, lower 3 basal and longest, up to 200 mm long, upper 1 or 2 sheathing stem. *Spike* mostly 6- to 15(–18)-flowered; outer bract mostly 9–12 mm long. *Flowers* pale pink; perianth tube 6–10 mm long; tepals mostly 12–16(–18) × 4–5 mm.

Distribution and ecology: occurring throughout the range of the species but rare or absent above 3 500 m.

Diagnosis: subsp. *baurii* is usually taller than subsp. *formosa* and mostly 350–500 high, with slightly smaller bright pink flowers with tepals 12–18 mm long. The spikes also have several to many more flowers than subsp. *formosa*, as many as 15 to 18 vs. 2 to 6. Although intermediates between the two subspecies have been recorded, the presence of both at one site is puzzling indicating a need for additional research.

38b. subsp. **formosa** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 43: 430 (1986); Goldblatt: 416 (2003). Type: Lesotho, Sani Top, west of border post, 9 500 ft [2 900 m], 16 Jan. 1976, *O.M. Hilliard & B.L. Burtt 8829* (NU, holo.; E, MO, iso.).

Plants up to 300 mm high. *Leaves* usually 3(4), lower 2(3) basal and longest, 35–150 mm long, upper leaf sheathing stem. *Spike* mostly 2- to 4(–6)-flowered; outer bract 10–15 mm long. *Flowers* deep pink; perianth tube 7–11 mm long; tepals mostly 15–21 × 5–9 mm.

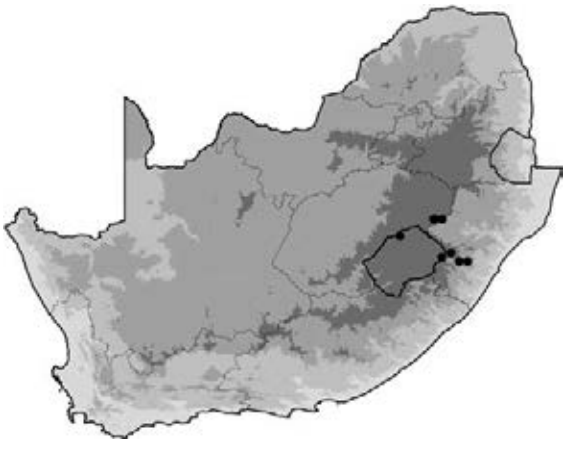
Distribution and ecology: high elevations in the Drakensberg of Lesotho and KwaZulu-Natal; in grassland.

Diagnosis: subsp. *formosa* is usually easily to distinguish from subsp. *baurii* by the spikes bearing 2 to 4(–6) flowers and normally only 2 basal leaves and a third, largely sheathing, cauline leaf. The slightly larger flowers have tepals 15–21 mm long vs. 12–16(–18) in subsp. *baurii*. Plants intermediate between the two subspecies have been recorded from slightly lower altitudes. A record of the co-occurrence at Sani Pass of subsp. *formosa* in fruit when subsp. *baurii* was in flower suggests that the current taxonomy may require revision.

39. **Hesperantha glareosa** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 43: 424 (1986). Type: South Africa, [KwaZulu-Natal], Underberg, headwaters of Mlahlangubo River, 23 Jan. 1982, *O.M. Hilliard & B.L. Burtt 15367* (NU, holo.; E, iso.).

Plants 100–200 mm high. *Corm* ovoid, 10–12 mm diam.; tunics dark brown, overlapping, lower margin breaking into sections. *Stem* simple or 1-branched from near base. *Leaves* 4, lower 2 or 3 basal, upper 1 or 2 cauline, uppermost largely sheathing, blades of lower reaching to between middle and apex of stem, firm, upright or slightly falcate, mostly 0.8–2.0 mm wide, main vein thickened. *Spike* flexuose, (1)2- to 7-flowered; bracts 6.5–14.0 mm long, inner slightly shorter than outer. *Flowers* diurnal, deep pink, ?unscented; perianth tube, mostly 4–6 mm long; tepals 10.0–14.5 × 3.5–5.5 mm. *Filaments* 2–3 mm long; anthers 3–6 mm long. *Style branches* ± 7–8 mm long, reaching to upper ⅓ of anthers in closed flower. *Capsules* ellipsoid, 5–7 mm long. *Seeds* light brown, angular with narrow raised edges, ± 1 mm diam. *Flowering time*: December to early March.

Distribution and ecology: largely a species of the central Drakensberg in Lesotho and Free State and KwaZulu-Natal in South Africa but possibly extending north to southern Mpumalanga (specimens from there are provisionally assigned here); growing in damp turf and wet, rocky pavement.



Distribution of ***Hesperantha glareosa***.

Diagnosis: distinguished largely by the firm, narrow leaves up to 2 mm wide, and usually few-flowered spike, *Hesperantha glareosa* has deep rose-pink flowers with a short perianth tube 4–6 mm long, slightly less than half as long as the tepals, 10.0–14.5 mm long. It is easily separated from the superficially similar *H. baurii* by its habitat in wet ground in thin soil vs. grassland, smaller flowers (tube mostly 7–11 mm long and tepals 12–21 mm long in *H. baurii*) and narrow leaves. Specimens from Mpumalanga are very like some depauperate specimens of *H. glareosa* and may be this species, but it is impossible to determine if these very slender, one- or two-flowered plants (e.g., *Galpin 14329*, BOL, PRE; *Jacobsen 4780*, PRE) are depauperate, four-leafed *H. schlechteri* or truly *H. glareosa*. The flowers are moderate in size, the tepals 10.5–14.5 mm long, and perianth tube 5–7 mm long.

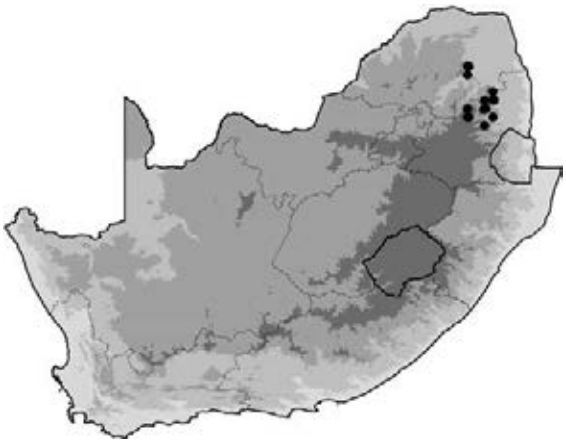
40. **Hesperantha schlechteri** *(Baker) R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 114: 50 (1936); Goldblatt: 417 (2003). *Geissorhiza schlechteri* Baker: 863 (1901). Type: South Africa, [Limpopo], Woodbush, 27 Mar. 1894, *Schlechter 4701* (BOL, holo.; G, K, P, iso.).

Hesperantha similis R.C.Foster: 24 (1948). Type: South Africa, [Mpumalanga], Sabie District, Devil's Knuckles, Apr. 1887, *Wilms 1446* (K, holo.; B, Z, iso.).

Plants 180–300 mm high. *Corm* ovoid, 8–12 mm diam.; tunics woody, concentric. *Stem* usually unbranched, flexuose, often looped above sheaths of upper leaves. *Leaves* mostly (4)5, lower (3)4 basal or subbasal, largest, uppermost 1 or 2 inserted in middle of stem, sometimes entirely sheathing or with short free unifacial tip, blades of lower leaves linear, (1)2–4 mm wide, margins and main vein not or barely thickened when alive. *Spike* flexuose, mostly 4- to 8-flowered; outer bract mostly 9–12 mm long, green, inner bract ± ⅔ as long as outer. *Flowers* diurnal, pale to deep pink, outer tepals with a coppery brown flush outside; perianth tube cylindric below, widening near apex, 5–7(–10) mm long; tepals subequal, ± elliptic, 13–16 × 5.0–6.5 mm, spreading. *Filaments* 3–5 mm long; anthers 4–5(–6) mm long, yellow; pollen yellow. *Style branches* 10–12 mm long, laxly spreading, exceeding anthers by ± 2 mm in closed flower. *Capsules* oblong-obovoid, 7–9 mm long. *Seeds* subglobose or the sides flattened by pressure, ± 0.6 mm long. *Flowering time*: January to mid-March.

Distribution and ecology: occurring in Limpopo and Mpumalanga provinces of South Africa, along the escarpment from Woodbush in the north to Long Tom Pass in the south; on rocks and thin soil on sandstone or quartzite pavement.

Diagnosis: one of several pink-flowered species of the genus, *Hesperantha schlechteri* is recognised by the relatively short perianth tube, 5–7(–10) mm long, anthers mostly 4.0–4.5 mm long, and typically 5 leaves, the lower 3 with extended blades 2–4 mm wide. The flexuose stem has a pronounced loop above the sheaths of the upper leaves. Plants from Mariepskop with four or five leaves, the blades only about 1 mm wide, may not be correctly placed in *H. schlechteri.* Plants from near Mac-Mac Falls are also puzzling, the plants having blades of the lower leaves 4–6 mm wide, unusually broad for any *Hesperantha* species in Mpumalanga. The flowers are quite small, with tepals ± 7 mm long and a tube ± 5 mm long. They may be depauperate *H. schlechteri* or an undescribed species. A few other collections, including some from Dullstroom, also represent this variant.

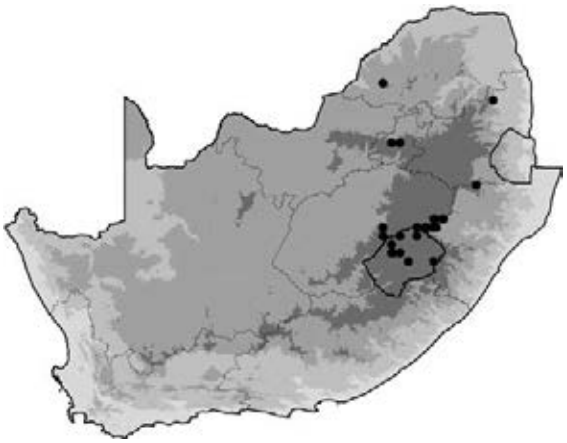


Distribution of ***Hesperantha schlechteri***.

41. **Hesperantha leucantha** *Baker*, Handbook of the Irideae: 150 (1892). Type: South Africa, [KwaZulu-Natal], Oliviershoek Pass, 14 Jan. 1886, *J.M. Wood 3437* (K, holo.).

Geissorhiza macra Baker: 1005 (1904). Type: Lesotho, Mt. Machache, without date, *H. Jacottet 1937* (G, holo.).

Plants mostly 300–450 mm high. *Corm* ovoid, slightly asymmetric, ± 10 mm diam.; tunics dark brown, ± concentric, splitting below into sections and above into pointed cusps. *Stem* simple or branched from near base, weak, often curved or trailing. *Leaves* 4 or 5, lower 2 or 3 basal, reaching to ± base or middle of spike, sword-shaped to ± linear or falcate, often weak and trailing, mostly 1.5–5.5 mm wide, main vein and margins thickened, remaining leaves cauline, progressively shorter, uppermost entirely sheathing. *Spike* (1–)3- to 6-flowered; outer bract green, mostly 8–15 mm long, inner bract smaller, partly membranous. *Flowers* diurnal, salver-shaped, pale pink to pale mauve, rarely ± white, scent not recorded; perianth tube cylindric, widening near mouth, mostly 7–11 mm long; tepals spreading, mostly 9–13(–15) mm long. *Filaments* ± 5 mm long, inserted slightly below top of tube; anthers 4–5 mm long, white; pollen white. *Style branches* 10–15 mm long, exceeding anthers in closed flower. *Flowering time*: December to February.



Distribution of ***Hesperantha leucantha***.

Distribution and ecology: widespread and extending from Limpopo south through Gauteng, and Mpumalanga to Free State and KwaZulu-Natal in South Africa, also in western Lesotho; rocky grassland and trailing on cliffs.

Diagnosis: *Hesperantha leucantha* is recognised by its pale pink flowers with perianth tube usually 12–15 mm long and exserted from the bracts unless these are unusually long, and tepals 9–12(–15) mm long across its main range in interior Lesotho, eastern Free State and northern KwaZulu-Natal. The filaments are ± 5mm long and inserted shortly within the tube. Related *H. baurii* also has pink flowers but shorter filaments 2.0–2.5 mm long inserted at the base of the outer tepals. Plants from north of the Vaal River, in Gauteng and Northwest Province, placed in *H. leucantha* (as *H. candida*) by Hilliard & Burtt (1986), are somewhat atypical in their greater height and slender habit, but are currently included there.

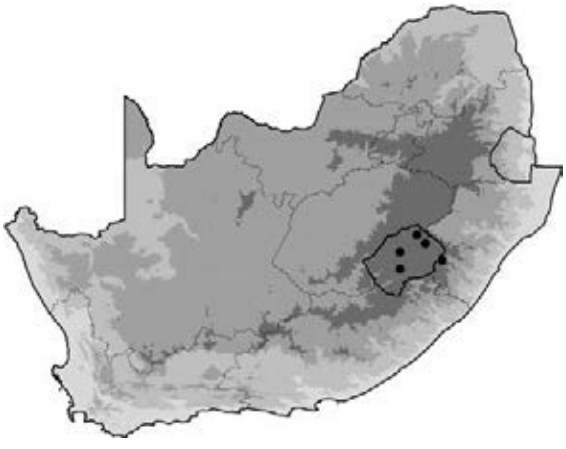
Hesperantha leucantha is sometimes confused with *H. glareosa*, a species with deep pink flowers with a much shorter perianth tube, mostly 4–6 mm long, and tepals 10.0–14.5 mm long. *Hesperantha glareosa* also has four leaves, the lower three basal and with firm, narrow blades, mostly 1–2 mm wide.

42. **Hesperantha exiliflora** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 419 (2003). Type: Lesotho, 3 km from New Oxbow Inn on road to Moteng Pass, subalpine grassland, 2 550 m, 3 Feb. 1987, *Killick 4477* (PRE, holo.; MO, iso.).

Plants mainly 120–250(–300) mm high. *Corm* obconic, ± 8 mm diam.; tunics woody, soon breaking into elliptic segments tapering above into short points. *Stem* slender, unbranched. *Leaves* usually 4, lower 2 basal and longest, reaching to between upper ⅓ of stem and apex of spike, ± linear, 1.2–2.3 mm wide, firm, erect, main vein and margins lightly raised, hyaline when dry, third leaf inserted shortly above ground, largely sheathing, uppermost leaf entirely sheathing, ± bract-like, 12–32 mm long, inserted in middle to upper ⅓ of stem. *Spike* mostly 1- to 3-flowered, lax, ± straight; outer bract 6.0–8.0(–9.5) mm long, green, upper margin transparent, inner bract slightly shorter, ± membranous with 2 green keels. *Flowers* diurnal, rotate, pink, pale yellow in throat; perianth tube funnel-shaped, 3.5–5.0 mm long; tepals elliptic, spreading, 6–8 × ± 2.5 mm. *Filaments* suberect, ± 2.5 mm long; anthers ascending, 2.5–3.3 mm long, shortly tailed, yellow; pollen yellow. *Style dividing* below mouth of tube, branches 3.0–3.5 mm long, diverging, reaching to between middle of anthers to just beyond tips in closed flower. *Flowering time*: January and February.

Distribution and ecology: known only from the central and eastern Drakensberg plateau of Lesotho but possibly also in KwaZulu-Natal, South Africa; in subalpine grassland, evidently in damp sites.

Diagnosis: the few known populations of *Hesperantha exiliflora* have remarkably small flowers, the perianth tube 3.5–5.0 mm long and the tepals 6–8 mm long, and it is distinguished largely by these features. The only other species of pink-flowered *Hesperantha* from eastern southern Africa with comparably small flowers, *H. ingeliensis*, has tepals mostly 10–12 mm long and broader, falcate leaves, 5.5–7.0 mm wide, unlike the straight, slender leaves up to 2.3 mm wide of *H. exiliflora*. *Hesperantha exiliflora* seems most closely allied to a second Drakensberg species, *H. brevistyla*, which has pale pink flowers with a tube 7–9 mm long, tepals ± 7 × 3.5 mm, short white anthers 2.5–3.5 mm long, and short style branches ± 6 mm long that reach to ± the lower third of the anthers at most. The flowers of *H. exiliflora* have yellow anthers and the style branches are 3.0–3.5 mm long, reaching to between the middle of the anthers or just beyond their tips in the closed flower. The tepals dry dark purple whereas those of *H. brevistyla* dry pink. Although collections of *H. exiliflora* were at first associated with the Drakensberg species *H. glareosa*, there seems no particular reason to consider them closely related. The straight stem and apparently consistently few-flowered



Distribution of ***Hesperantha exiliflora***.

spikes of *H. exiliflora* are unlike the rather wiry, flexuose spikes of *H. glareosa*, which has larger flowers with a tube 5–6 mm long and tepals 10–12 mm long.

43. **Hesperantha alborosea** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 43: 421 (1986). Type: South Africa, [KwaZulu-Natal], Underberg, Cobham, Upper Polela Cave area, 7 800 ft [2 400 m], 13 Feb. 1979, *O.M. Hilliard & B.L. Burtt 15367* (E, holo.; NU, iso.).

Plants 70–110 mm high. *Corm* ± ovoid, ± 15 mm diam.; tunics woody, dark brown, imbricate, lower margins breaking into sections and tapering above into short points. *Stem* erect, simple or sometimes 1-branched, somewhat flexuose, with upper cataphyll often turning dry and brown distally. *Leaves* usually 4, lower 2 basal and longest, reaching to between upper ⅓ of stem and shortly above apex of spike, ± sword-shaped, 2.0–4.5 mm wide, firm, erect, main vein and margins thickened and prominent, hyaline when dry, third leaf inserted shortly above ground, largely sheathing, uppermost leaf entirely sheathing, ± bract-like, 12–32 mm long, inserted in middle to upper ⅓ of stem. *Spike* mostly 3- to 10-flowered, weakly flexuose; outer bract 6.5–10.0 mm long, green with red tips, inner bract slightly shorter. *Flowers* diurnal, rotate, white, outer tepals flushed rose-pink outside; perianth tube funnel-shaped, 8–9 mm long; tepals elliptic, spreading, 12–15 × 4.0–5.5 mm. *Filaments* suberect, ± 3 mm long; anthers ascending, 3–4 mm long. *Style branches* ± 6.5 mm long, reaching to slightly beyond anthers tips in closed flower. *Flowering time*: January and February.

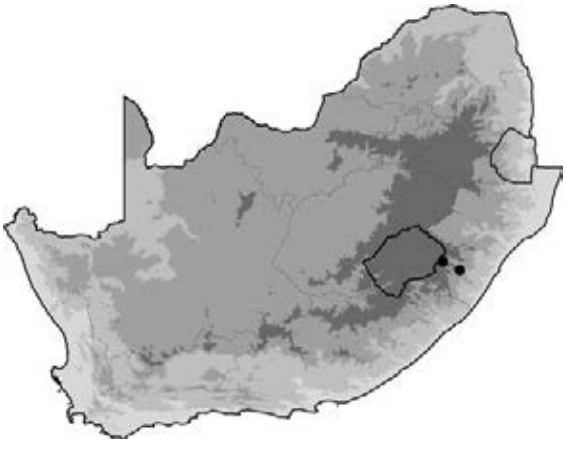
Distribution and ecology: recorded at elevations between 2 300 and 2 700 m in the southern KwaZulu-Natal Drakensberg, South Africa at Upper Polela Cave and Sani Pass; growing in wet situations such as rock flushes and wet gravel.

Diagnosis: among the white-flowered species of the genus from eastern southern Africa, *Hesperantha alborosea* is recognised by its short stature, up to 110 mm high, firm to rigid leaves with thickened margins and main vein, and flowers with a relatively short perianth tube, 6–9 mm long, the tepals about 1.5× as long. It most closely resembles *H. hygrophila*, also with white flowers but usually without pink on the reverse of the outer tepals, tepals usually ± twice as long as the tube, and longer anthers, 5–10 mm long.

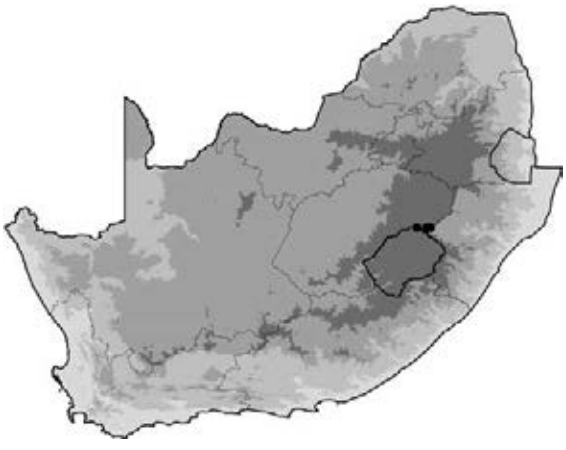
44. **Hesperantha brevistyla** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 420 (2003). Type: South Africa, Free State, Sentinel trail, rocky pavement below basalt cliffs on trail to the chain ladders, 5 Mar. 2002, *Goldblatt & Porter 11989* (NBG, holo.; MO, PRE, iso.).

Plants 40–100(–160) mm high. *Corm* obconic, ± 3 mm diam.; tunics woody, soon breaking into elliptic segments tapering above into short points. *Stem* unbranched. *Leaves* 4 or 5, lower 3 or 4 basal and longest, ± as long as spike, falcate to suberect, firm, 2–4(–5) mm wide, main vein and margins lightly raised, hyaline when dry, uppermost leaf inserted in ± middle of stem, partly or rarely entirely sheathing. *Spike* 1- to 4(5)-flowered, ± straight; bracts 9–13 mm long, green, inner 2-lobed at tip. *Flowers* diurnal, rotate, pale pink, cream-coloured in mouth of tube, outer tepals pale greenish with darker green veins outside; perianth tube funnel-shaped, 7–9 mm long; tepals spreading horizontally, elliptic, 7–8 × ± 3.5 mm, acute. *Filaments* ascending, 1.8–2.0 mm long; anthers ascending, 2.2–4.0 mm long, white; pollen white. *Style* dividing below mouth of tube, branches suberect, reaching to between the base and middle of anthers, ± 6 mm long. *Capsules* ellipsoid, 8–12 mm long. *Seeds* angular-prismatic, reddish brown, ± 1.3 × 1 mm, with membranous ridges at angles. *Flowering time*: February to mid-March.

Distribution and ecology: restricted to the northern Drakensberg of Free State and KwaZulu-Natal, South Africa, and probably also in northern Lesotho; on basalt slopes and rocky pavement in shallow damp soil.



Distribution of ***Hesperantha alborosea***.



Distribution of ***Hesperantha brevistyla***.

Diagnosis: with small, pale pink flowers, the outer tepals pale greenish pink on the outside and veined dark green, *Hesperantha brevistyla* has unusually small white anthers, 2.2–4.0 mm long and remarkably short, suberect style branches that reach only to the base or middle of the anthers, unlike the longer, spreading style branches typical of the genus. *Hesperantha brevistyla* may be most closely allied to a second small-flowered Drakensberg species, *H. exiliflora*, which has pink flowers with a perianth tube 3.5–5.0 mm long, tepals 6–8 × ± 2.5 mm, yellow anthers 2.5–3.3 mm long, and style branches 3.0–3.5 mm long, reaching to between the middle of the anthers or just beyond their tips in the closed flower. The flowers of *H. exiliflora* dry purple whereas those of *H. brevistyla* dry pale pink.

45. **Hesperantha ingeliensis** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 43: 424 (1986). Type: South Africa, [KwaZulu-Natal], Alfred District, Ngeli Mtn, ± 1 800 m, 4 Jan. 1969, *Hilliard & Burtt 5838* (NU, holo.; E, iso.).

Plants mostly 120–180 mm high. *Corm* ± globose, slightly asymmetric, ± 10 mm diam.; tunics woody, imbricate. *Stem* straight or arching toward ground, unbranched. *Leaves* 4, lower 2 basal, with well-developed blades reaching up to base of spike, (2)4–6 mm wide, sword-shaped to falcate, margins and main vein visibly thickened; upper 2 leaves cauline and largely or upper fully sheathing. *Spike* mostly 2-flowered; bracts green, outer 9–13 mm long, inner slightly shorter. *Flowers* diurnal, rotate, light purple to pink, evidently not scented; perianth tube 8–10 mm long, cylindric, dilated at throat; tepals subequal, elliptic, 9–12 × 4–5 mm, spreading. *Filaments* ± 2 mm long; anthers 4.5–5.5 mm long, yellow; pollen ?yellow. *Style branches* ± 8 mm long, shortly exceeding anthers in closed flower. *Capsules* and *seeds* unknown. *Flowering time*: January to March.

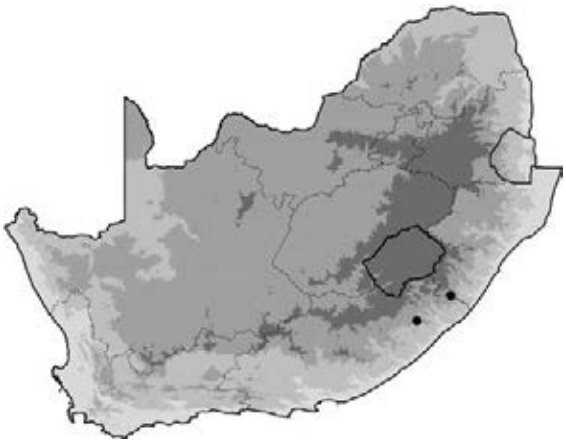
Distribution and ecology: poorly documented, known only from rocky sites on Ngeli Mtn in southern KwaZulu-Natal, South Africa and on Mjika, north of Mthatha in Eastern Cape; on wet cliffs and rocky flats at 1 400–1 800 m elevation.

Diagnosis: poorly known *Hesperantha ingeliensis* is distinguished from other eastern southern African pink–purple-flowered species of *Hesperantha* by the spike of only one or two flowers with an unusually short perianth tube, ± 5 mm long, and tepals ± twice as long. Its immediate relationships are uncertain, but it is possibly allied to *H. baurii*, from which it is distinguished by the spikes of mostly two flowers with shorter anthers.

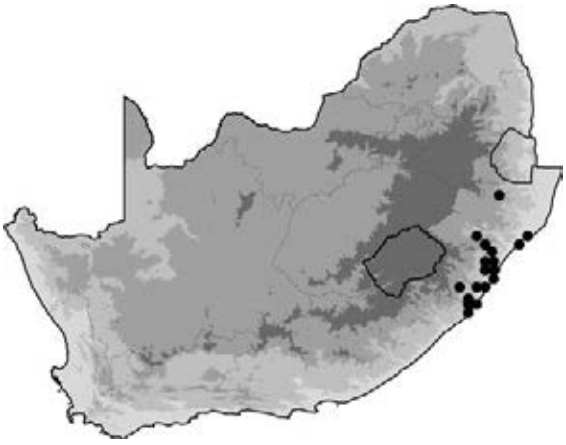
46. **Hesperantha lactea** *Baker*, Handbook of the Irideae: 151 (1892); Hilliard & Burtt: 431 (1986). Type: South Africa, [KwaZulu-Natal], Verulam, Nov., *J.M. Wood 1118* [K, lecto., designated by Hilliard & Burtt: 431 (1986)].

Plants mostly 200–500 mm high. *Corm* ± globose, slightly asymmetric with obliquely flattened side, 10–13 mm diam.; tunics woody, imbricate, splitting from base into sections. *Stem* simple or sometimes branched from near base. *Leaves* 4, lower 2 basal, with well-developed blades reaching up to base of spike, (2)4–6 mm wide, sword-shaped to falcate, margins and main vein visibly thickened; upper 2 leaves cauline and largely or upper fully sheathing. *Spike* flexuose, mostly 4- to 14(–18)-flowered; bracts 10–17 mm long, sometimes tipped red. *Flowers* diurnal, creamy yellow, evidently not scented; perianth tube 6.0–8.5 mm long, cylindric, dilated at throat; tepals 14–20 × 4–6 mm, ± elliptic, spreading. *Filaments* ascending, 3–4 mm long; anthers 5–7 mm long, dull yellow to brown; pollen brown or dull yellow. *Style branches* spreading, 7–10 mm long, reaching to ± apex of anthers. *Capsules* ± ovoid–oblong, 6–8 × ± 4 mm. *Seeds* light brown, angular, angles narrowly ridged, pale. *Flowering time*: November to February.

Distribution and ecology: largely a lowland and coastal species, extending from the coast of northern Eastern Cape north to Durban in KwaZulu-Natal, South Africa. Isolated records from Hlobane in the Vryheid District in



Distribution of ***Hesperantha ingeliensis***.



Distribution of ***Hesperantha lactea***.

northern KwaZulu-Natal assigned to this species may represent *H. inconspicua*.

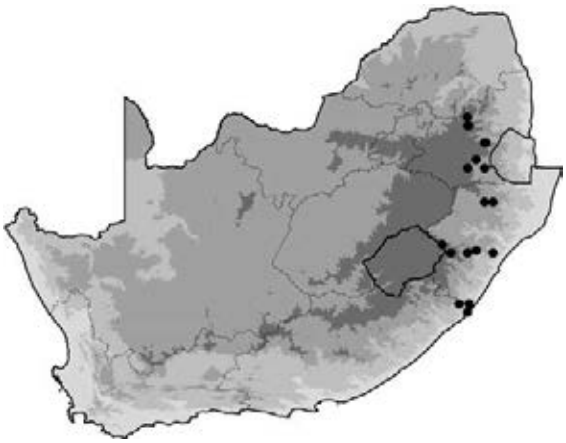
Diagnosis: *Hesperantha lactea* is a relatively tall species sometimes up to 500 mm high or more, with pale, creamy white to pale yellow flowers with a tube 6.0–8.5 mm long, and spreading tepals 14–20 mm long. The anthers, 5–7 mm long, are discolorous, usually brown or dull yellow, an unusual feature among white-flowered species of the genus. Like other white to pale yellow-flowered *Hesperantha* species of eastern southern Africa, the flowers are diurnal, with records of opening 11:45–12:30 and closing 16:40–17:15. This contrasts sharply with most white-flowered species of the genus from the southern African winter-rainfall zone, the flowers of which are crepuscular to nocturnal, opening in the late afternoon and closing after dark.

47. **Hesperantha inconspicua** *(Baker) Goldblatt* in Annals of the Missouri Botanical Garden 90: 422 (2003). *Gladiolus inconspicuus* Baker: 1005 (1904). Type: South Africa, [Mpumalanga as Transvaal], Donkerhoek, 4 Jan. 1894 but both locality, collection number and perhaps date are incorrect, *Schlechter 4188* (G, holo.).

Plants 25–45 mm high. *Corm* unknown. *Stem* smooth, often branched from the axil of third leaf. *Leaves* mostly 4, lower 3 basal or subbasal, leathery, narrowly sword-shaped to linear, mostly 3.0–4.5 mm wide, main vein and margins lightly thickened, midrib rounded, uppermost leaf inserted in middle of stem, partly to entirely sheathing, reaching to ± base of spike. *Spike* mostly 6- to 12-flowered; bracts green or purplish at tips, 10–15 mm long. *Flowers* white, sometimes faintly flushed pink on outside of outer tepals, often only on fading, unscented; perianth tube slender, expanded near apex, 7.0–8.5 mm long; tepals subequal, spreading at right angles to tube, 12–16(–18) × 6–8 mm. *Filaments* 2.5–3.0 mm long; anthers 6.5–8.0 mm long, creamy white; pollen yellow. *Style branches* reaching to apex of anthers in closed flower. *Capsules* subglobose, 4–7 mm long. *Seeds* angular-prismatic to ± ovoid, 1.5–1.8 × 1.2 mm. *Flowering time*: December to mid-March.

Distribution and ecology: South Africa, from the Blyde River hills and Lydenburg in Mpumalanga to the Mtamvuna River Gorge in southern KwaZulu-Natal.

Diagnosis: unexceptional in its vegetative aspect and flowers, *Hesperantha inconspicua* stands out among the eastern southern African species in its relatively tall stature, mostly 400–600 mm high, and white perianth (sometimes faintly flushed pink on the reverse of the outer tepals). Among the few other white- or cream-flowered species of eastern southern Africa, *H. inconspicua* can be confused with the coastal KwaZulu-Natal species *H. lactea*, which has creamy yellow flowers and dull yellow to brownish anthers and pollen. The leaves of the two species are virtually identical, both having thickened margins and a lightly raised, rounded midrib, with the other veins obscure and not visible when alive. The related *H. saxicola*, which also has white flowers, often fading pink, stands out both in its shorter stature and unusual habitat, rock outcrops and cliffs. These plants have drooping leaves and stems 100–180 mm long, and flexuose spikes of up to five large flowers with tepals mostly 15–16 × 7 mm and anthers ± 4 mm long. *Hesperantha inconspicua* often has smaller flowers with tepals 12–15 mm long but longer anthers, 6.5–8.0 mm long, and 6–12 flowers per spike. *Hesperantha hygrophila*, also with white flowers, has very different leaves with the margins thickened and main vein raised and flattened into wings held parallel to the blade surface.



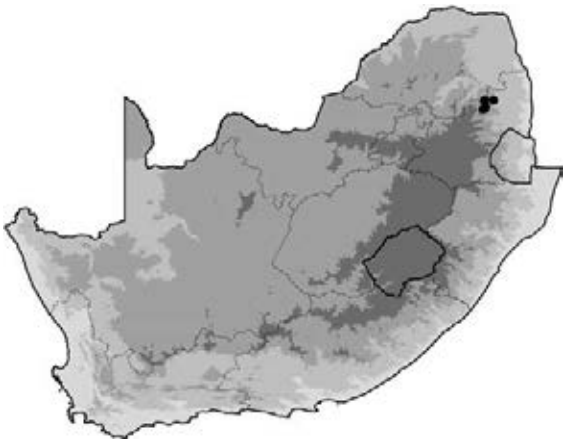
Distribution of ***Hesperantha inconspicua***.

48. **Hesperantha saxicola** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 423 (2003). Type: South Africa, [Mpumalanga], rocks at top of Mt. Anderson, Mar. 1933, *E.E. Galpin 13781* (PRE, holo.; BOL, K, iso.).

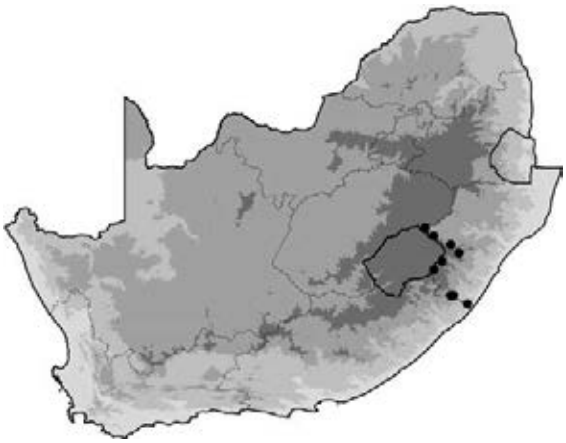
Plants 100–250 mm high. *Corm* ± globose, ± 9 mm diam.; tunics dark brown, extended upward as a collar of fibres around base. *Stem* trailing from cliffs, simple or branched. *Leaves* mostly 4, lower 3 basal or subbasal, reaching ± to base of spike, soft-textured, ± linear, mostly 1.5–2.2 mm wide, midrib and margins hardly thickened, uppermost leaf shorter, inserted in middle of stem, partly to entirely sheathing. *Spike* 2- to 4-flowered; bracts green, often drying at tips, 10–15 mm long, inner ⅔ as long to ± as long as outer. *Flowers* white, ?unscented; perianth tube funnel-shaped, expanded in upper half, (7–)11 mm long; tepals subequal, spreading, (11–)15–16 × 5.5–7.0 mm. *Filaments* 2.5–3.0 mm long; anthers ± 4 mm long, creamy white; pollen yellow. *Style branches* exceeding anthers by ± 1.8 mm in closed flower. *Flowering time*: March and April.

Distribution and ecology: local in Mpumalanga, and possibly also Limpopo Province, South Africa; on wet cliffs and rock seeps.

Diagnosis: *Hesperantha saxicola* is recognised by the trailing stems, linear leaves up to 2.2 mm wide, and spikes of only 2 to 5 white flowers with tepals 11–16 mm long.



Distribution of ***Hesperantha saxicola***.



Distribution of ***Hesperantha hygrophila***.

The stamens are comparatively short, with filaments up to 3 mm long and anthers about 4 mm long. *Hesperantha saxicola* has been confused with *H. leucantha*, which has upright stems and smaller, pale pink flowers. A collection from Mt. Sheba, a short distance to the north of Long Tom Pass, appears to belong here but the flowers have tepals lightly flushed with purple outside, leaves less than 1 mm wide, a perianth tube about 7 mm long and tepals ± 11 mm long, smaller than in populations to the south. Similar small-flowered plants with a white perianth from God's Window near Graskop (*Lötter 324*, NBG) may also be this species.

49. **Hesperantha hygrophila** *Hilliard & B.L.Burtt* in Notes from the Royal Botanical Garden, Edinburgh 40: 278 (1982); Hilliard & Burtt: 433 (1986). Type: South Africa, [KwaZulu-Natal], Alfred District, Ngeli Mtn, 2 Jan. 1969, *Hilliard & Burtt 5762* (E, holo.; NH, NU, iso.).

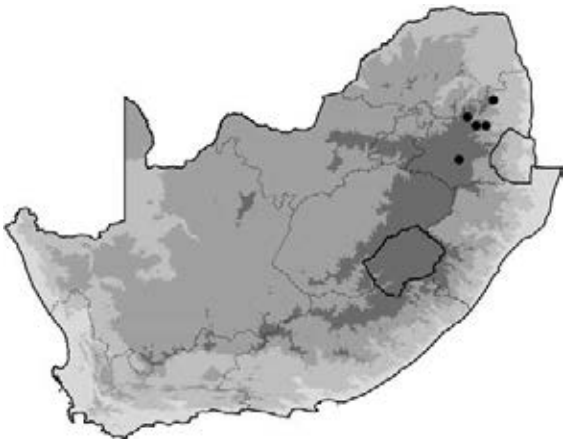
Plants 150–750 mm high. *Corm* ± obovoid, ± 10–12 mm diam.; tunics dark brown, imbricate, splitting into short spines above and into truncate sections below. *Stem* simple or 1-branched from near base. *Leaves* mostly 4, lower 2 basal, third inserted on lower part of stem, uppermost reduced, usually entirely sheathing, lower leaves ± linear, reaching ± to base or middle of spike, mostly 2–5 mm wide, main vein and margins thickened, raised and winged, secondary veins clearly visible. *Spike* ± straight, mostly 3- to 6-flowered; bracts pale green, outer 9.5–15.5 mm long, inner slightly shorter. *Flowers* diurnal, white, occasionally pale pink, unscented; perianth tube funnel-shaped, expanded in upper half, 5–7 mm long; tepals subequal, spreading, (9–)12–16 × 5.0–7.0 mm. *Filaments* 2–3 mm long; anthers 5–10 mm long, creamy white; pollen ± white. *Style branches* 8–9 mm long, exceeding anthers by ± 1.8 mm in closed flower. *Flowering time*: March and April.

Distribution and ecology: restricted to the Drakensberg and outlying ranges of KwaZulu-Natal, South Africa and Lesotho as far south as Ngeli Mtn; on wet to marshy slopes and flats usually among grasses and sedges.

Diagnosis: with unremarkable, white or sometimes pale pink flowers, *Hesperantha hygrophila* is recognised primarily by the distinctive pale green leaves with the main vein, margins, and a secondary pair of veins quite clearly thickened. The main vein is raised and flattened into wings that arch over the leaf surface and even the secondary veins are visibly thickened when seen alive. The flowers are diurnal with a record of opening between 8:30 and 9:00 and closing by 12:30. The species has been confused with white-flowered *H. inconspicua*, a generally more robust species with ± plane leaves and more flowers per spike (up to 16 in some plants), and sometimes with the stem branched in the axil of the third leaf. *Hesperantha hygrophila* may also be confused with the creamy white to pale yellow-flowered *H. lactea*, which grows in drier, well-drained grassland at altitudes of up to 800 m, rather than in wet habitats. *Hesperantha lactea* has dull yellow to light brown anthers that tend to dry dark brown, a feature which conveniently separates it from *H. hygrophila* in which the creamy white anthers remain pale when dry. The differences in leaf venation also separate the two but this feature is not always easy to see in dry specimens.

50. **Hesperantha rupestris** *N.E.Br. ex R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 166: 23 (1948). Type: South Africa, [Mpumalanga], Waterval Boven, among rocks, 29 Mar. 1929, *C.E. Moss 17314* (K, holo.; PRE, iso.).

Plants 400–500 mm high. *Corms* globose, asymmetric with oblique flattened side, ± 10 mm diam.; tunics woody, imbricate, splitting from base into sections. *Stem* usually unbranched. *Leaves* 4, lower 2 basal and longest, 170–310 mm long, upper leaves cauline, progressively shorter, uppermost sheathing for half its length. *Spike* 6- to 9-flowered, lax, ± 2-ranked; bracts green with membranous tips, firm-textured, outer ± 12 mm long, with distinct keel, inner ± 7 mm long, 2-keeled and notched at tip. *Flowers* diurnal, white, outer tepals pink to red outside, presence of scent unknown; perianth tube ± 7 mm long; tepals elliptic, 12–15 × 2.5–3.0 mm.



Distribution of ***Hesperantha rupestris***.

Filaments ± 3 mm long; anthers 6–7 mm long. *Style branches* ± 10 mm long, reaching to ± apex of anthers in closed flower. *Flowering time*: February and March.

Diagnosis: restricted to the central Mpumalanga highlands in South Africa; in rocky grassland.

Diagnosis: a fairly robust species, sometimes standing 450–500 mm high, *Hesperantha rupestris* most closely resembles pink-flowered *H. baurii* in general aspect and is distinguished by the white to creamy white flowers with outer tepals flushed dark pink to red on the outside. Plants usually have four leaves, the lower two basal, narrowly lanceolate and reaching to about the base of the spike. The firm-textured blades have the margins and main vein thickened. As in other eastern southern African *Hesperantha* species with white flowers, these are diurnal and have been reported as opening in the morning.

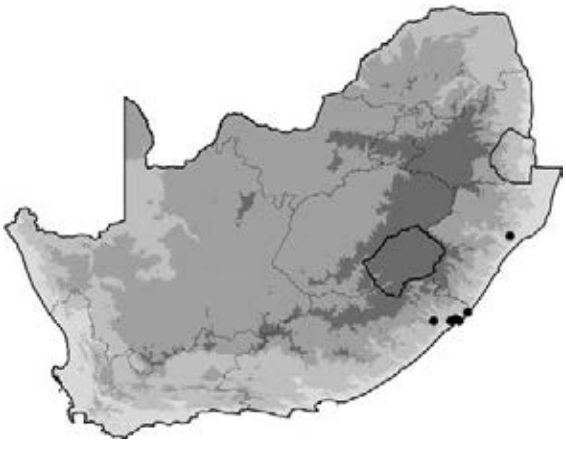
51. **Hesperantha modesta** *Baker*, Handbook of the Irideae: 150 (1892); Goldblatt: 425 (2003). Type: South Africa, [KwaZulu-Natal], Umlaas Location [or Bevaan River on the type at K, evidently in error], 17 July 1885, *Wood 3201* (K, holo.; NH, iso.).

?*Hesperantha subexserta* Baker: 62 (1896). Type: South Africa, [KwaZulu-Natal], valley near Botha's Hill, 2 000 ft [600 m], 6 Oct., *Wood 4543* (K, holo.; NH, iso.).

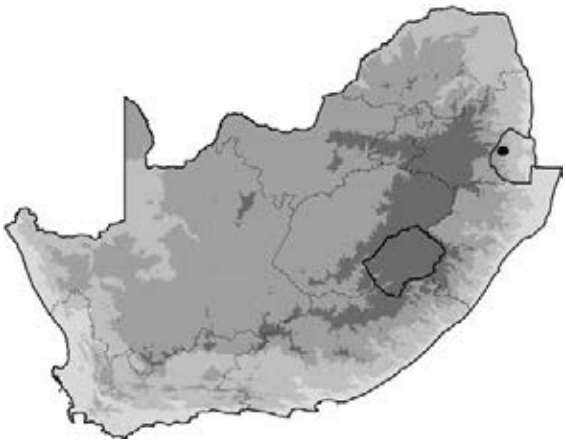
Plants mainly 150–250 mm high. *Corm* obconic, 7–9 mm diam.; tunics woody, soon breaking into elliptic segments tapering above into short points. *Stem* usually unbranched. *Leaves* 3 (rarely 4), lower 2 basal and longest, reaching to ± middle of stem, ± linear, 2–3 mm wide, firm-textured, main vein and margins lightly raised; upper 1 (or 2) leaves smaller, 45–60 mm long, inserted on lower ⅓ to middle of stem, sheathing for most of their length, with short free tip. *Spike* lax, mostly 2- or 3(4)-flowered; bracts green, 12–15 mm long, inner ± ⅔ as long as outer, translucent. *Flowers* diurnal, rotate, bright mauve-pink, pale yellow in mouth of tube; perianth tube 6–9 mm long, cylindric, expanded near apex; tepals spreading, elliptic, 10–15 × 3.5–5.0 mm, acute. *Filaments* suberect, ± 3 mm, inserted on tepals above mouth of tube; anthers ± 5 mm long, shortly tailed, yellow; pollen yellow. *Style branches* ± 10 mm long, laxly spreading, reaching to anther tips in closed flower. *Flowering time*: August to October.

Distribution and ecology: restricted to coastal KwaZulu-Natal and Eastern Cape, South Africa, mainly in the sandstone belt from Durban to Port St Johns, possibly also in Zululand near Eshowe; in marshy grassland, vlei edges and streambanks.

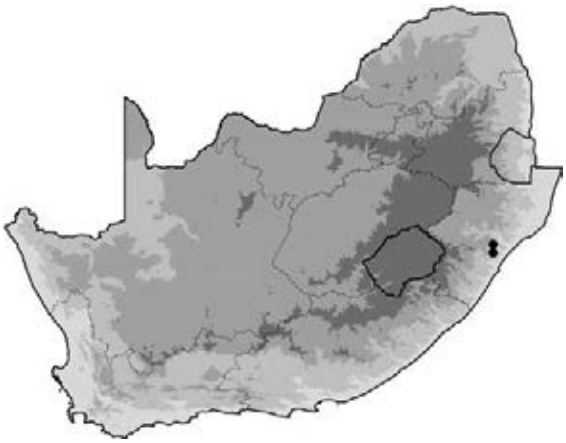
Diagnosis: sometimes confused with *Hesperantha baurii*, *H. modesta* is a late winter–spring-flowering species, usually with three leaves, the lower two basal and with well-developed linear blades of soft texture and the upper one (or two) cauline and largely sheathing (*H. baurii* usually has four, sometimes five leaves). The flowers are relatively large, in the middle of the range for *H. baurii*, but the available collections show it to be unusual in usually having only two to four flowers per spike. There is confusion about the type locality of *H. modesta* as the isotype at the KwaZulu-Natal Herbarium has the locality, Umlaas Location, whereas the sheet at K with the same number and date is purportedly from the Bevaan River, in the interior in the Vryheid District, which is evidently incorrect. *Hesperantha subexserta*, from Botha's Hill and also based on a Medley Wood collection, flowering in October, has provisionally been treated as a synonym of *H. modesta*. The type plants have two basal leaves, and one or two cauline, sheathing leaves of the soft texture typical of *H. modesta*, but the spike of one of the plants of the type collection has up to eight flowers and a short lateral branch in contrast to the two or three, or at most four flowers per spike of specimens of *H. modesta*. A collection from Eshowe, Zululand (*Lawn 1179*), well to the north of other collections of *H. modesta* is provisionally included here. The poor condition and crowded mounting of the specimens makes them difficult to identify for certain but the flowering time, October, and marshy habitat, suggest this species.



Distribution of ***Hesperantha modesta***.



Distribution of ***Hesperantha umbricola***.



Distribution of ***Hesperantha gracilis***.

52. **Hesperantha umbricola** *Goldblatt* in South African Journal of Botany 53: 459 (1987). Type: Swaziland, near Mbabane, among rocks, 21 Feb. 1982, *Goldblatt 6610* (MO, holo.; E, K, NBG, NU, PRE, S, iso.).

Plants 80–200(–250) mm high. *Corm* ± globose, 3–6 mm diam.; tunics dark brown, concentric, splitting into elliptic sections. *Stem* unbranched. *Leaves* 3 to 5, all basal or uppermost inserted on lower part of stem, reaching almost to base of 1.3–3.0 mm wide, main vein slightly thickened. *Spike* 2- to 6(–10)-flowered, weakly flexuose; bracts green with membranous tips, outer 5–9(–12) mm long, inner ± half as long, forked at apex. *Flowers* diurnal, rotate, white; perianth tube ± 5 mm long, expanded near apex; tepals elliptic, ± 6 × 2.5 mm. *Filaments* ± 2 mm long; anthers ± 3 mm long, white; pollen white. *Style branches* ± 6 mm long, reaching to ± apex of anthers in closed flower. *Capsules* obovoid, ± 4 mm long. *Seeds* angular, ± 0.6 mm long. *Flowering time*: February.

Distribution and ecology: known only from near Mbabane in Eswatini; growing in shade of granite boulders.

Diagnosis: *Hesperantha umbricola* is recognised by the unusually small, white flowers with a perianth tube about 5 mm long and tepals 6 mm long. The stamens are proportionately small, with filaments 2 mm long and anthers ± 3 mm long. The flowers are diurnal. The species may be allied to white-flowered *H. inconspicua* but its much smaller flowers that do not fade pink, and the narrow, soft-textured leaves make it easy to distinguish from that species, the flowers of which have tepals 12–18 mm long and often turn pale pink on fading.

53. **Hesperantha gracilis** *Baker*, Handbook of the Irideae: 149 (1892); Hilliard & Burtt: 422 (1986). Type: South Africa, [KwaZulu-Natal], base of perpendicular rocks at Isangwaan, Apr., *J.M. Wood 923* (K, holo.).

Plants 300–450 mm high. *Corm* ± globose, ± 10 mm diam.; tunics dark brown, concentric, splitting into elliptic sections tapering into short cusps above. *Stem* often curving downward, simple or 1- or 2-branched from near base, sheathed below by pale, membranous cataphyll. *Leaves* 4, lower 2 basal, upper 2 cauline, uppermost reduced, usually entirely sheathing; blades of lower leaves reaching to between middle of stem and apex of spike, 2–5 mm wide, fairly soft-textured, main vein and margins raised. *Spike* (2–)5- to 14-flowered; bracts green, outer 12–25 mm long, inner ± half as long. *Flowers* diurnal, white or mauve; perianth tube 6–8 mm long, cylindric, wider toward mouth; tepals subequal, elliptic, 14–21 × 4–6 mm, spreading. *Filaments* suberect, 2–3 mm long; anthers 6.0–7.5 mm long, ?white; pollen ?white. *Style branches* ± 9 mm long, reaching to ± apex of anthers in closed flower. *Capsules* ellipsoid-oblong, 5–8 mm long. *Seeds* ± light brown, ovoid, with loose testa, with persistent, slender funicle. *Flowering time*: February to April.

Distribution and ecology: poorly documented but evidently endemic to the hills between Durban and Pietermaritzburg in KwaZulu-Natal, South Africa; on wet, sandstone cliffs in moss and humus at 1 000–1 500 m elevation.

Diagnosis: a fairly slender plant, *Hesperantha gracilis* is recognised by the trailing stem, soft-textured, ± trailing leaves, and relatively large white to mauve flowers, with tepals 14–21 mm long and two to three times as long as the perianth tube, 6–8 mm long. *Hesperantha gracilis* may be most closely related to *H. leucantha* of interior eastern southern Africa, which has erect stems and pale pink to mauve or lilac flowers with a longer perianth tube mostly 9–16 mm long.

54. **Hesperantha pubinervia** *Hilliard & B.L.Burtt* in Notes from the Royal Botanical Gardens, Edinburgh 43: 419 (1986); Goldblatt: 426 (2003). Type: South Africa, [KwaZulu-Natal], Royal Natal National Park, Mont-aux-Sources, Feb. 1927, *Prescott-Decie s.n.* (BOL, holo.).

Plants 120–300 mm high. *Corm* conic, 7–9 mm diam.; tunics woody, dark brown, concentric, soon breaking

into elliptic segments tapering above into short points. *Stem* unbranched. *Leaves* 4, lower 2 basal, upper smaller and partly to entirely sheathing, blades ± linear, 2.5–3.5 mm wide, suberect, with scabrid hairs on margins, main vein and secondary veins, main vein prominently thickened, margins less so. *Spike* 1- to 3(4)-flowered; bracts 20–24 mm long, green. *Flowers* dull salmon-pink, pale yellow-green in mouth of tube edged in darker salmon; perianth tube 20–25 mm long, unusually slender, occluded by style almost to apex and without nectar; tepals spreading, 14–18 × 3.5 mm, subacute. *Filaments* erect, ± 5 mm long; anthers erect, ± contiguous, ± 4.5 mm long, yellow; pollen yellow. *Style branches* suberect in open flower, ± 6 mm long, reaching to ± upper ⅓ of anthers and extending between them. *Capsules* oblong, (10–)12–14 mm long. *Seeds* angular-prismatic, ± 1.2 × 1.0 mm, with membranous ridges on angles. *Flowering time*: February and March.

Distribution and ecology: known only from the high northern Drakensberg on the slopes below the Sentinel and on the Mont-aux-Sources Plateau, in Free State and adjacent KwaZulu-Natal, South Africa, and probably Lesotho; in rocky grassland on basalt.

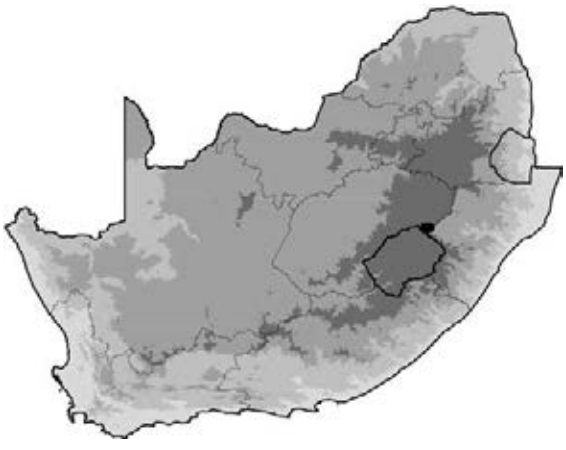
Diagnosis: poorly known, *Hesperantha pubinervia* is readily recognised by the ± linear basal leaves scabrid-hairy on the margins and veins, and the relatively long-tubed flowers of an unusual dull salmon-pink colour. The perianth tube, 20–25 mm long, is unusually slender and completely occluded by the style. The flowers do not produce nectar and are evidently pollinated through deceit, offering no reward to its pollinator, a long-proboscis fly. *Hesperantha pubinervia* is also somewhat unusual in having relatively short, ascending style branches ± 6 mm long, rather than spreading over the tepals as in most species of the genus. The distinctively coloured flowers contrast markedly with the deep pink to magenta flowers of sympatric and co-blooming *H. baurii* and *H. scopulosa,* and with the pale pink flowers of *H. brevistyla* and *H. leucantha*.

55. **Hesperantha pulchra** *Baker*, Handbook of the Irideae: 150 (1892); Hilliard & Burtt: 413 (1986). Type: South Africa, [Eastern Cape], Transkei, Baziya Mtn, Apr., *Baur 159* (K, holo.; B, iso.).

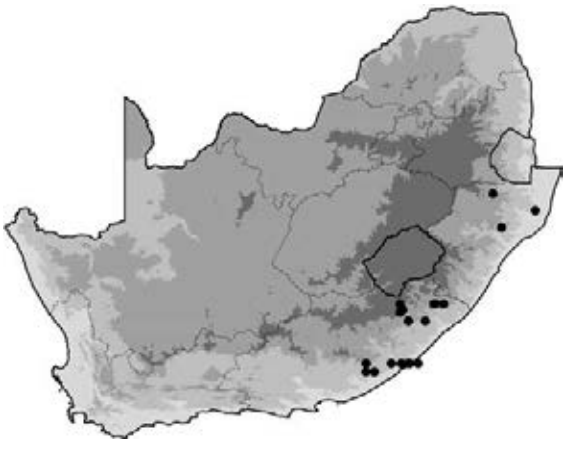
Plants 400–800 mm high. *Corm* ± globose, 15–20 × 12–16 mm; tunics dark brown, concentric, splitting into narrow elliptic sections narrowed distally into short cusps. *Stem* unbranched. *Leaves* 4, lowermost 1 or 2 basal, ± ⅔ as long as stem, 3.0–5.5 mm wide, remaining leaves cauline and shorter, uppermost largely sheathing and bract-like. *Spike* 5- to 11-flowered, straight or slightly flexuose; bracts green, outer 17–36 mm long, inner shorter. *Flowers* salver-shaped, diurnal, unscented; perianth tube ± cylindric, expanded near apex, 14–25(–28) mm long; tepals 14–24 mm long. *Filaments* (3)4–6 mm long; anthers 7–11 mm long, yellow; pollen yellow. *Style branches* 10–16 mm long, reaching to ± apex of anthers in closed flower. *Capsules* oblong, 10–17 mm long. *Seeds* globose, ± 1.3 mm diam. with short to well-developed wings. *Flowering time*: mainly March and April.

Distribution and ecology: extending from the Amatole Mtns of Eastern Cape, South Africa north to Naude's Nek; in rocky grassland.

Diagnosis: a late-flowering species, *Hesperantha pulchra* is recognised by the bright pink flowers with a perianth tube of intermediate length, mostly 15–20 mm long (14–28 mm), and relatively short filaments, 3–6 mm long. Plants from KwaZulu-Natal, north of the Tugela River, with a tube 15 mm long (*Gerstner 6713*, PRE) and ± 12 mm (*Fakude 3*, NH) fit uncomfortably in this otherwise Eastern Cape species. Plants from Mt Thomas, near Stutterheim in Eastern Cape (*McMaster s.n.,* NBG), collected in later flower on 11 February, with ripe capsules at the base of the spike, resemble *H. pulchra* except for the early flowering. These plants have narrowly elliptic capsules 25 mm long that contain large seeds, up to 4 mm long with the wings at either end ± 1 mm long and



Distribution of ***Hesperantha pubinervia***.



Distribution of ***Hesperantha pulchra***.

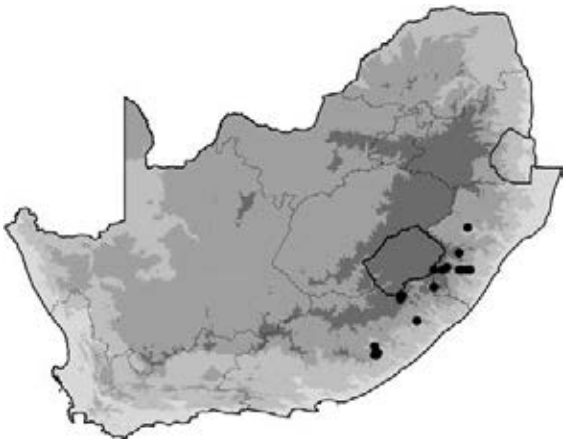
the seed body ± 2 mm long. Capsules of *H. pulchra* are described by Hilliard & Burtt (1986) as 10–17 mm long with seeds ± 1.25 mm diam., with weakly or strongly developed wings. We need to know more about both the Zululand and Mt Thomas plants. Additional collections, especially in fruit, will be helpful in understanding the range of variation in this species.

56. **Hesperantha woodii** *Baker*, Handbook of the Irideae: 150 (1892); Hilliard & Burtt: 413 (1986); Goldblatt: 427 (2003). Type: South Africa, [KwaZulu-Natal], Richmond District, Peak of Byrne, Apr. or May, 1883, *J.M. Wood 1868* (K, NH, syn.).

Hesperantha galpinii R.C.Foster: 13 (1948). Type: Lesotho, valley above Buffalo River falls, 14 Mar. 1904, *E.E. Galpin 6856* (BOL, lecto., designated by Goldblatt: 427 (2003); B, GRA, K, NH, PRE, SAM, isolecto.).

Plants 200–450 mm high. *Corm* conic, 8–10 mm diam.; tunics woody, layers soon breaking into triangular segments tapering above into short points. *Stem* unbranched. *Leaves* usually 4, lower 2 basal, longest, reaching to between middle of stem and apex of spike, linear, 2–3 mm wide, firm, upright, main vein prominently raised, margins lightly thickened, upper 2 leaves smaller and partly to entirely sheathing. *Spike* mostly 2- to 4-flowered; bracts 22–30 mm long, green, becoming dry and ± brown above. *Flowers* bright mauve-pink, pale yellow in throat; perianth tube (18–)22–38 mm long, cylindric, lightly curving toward apex, expanded near mouth; tepals weakly ascending, elliptic, 23–27 × 6.0–7.5 mm, acute. *Filaments* ascending, 6–8 mm long; anthers diverging, 9–10(–11) mm long, tailed in lower 2 mm, yellow; pollen yellow. *Style branches* 18–20 mm long, laxly ascending, exceeding anthers in closed flower. *Capsules* ± ellipsoid, 16–18 mm long. *Seeds* unknown. *Flowering time*: February to April, possibly in May.

Distribution and ecology: restricted to the mountains of southern Lesotho and southern KwaZulu-Natal and adjacent Eastern Cape in South Africa as far south as Naude's Nek; on stony slopes and rocks, often near streams.



Distribution of ***Hesperantha woodii***.

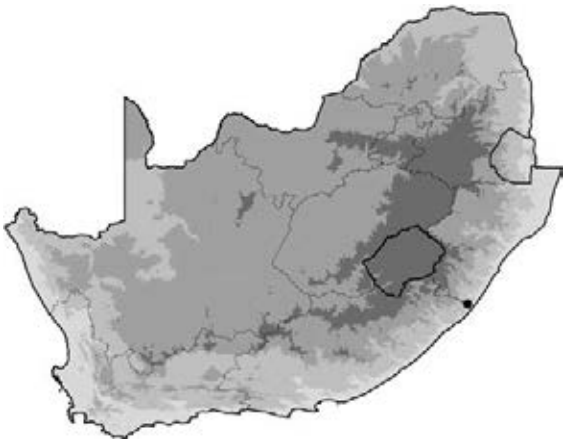
Diagnosis: one of a handful of long-tubed, pink-flowered species of *Hesperantha* in eastern southern Africa, *H. woodii* is a relatively tall species, reaching up to 450 mm, with radially symmetric flowers, and is recognised by the perianth tube mostly 20–38 mm long, only slightly curved near the mouth, and the ascending rather that fully spreading tepals. Vegetatively similar *H. grandiflora* has a strongly curved perianth tube (26–)33–55 mm long, and zygomorphic flowers with vertically oriented tepals and unilateral stamens and style branches, and red-brown anthers and pollen, which are in marked contrast to the conventional yellow anthers and pollen in *H. woodii*.

57. **Hesperantha mtamvunae** *Goldblatt & J.C.Manning*, new species. Type: South Africa, KwaZulu-Natal, Port Edward, Umtamvuna Nature Reserve, Outeniqua Trail, 29 June 2017, *K.W. Grieve 2393* (NBG, holo. [2 sheets]).

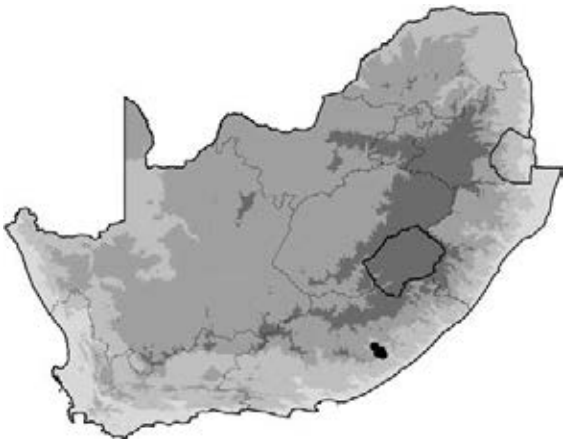
Plants 500–750 mm high. *Corm* conic, ± 10 mm diam.; tunics woody, layers soon breaking into triangular segments tapering above into short points. *Stem* unbranched. *Leaves* 4, lowermost green or dry at flowering, lower 2 basal, longest, reaching to between middle of stem and apex of spike, linear, 1.5–2.5 mm wide, firm, upright, main vein prominently raised, margins lightly thickened, upper 2 leaves smaller and partly to entirely sheathing. *Spike* straight, 3- to 6-flowered; bracts 27–30 mm long, green, becoming dry and ± brown above. *Flowers* suberect, bright mauve-pink, pale yellow in throat; perianth tube 22–25 mm long, cylindric, straight or lightly curving toward apex, expanded near mouth; tepals weakly ascending, elliptic, 23–25 × 5–6 mm, acute. *Filaments* ascending, 5–6 mm long; anthers diverging, 11–12 mm long, tailed in lower 2 mm, brown; pollen brown (?rarely yellow). *Style branches* 18–20 mm long, laxly ascending, exceeding anthers in closed flower. *Capsules* ellipsoid, (12–)15–20 mm long. *Seeds* angular-prismatic, ± 2.5–3.5 × 1.5 mm, with broad membranous wings at both ends. *Flowering time:* June to July.

Distribution and ecology: known only from the Umtamvuna Nature Reserve in southern KwaZulu-Natal, South Africa; in open damp grassland and forest margins, on quartzite on fairly steep S- and SE-facing slopes below 400 m altitude.

Diagnosis: Hesperantha mtamvunae is recognised among the longer-tubed species of the genus in eastern southern Africa by its unusual height, 500–750 mm, and spikes of 3 to 6 pink flowers with the perianth tube 22–25 mm long and distinctive brown anthers, 11–12 mm long, thus twice as long as the filaments, 5–6 mm long. *Hesperantha woodii* from inland KwaZulu-Natal and the Eastern Cape has similar flowers but is a shorter plant up to 450 mm tall, usually with only 2 to 4 flowers per



Distribution of ***Hesperantha mtamvunae***.



Distribution of ***Hesperantha stenosiphon***.

spike, with bright yellow anthers, mostly 9–10 mm long, with proportionally longer filaments 6–8 mm long. *Hesperantha pulchra*, also with yellow anthers, has broader leaves 3.0–5.5 mm wide, and shorter style branches, 10–16 mm long, reaching only to the tips of the anthers in closed flowers.

Few other long-tubed, pink-flowered species of *Hesperantha* have brown anthers and sometimes pollen, notably *H. stenosiphon* (perianth tube 45–60 mm long and pollen yellow), *H. grandiflora* (perianth tube 40–55 mm long and flowers zygomorphic with stamens declinate, filaments 8–14 mm long), and *H. hutchingsiae* (perianth tube 21–23 mm long and spikes 2- or 3-flowered), and all are significantly shorter plants from inland at relatively high elevations, unlike the near-coastal *H. mtamvunae.* Additional collections are needed to better assess the species and its relationships.

58. **Hesperantha stenosiphon** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 429 (2003). Type: South Africa. Eastern Cape, Bolo District, Moonstone Farm, steep grassy slope, 1 120 m, 20 Mar. 2001, *C. McMaster s.n.* (NBG, holo.; MO, PRE, iso.).

Plants 250–500 mm high. *Corm* globose, ± 12 mm diam.; tunics woody, layers soon breaking into vertical segments tapering above into short points. *Stem* usually unbranched. *Leaves* usually 4, lower 2 basal, longest, reaching to between middle of stem and apex of spike, ± linear, 2–3 mm wide, firm, erect, main vein and margins lightly thickened, upper leaves smaller and partly to entirely sheathing. *Spike* (2–)4- to 8(–12)-flowered; bracts 18–24 mm long, green, becoming dry and brown near tips. *Flowers* bright pink, white in mouth of tube; perianth tube 45–60 mm long, cylindric, slightly curved or straight, barely expanded near mouth; tepals ascending, elliptic, 18–21 × 7–8 mm, subacute. *Filaments* suberect, ± 3 mm long; anthers diverging, 9–10 mm long, dark brown to ± black; pollen yellow. *Style branches* ± 8.5 mm long, reaching to just below anther tips in closed flower. *Flowering time*: March and April.

Distribution and ecology: a narrow endemic of the Cathcart area of Eastern Cape, South Africa, known from just two localities; on hill tops among rocks partly shaded by bush and small trees or in open rocky grassland.

Diagnosis: among the elongate-tubed and pink-flowered species of *Hesperantha* of eastern southern Africa, *H. stenosiphon* stands out in the radially symmetric flowers with a nearly straight perianth tube 45–60 mm long, and dark brown to nearly back anthers but yellow pollen. The filaments are comparatively short, ± 3 mm long whereas the anthers are 9–10 mm long. It is probably most closely allied to long-tubed *H. grandiflora* and *H. woodii* and shares with them linear leaves with lightly to moderately thickened margins and midribs as well as the pink perianth. *Hesperantha grandiflora* has nodding flowers with vertically oriented tepals and unilateral, declinate stamens and style branches, filaments 8–14 mm long, and red-brown to purple anthers and pollen; and *H. woodii* has similarly large, but nearly upright, radially symmetric flowers with filaments 6–8 mm long and yellow anthers and pollen. The flowers of all three species have typical adaptations for pollination by long-proboscid flies, but pollination of *H. stenosiphon* has not been documented.

59. **Hesperantha coccinea** *(Backh. & Harv.) Goldblatt & J.C.Manning* in Novon 6: 263 (1996). *Schizostylis coccinea* Backh. & Harv.: t. 5422 (1864). Type: South Africa, without precise locality or collector, illustration in Back. & Harv.: t. 5422 (1864).

Schizostylis pauciflora Klatt: 380 (1867). Type: South Africa, without precise locality or collector, (K, holo.).

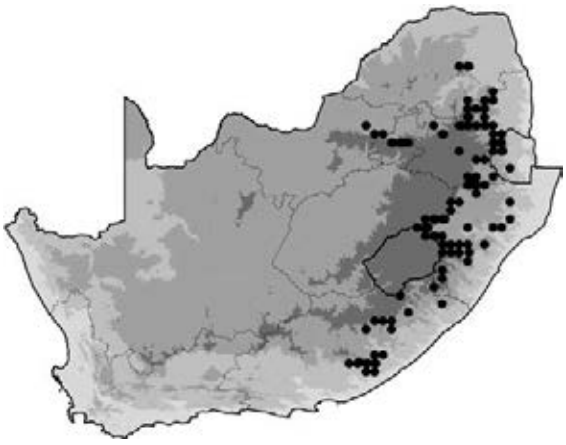
[*Schizostylis ixioides* Harv. ex Baker: 108 (1877), invalid name only in synonymy.]

Plants up to 450 mm high. *Rootstock* a creeping rhizome. *Stem* usually unbranched, sometimes bearing cormlets in aerial axils. *Leaves* several, narrowly lanceolate to ± linear, somewhat fleshy, lower 3 or 4 basal and longest, reaching to about the base of the spike, 7–10 mm wide,

upper 3 or 4 leaves cauline and progressively shorter. *Spike* usually with 12 or more flowers; bracts green, outer 20–25 mm long, inner 2-keeled, ± ⅔ as long. *Flowers* salver-shaped, diurnal, red or pink, unscented; perianth tube ± 25 mm long, cylindric, expanded near apex; tepals elliptic, spreading, shallowly spooned, mostly 25–28 × 12–15 mm, inner slightly narrower than outer. *Filaments* ± 10 mm long; anthers ± 8 mm long, brown; pollen dull yellow. *Style branches* ± 20 mm long, laxly spreading over tepals, exceeding anthers in closed flower. *Capsules* club-shaped, 12–15 mm long. *Seeds* angular, ± 2 × 1.2 mm, with loose, translucent, light brown seed coat with a smooth outline, slightly ridged on angles. *Flowering time*: mainly March to May.

Distribution and ecology: relatively widespread in eastern southern Africa, extending from Hogsback in Eastern Cape, South Africa along the Great Escarpment and interior to Limpopo, as well as Lesotho and Eswatini, also recorded in eastern Zimbabwe; in marshes and along streams and drainage lines.

Diagnosis: with a flower structure exactly like that of *Hesperantha* species apart from the red colour of many populations, and virtually identical to that of long-tubed species like *H. pulchra* and *H. woodii*, there is little doubt that *H. coccinea* is correctly placed in the genus. While the flowers accord exactly with *Hesperantha* the rootstock differs in being a slender, branched rhizome. A plant of aquatic or semi-aquatic habitats, *H. coccinea* is thought to have lost its corm because this xeromorphic feature is not adaptive in such conditions. Small corms of the shape typical of *Hesperantha* are produced in the aerial leaf axils of some populations, supporting its assignment in the genus. There are two colour morphs of *H. coccinea*, the typical and more widespread red-flowered morph, which extends from the Amatole Mtns in Eastern Cape to Limpopo, and a pink morph local in the northern Drakensberg and Witwatersrand in Gauteng. Plants from there have been described as a separate species, *S. pauciflora*, because of its few-flowered spikes but probably represent depauperate plants or possibly a local variant. Mixed populations of red- and pink-flowered plants occur around Golden Gate in the Free State. The common red-flowered morph of *H. coccinea* is pollinated by large butterflies of the families Papilionidae and Satyridae but the pollination biology of the pink-flowered morph has not been studied.



Distribution of ***Hesperantha coccinea***.

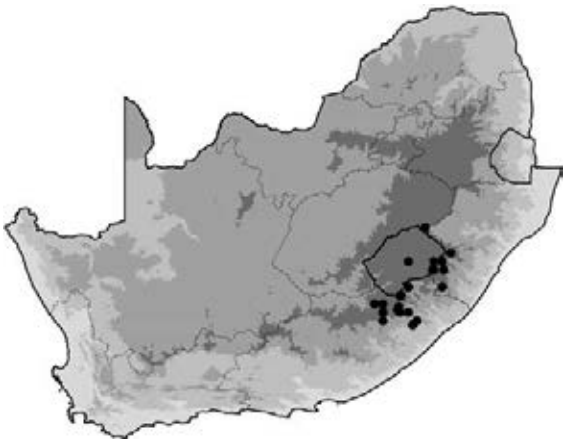
Hesperantha coccinea is widely grown in gardens in North America and western Europe, and a range of named cultivars are available in the nursery trade, including at least one with white flowers.

60. **Hesperantha grandiflora** *G.J.Lewis* in Journal of South African Botany 7: 30 (1941) as new name for *Acidanthera tysonii* Baker: 187 (1892), not *H. tysonii* Baker (1892) [= *H. radiata* (Jacq.) Ker Gawl.]; Hilliard & Burtt: 410 (1986); Goldblatt: 431 (2003). Type: South Africa, [KwaZulu-Natal], waterfall near Mt Currie, Apr. 1883, *W. Tyson 1151* (*Herb. Norm. Austro-Afr. 895*) (K, holo.; BOL, NBG, PRE, iso.).

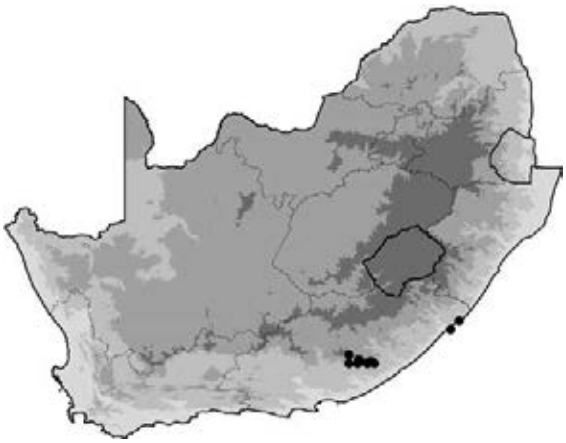
Plants 200–550 mm high. *Corm* conic, 12–15 mm diam.; tunics woody, ± imbricate, layers fragmenting into rectangular sections below and tapering into short cusps above. *Stem* unbranched. *Leaves* usually 4, lower 1 or 2 basal, longest, reaching to between middle of stem and apex of spike, ± linear, 2–3 mm wide, firm, ± erect, main vein prominently raised, margins lightly thickened, upper 2 leaves progressively smaller, uppermost partly to entirely sheathing. *Spike* mostly 2- to 5-flowered; bracts (20–)25–35(–42) mm long, green, inner slightly smaller than outer. *Flowers* diurnal, zygomorphic, pink, paler in throat; perianth tube 40–55 mm long, cylindric, curving outward distally, expanded near mouth; tepals ± vertically oriented, obovate-elliptic, (20–)25–37 × (6–)8–10(–12) mm. *Filaments* unilateral, declinate, 8–14 mm long; anthers ± parallel, facing dorsal tepal, 9–12 mm long, brown to purple; pollen brown to purple. *Style branches* arching below anthers, 15–25 mm long, exceeding anthers in closed flower. *Capsules* ± ellipsoid, 12–15 mm long. *Seeds* light brown, ± globose, 1.0–2.0 mm long, ± 1 mm diam., with narrow membranous wing at both ends. *Flowering time*: mainly late January to early March.

Distribution and ecology: relatively widespread in eastern southern Africa, extending from Lesotho and eastern Free State, South Africa near Witzieshoek through the KwaZulu-Natal Drakensberg to Eastern Cape at least as far south as Barkly Pass; in highland grassland.

Diagnosis: one of several long-tubed and pink-flowered species of *Hesperantha* in eastern southern Africa, *H. grandiflora* stands out in its zygomorphic, nodding flowers with the perianth tube, usually 40–55 mm long, curved outward near the apex and about 1.5× as long as the tepals, which are oriented ± vertically, while the stamens are unilateral and declinate, arching downward to lie above the lowermost tepal. The anthers are dark purple to red-brown, only rarely encountered in the genus. *Hesperantha stenosiphon*, with a similarly long perianth



Distribution of ***Hesperantha grandiflora***.



Distribution of ***Hesperantha huttonii***.

tube but much smaller tepals, also has dark anthers, as does short-tubed *H. hutchingsiae*, but both have radially symmetric flowers. Like other long-tubed, pink-flowered species of *Hesperantha*, *H. grandiflora* is pollinated by long-proboscid nemestrinid flies.

61. **Hesperantha huttonii** *(Baker) Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 40: 278 (1982); Hilliard & Burtt: 415 (1986); Goldblatt: 432 (2003). *Acidanthera huttonii* Baker: 339 (1876c). Type: South Africa, [Eastern Cape], Stockenstroom Division, Katberg, without date, *H. Hutton s.n.* (K, holo.).

Plants 200–500 mm high. *Corm* ± globose, 8–10 mm diam.; tunics dark brown, softly woody, overlapping, spitting below into truncate sections. *Stem* simple or occasionally 1-branched, erect or drooping. *Leaves* 5(6), lowermost 1 or 2 basal, up to 450 × 3–9 mm, soft-textured, flaccid, usually falcate, remaining leaves cauline, decreasing in size above, uppermost often entirely sheathing. *Spike* usually 4- to 7-flowered, ± straight; bracts 20–40 mm long. *Flowers* diurnal, salver-shaped, pink, unscented; perianth tube cylindric, expanded at apex, (15–)20–39 mm long; tepals elliptic, spreading, 15–24 × 5–8 mm. *Filaments* 6.0–7.5 mm long; anthers 7–10 mm long, yellow; pollen yellow. *Style branches* 18–20 mm long, exceeding anthers in closed flower. *Capsules* ± ellipsoid, 12–20 mm long. *Seeds* (1.5–)2.5–3.5 × 1.25 mm, with broad membranous wings at both ends ± 1.2–1.5 × 1 mm. *Chromosome number* 2*n* = 26. *Flowering time*: mostly February and March.

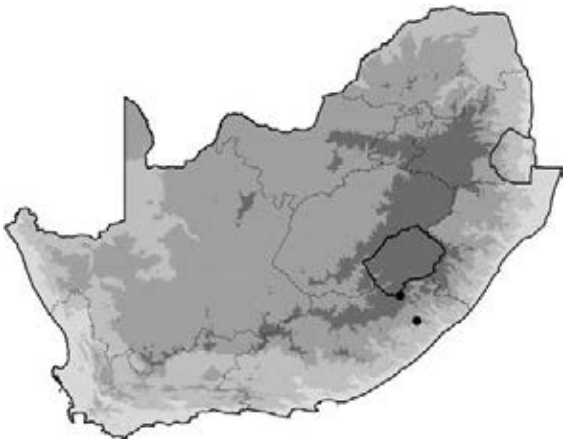
Distribution and ecology: occurring in Eastern Cape, South Africa, in the Amatole Mtns and Katberg to Adelaide and along the coast in the northern parts of the province; along forest margins, often in light shade, in clearings and on rock outcrops.

Diagnosis: *Hesperantha huttonii* is readily recognised by the pale pink flowers with an elongate perianth tube, typically 30–39 mm long, and large yellow anthers, 7–10 mm long. Plants have fairly broad, flaccid, drooping leaves, a suberect to drooping stem, and usually a cormlet in the axils of the lower leaves. The seeds of *H. huttonii* are distinctive, mostly 2.5–3.5 × ± 1.25 mm wide, with membranous wings at either end, the wings each ± half as long as the seed body which is up to 1.5 mm long. Plants from coastal northern Eastern Cape province, some 250 km to the east of the main range, best match the species, but one of the collections from there appears to lack axillary cormlets and has a perianth tube 23 mm long, while another collection has flowers with a tube only 15–17 mm long. The coastal plants are provisionally included in *H. huttonii* until more information becomes available. The long-tubed flowers are pollinated by long-proboscid flies.

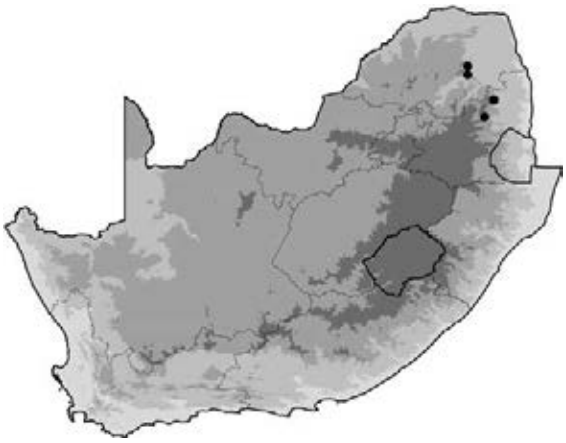
62. **Hesperantha hutchingsiae** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 43: 414 (1986). Type: South Africa, [Eastern Cape], Transkei, Mhlahlane Forest Station, Mjika, ± 1 500 m, 21 Mar. 1985, *Hutchings & Plumstead 1621* (E, holo.).

Plants ± 300 mm high. *Corm* ± globose, ± 8 mm diam.; tunics dark brown, softly woody, imbricate. *Stem* simple, sheathed below by membranous, brown cataphyll. *Leaves* 4, lower 3 basal, linear, ½–⅔ as long as stem, 1.5–2.0 mm wide, main vein and margins thickened, prominent, uppermost leaf cauline, short, entirely sheathing. *Spike* 2- or 3-flowered; outer bract green flushed with dark purple, 16–20 mm long, inner smaller. *Flowers* diurnal, salver-shaped, rosy-purple, ?unscented; perianth tube cylindric, 21–23 mm long, expanded at throat; tepals subequal, ± 16 × 5.5 mm, spreading. *Filaments* ± 5 mm long; anthers 7.5 mm long, brown; pollen brown. *Style branches* ± 10 mm long, reaching to ± apex of anthers. *Flowering time*: March.

Distribution and ecology: so far known from two populations in the southern Drakensberg in Eastern Cape, South Africa, at Naude's Nek and to the southwest above Mhlahlane Forest Reserve near Mthatha; in wet depressions and marshes.



Distribution of ***Hesperantha hutchingsiae***.



Distribution of ***Hesperantha brevicaulis***.

Diagnosis: one of several species of eastern southern Africa with long-tubed, pink to purple flowers, *Hesperantha hutchingsiae* appears to be allied to the Eastern Cape and KwaZulu-Natal species *H. pulchra*. It is distinguished from that species by the shorter, narrower leaves 1.5–2.0 mm wide, 2- or 3-flowered spikes, and rosy-purple flowers. *Hesperantha pulchra* has leaves 3.0–5.5 mm wide, and spikes with mostly 5 to 11 bright pink flowers. *Hesperantha hutchingsiae* also stands out in the brown cataphyll sheathing the base of the stem, and in the dark brown anthers and pollen, both unusual in the genus, although dark brown to purple anthers also occur in the pink-flowered *H. grandiflora* and *H. stenosiphon*, both of which have flowers with a substantially longer perianth tube, 40–55 mm long in *H. grandiflora* and 45–60 mm long in *H. stenosiphon*; and in *H. mtamvunae*, with much longer anthers 11–12 mm long.

63. **Hesperantha brevicaulis** *(Baker) G.J.Lewis* in Journal of South African Botany 6: 30 (1941); Goldblatt: 433 (2003). *Acidanthera brevicaulis* Baker: 132 (1896). Type: South Africa, [Mpumalanga], Barberton, Devil's Bridge, Makwonga Range, Mar. 1891, *E.E. Galpin 1252* (K, holo.).

Plants 100–250 mm high. *Corm* conic, 7–9 mm diam.; tunics unknown. *Stem* usually inclined to sprawling, unbranched. *Leaves* 4, occasionally 5, lower 3 or 4 ± basal, with fairly soft-textured blades trailing distally, ± linear, 2–4 mm wide, main vein slightly raised, uppermost leaf cauline, largely to entirely sheathing. *Spike* mostly 2- or 3(4)-flowered; bracts green, soft-textured, outer 20–28 mm long, inner slightly shorter. *Flowers* mauve-pink, pale yellow in tube; perianth tube (13–)20–35 mm long, cylindric, curved toward apex, expanded near mouth; tepals spreading, 20–25 × 7–8 mm, subobtuse. *Filaments* ascending, (4–)5–8 mm long; anthers diverging, 7–10 mm long, yellow; pollen yellow. *Style branches* laxly spreading, 12–15(–20) mm long, exceeding anthers in closed flower. *Capsules* narrowly ovoid, 15–20 mm long, *Seeds* unknown. *Flowering time*: March to May, sometimes in February.

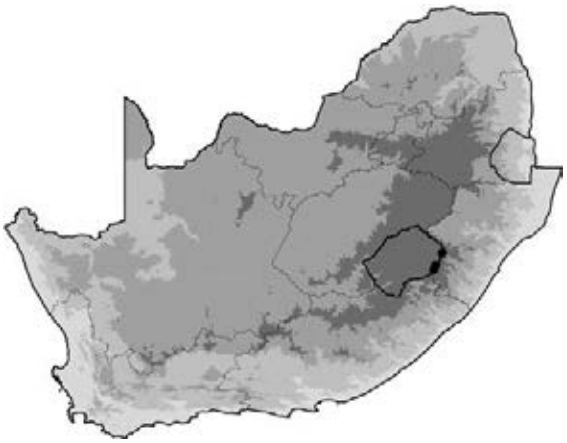
Distribution and ecology: South Africa, in Mpumalanga and Limpopo provinces along the Eastern Escarpment; on steep rocks and cliffs, growing in damp moss and rock crevices.

Diagnosis: one of several long-tubed, pink-flowered species of *Hesperantha* in eastern southern Africa, *H. brevicaulis* is distinguished by the soft-textured, trailing leaves, and short, usually trailing stem, 100–250 mm long. The comparatively large flowers typically have a perianth tube 18–35 mm long and tepals 20–25 mm long, the open flower thus 40–50 mm diam. The flowers are adapted for pollination by long-proboscid flies.

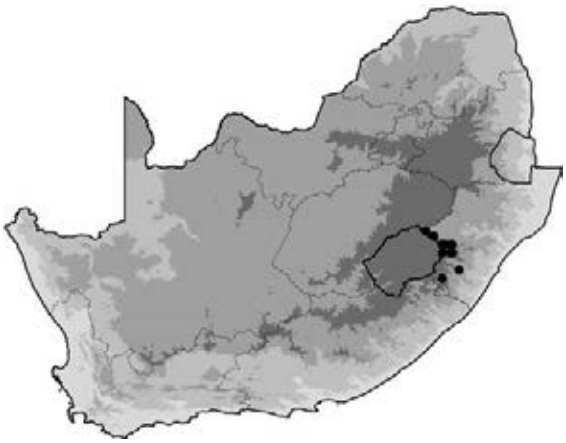
Plants from the Wolkberg and Serala in Limpopo apparently represent this species but flower earlier in the season, beginning to bloom as early as the middle of February. They also have flowers with a somewhat shorter perianth tube, 13–16 mm long. These shorter-tubed plants are provisionally included in *H. brevicaulis*. Plants from Serala, south of the Wolkberg, also differ from populations to the south in having anthers 5.0–6.5 mm long vs. 7–10 mm elsewhere.

Also puzzling are plants from Mt Prospect near Lydenburg, collected in early flower in mid-February. They have long-tubed mauve flowers with a tube 30–32 mm long, tepals ± 18 mm long, short filaments about 3 mm long, and anthers 6 mm long. The four leaves have well-developed blades and there is no sign of a largely sheathing upper leaf. The plants have blades with a firm texture, an apparently drooping flowering stem, and a spike of five flowers. The plant thus fits poorly in *Hesperantha brevicaulis* because of the firm leaves, absence of a sheathing upper leaf, spike with more than four flowers, short filaments, and relatively short anthers. Additional material of this plant is needed.

64. **Hesperantha curvula** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 43: 416 (1986). Type: South Africa. [KwaZulu-Natal], Underberg, Bushman's Nek, Thamathu Pass, 5 Feb. 1976, *Hilliard & Burtt 8981* (NU, holo.; E, MO, iso.).



Distribution of ***Hesperantha curvula***.



Distribution of ***Hesperantha scopulosa***.

Plants 120–300 mm high. *Corm* unknown. *Stem* usually simple or 1-branched, curving outward below, then ± erect. *Leaves* 4, lower 2 ± basal, ± half as long as stem, ± falcate, firm-textured, 1.5–4.0 mm wide, upper 2 leaves cauline, uppermost leaf largely to entirely sheathing. *Spike* mostly (1)3- to 5-flowered; bracts green or flushed purple distally, outer 14–21 mm long, inner slightly shorter. *Flowers* diurnal, magenta-rose, salver-shaped, ?unscented; perianth tube cylindric, curved toward apex, expanded near mouth, 18–25 mm long; tepals subequal, elliptic, spreading, 16–25 × 6–8 mm. *Filaments* ascending, (3–)4 mm long; anthers 7–9 mm long, yellow; pollen ?yellow. *Style branches* laxly spreading, 12–15(–20) mm long, exceeding anthers in closed flower. *Flowering time*: late January and February.

Distribution and ecology: a narrow endemic of the southern Drakensberg of KwaZulu-Natal, South Africa; occurring on wet turf ledges above Cave sandstone outcrops, ± 2 000–2 400 m elevation.

Diagnosis: recognised by the stem, curved outward above the base and then suberect, *Hesperantha curvula* has moderately long-tubed, bright magenta-pink flowers, the tube 18–25 mm long, with spreading tepals ± as long as the tube. *Hesperantha pulchra*, from lower elevation grassland in the Eastern Cape, has a comparably long tube but pale pink flowers and erect stems. *Hesperantha scopulosa*, which co-occurs with *H. curvula* in part of its range, has a longer perianth tube mostly 32–42 mm long.

65. **Hesperantha scopulosa** *Hilliard & B.L.Burtt* in Notes from the Royal Botanic Garden, Edinburgh 43: 417 (1986). Type: South Africa, [KwaZulu-Natal], Underberg, Bamboo Mtn, 8 Mar. 1977, *Hilliard & Burtt 10074* (NU, holo.; E, MO, iso.).

Plants mostly 140–250 mm high. *Corm* ± globose, 15–20 mm diam.; tunics dark brown, fragmenting below into truncate sections and drawn into short cusps above. *Stem* usually simple, rarely 1(2)-branched, curving outward distally, sometimes pendent. *Leaves* (3)4, lower 2 ± basal, ± usually longer than stem, falcate, soft-textured, (2.5–)4.5–10.0 mm wide, upper leaves cauline, shorter, uppermost largely to entirely sheathing. *Spike* mostly (1)3- to 8-flowered; bracts green or flushed purple distally, outer 20–35 mm long, inner slightly shorter. *Flowers* diurnal, salver-shaped, mauve-pink to magenta- pink, white in throat, unscented; perianth tube cylindric, curved toward apex, expanded near mouth, mostly 30–42 mm long; tepals subequal, elliptic, spreading, 16–25 × 5.5–7.2 mm. *Filaments* ascending, 3.0–4.4 mm long; anthers 4.5–7.0 mm long, yellow; pollen yellow. *Style branches* laxly spreading, 10–14 mm long, exceeding anthers in closed flower. *Capsules* ellipsoid, 8–13 mm long. *Seeds* ellipsoid-fusiform, lightly angled, 1.25–1.50 mm long, golden-brown, with thread-like funicle 2–3 mm long, pendent after capsule dehiscence. *Flowering time*: mostly mid-February to April.

Distribution and ecology: occurring at mid- to upper elevations of the Drakensberg of eastern Free State and KwaZulu-Natal, South Africa, probably also in Lesotho; on wet rock ledges and mossy rock faces, often on sandstone but also basalt.

Diagnosis: among the long-tubed *Hesperantha* species of the Drakensberg, *H. scopulosa* stands out in its rocky habitat, curved and often trailing stems, falcate leaves and mauve to magenta-pink flowers. The perianth tube is typically 30–42 mm long and 1.5–2.0× as long as the tepals, 16–25 mm long. Seeds of *H. scopulosa*, are striking in the genus, ovoid, ± 1.3 mm long, with a pale, irregularly twisted persistent funicle several times longer than the seed body. The chalazal end of the seed has what appears to be a vestigial wing. The flowers are pollinated by long-proboscid flies but flowers that have been examined show the tube lacks nectar and pollination visits depend on their resemblance to those of other species in the area that secrete nectar.

Sect. 2. **Hesperantha**

Plants with relatively large symmetrical, bell-shaped corms with flat, horizontal or oblique base; older corm tunics partly splitting from base. *Spike* with floral outer bract margins free to base. *Flowers* variously coloured, with straight perianth tube.

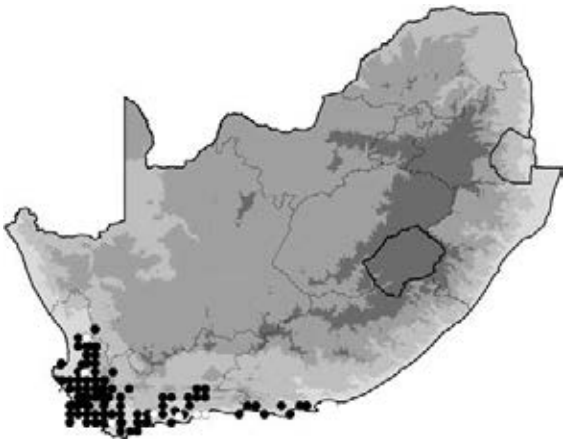
Species 13: restricted to the southern African winter-rainfall zone.

66. **Hesperantha falcata** *(L.f.) Ker Gawl.* in König & Sims, Annals of Botany 1: 225 (1804a); Goldblatt: 97 (1984). *Ixia falcata* L.f.: 92 (1782). Type: South Africa. Western Cape, hills around Cape Town, without date, *C.P. Thunberg s.n.* [UPS–THUNB 9052B, lecto., designated by Goldblatt: 97 (1984)].

Plants mostly 120–300 mm high. *Corm* bell-shaped with flat base, mostly 7–12 mm diam.; tunics overlapping, dark brown, outer layers splitting into sections below. *Stem* simple or 2- or 3-branched from near base, sometimes also from aerial axil. *Leaves* 4 or 5, lower 3 or 4 basal, usually reaching to ± base of spike, straight or falcate, mostly 4–8 mm wide, uppermost leaf shortest, sometimes entirely sheathing. *Spike* mostly 3- to 7-flowered; bracts green, often red later becoming dry distally, outer 7–12 mm long, inner slightly shorter. *Flowers* salver-shaped, white then with outer tepals red to brown outside and crepuscular, or yellow with outer tepals flushed brown outside and diurnal, sweetly scented when white; perianth tube cylindric, mostly 5–9 mm long, expanded near mouth; tepals (9–)12–16 mm long, elliptic, shallowly spooned. *Filaments* 3–4 mm long; anthers 3.5–7.5 mm long, ± horizontal, white or yellow; pollen white or yellow. *Style branches* ± 6 mm long, reaching to between middle and tips of anthers in closed flower. *Capsules* obovoid, 7–10 mm long. *Seeds* light brown, angular. *Chromosome number* 2*n* = 26. *Flowering time*: August and September, to mid-October in the south.

Distribution and ecology: South Africa, extending from the Bokkeveld Mtns in Northern Cape to the Cape Peninsula in Western Cape and east to Port Elizabeth in Eastern Cape; on sandy loam, stony sandstone slopes or on clay in renosterveld.

Diagnosis: one of the most common and widespread species of the genus in the winter-rainfall zone, *Hesperantha falcata* is recognised in sect. *Hesperantha* by the three or four, usually falcate, basal leaves and one more cauline and largely sheathing leaf, and white, creamy white or yellow flowers. Other white-flowered species of the section have smaller flowers, in *H. spicata* a perianth tube 4–6 mm long and tepals 4–7(–9) mm long. *Hesperantha laxifolia* has a similarly short perianth tube ± 5 mm long, only two foliage leaves (and one or two more entirely sheathing) and unusually short style branches ± 2.5 mm long. In *H. laxifolia* the style and style branches remain included in the perianth tube and in *H. cedarmontana* both style branches and stamens are included. In the rare white-flowered *H. dolomitica* from the Knersvlakte and *H. eremophila* from the Richtersveld, the narrow tepals remain half cupped in fully open flowers.



Distribution of ***Hesperantha falcata*** subsp. ***falcata***, ●; subsp. ***lutea***, ○.

The yellow-flowered populations, which occur mainly in the southern Cape and typically on clay or clay loam soils, are treated as a separate subspecies, distinguished by flower colour and diurnal flowering. Subsp. *falcata* remains relatively variable and some variants have been accorded specific rank, notably *H. trifolia*, recognised by its particularly large, creamy white flowers, almost always has three leaves and spikes with sometimes as few as two or three flowers, and the bracts are also rather soft-textured, often ± membranous but the presence of intermediates makes its recognition as a separate taxon seem unhelpful. These populations represent the northern race of the species. Plants from the east of the range of subsp. *falcata* have the smallest flowers of the species.

Key to subspecies

1a Flowers white, sometimes creamy white (rarely creamy yellow) and crepuscular, scented in the late afternoon and evening. . . . . 66a. subsp. *falcata*
1a Flowers pale to deep yellow and diurnal, never scented. . . . . 66b. subsp. *lutea*

66a. subsp. **falcata**

Hesperantha insipida G.J.Lewis: 56 (1941), as a new name for *Geissorhiza pauciflora* Baker: 1004 (1904) [not *H. pauciflora* G.J.Lewis, 1938]. Type: South Africa, [Western Cape], near Porterville, *R. Schlechter 4891* (B, BOL, G, K, W, Z, syn.).

Hesperantha pentheri Baker: 26 (1906). Type: South Africa, [Western Cape], Olifants River Valley, Clanwilliam, Aug. 1894, *A. Penther 686* [K, lecto., designated by Foster: 21 (1948)].

Hesperantha trifolia R.C.Foster: 26 (1948). Type: South Africa, [Western Cape], Bulshoek, 2 Aug. 1896, *R. Schlechter 8378* (B, holo.; BOL, G, K, MO, P, PH, PRE, US, Z, iso.).

[*Hesperantha maritima* Eckl.: 23 (1827), invalid name without description.]

[*Hesperantha pallida* Eckl.: 23 (1827), invalid name without description.]

Flowers nocturnal, white or creamy white, occasionally creamy yellow, outer tepals usually flushed red, sometimes brown outside, sweetly scented when open in later afternoon and evening; perianth tube 5–9 mm long; tepals (9–)12–16 mm long. *Flowering time*: August and September to early October in the southeast; flowers opening late afternoon, usually after 16:00 (but variable), closing after 21:00–21:30 or after 2:00, depending on population and weather conditions.

Distribution and ecology: occurring thoughout the range of the species, from the Bokkeveld Mtns to Port Elizabeth; on sandy flats and slopes, sometimes in seasonally wet places.

Diagnosis: the clear white to creamy white (sometimes almost pale yellow) flowers of subsp. *falcata* separate if from yellow-flowered subsp. *lutea.* As outlined above subsp. *falcata* remains variable, with the northern populations in the Olifants River Valley and nearby (described in the past as *H. pentheri* and *H. trifolia*) often having larger flowers, blooming earlier in the season, and often occurring in rocky, well-drained sites. Intermediates between this and the typical form make it impossible to consistently differentiate the two as separate taxa.

66b. subsp. **lutea** *(Benth. ex Baker) Goldblatt & J.C.Manning* in South African Journal of Botany 98: 119 (2015). *Hesperantha lutea* Benth. ex Baker [as *H. lutea* Benth.]: 149 (1892). Type: South Africa, [Western Cape], Caledon [District], without date, *C.L. Zeyher s.n.* (K, holo.).

Hesperantha lutea var. *luculenta* R.C.Foster: 19 (1948). Type: South Africa, [Western Cape], hills at Berg River Bridge, Piketberg, *R. Schlechter 5261* (GH, holo.; B, BOL, G, K, P, PRE, S, Z, iso.).

[*Geissorhiza lutea* Eckl.: 21 (1827), invalid name without description.]

Flowers diurnal, clear pale or deep yellow, outer tepals usually flushed brown outside, unscented. *Flowering time*: mainly late August and September; flowers open late morning to shortly after midday and close ± 16:00.

Distribution and ecology: extending from near the Koebee Mtns to Porterville in the west and from Caledon to Mossel Bay in the south, Western Cape; on clay or clay loam slopes and flats.

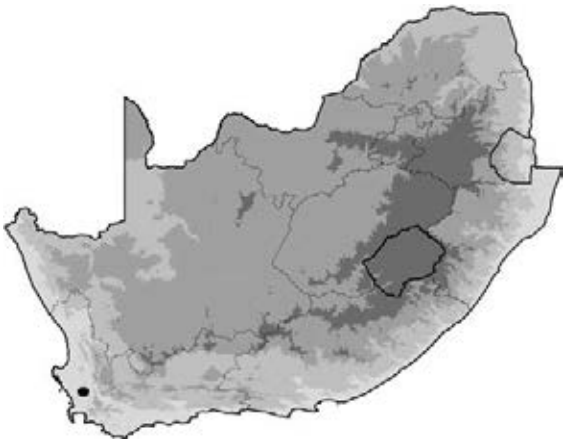
Diagnosis: subsp. *lutea* is readily recognised in sect. *Hesperantha* by the clear yellow flowers. The northwestern populations have pale yellow flowers and those in the south deep yellow but the flowers are diurnal in both, opening in the late morning to shortly after midday and closing in the late afternoon. The subspecies occurs on clay soils in renosterveld, whereas subsp. *falcata* is most often found on sandy ground, sometimes in wet sites, or sandstone outcrops. The only other yellow-flowered populations in the section are a rare pale yellow-flowered morph of *H. pauciflora* from the Bokkeveld Mtns. *Hesperantha pauciflora* is distinguished from *H. falcata* by the corms bearing prominent lateral spines and typically pink to purple flowers. *Hesperantha sufflava* has pale, watery yellow flowers and differs in consistently having only three leaves, all basal, and the style dividing well within the perianth tube.

67. **Hesperantha sufflava** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 435 (2003). Type: South Africa, Western Cape, Malmesbury, sandy gravel slopes in renosterveld, 14 Aug. 1999, *P. Goldblatt & I. Nänni 11087* (NBG, holo.; K, MO, PRE, S, WAG, iso.)

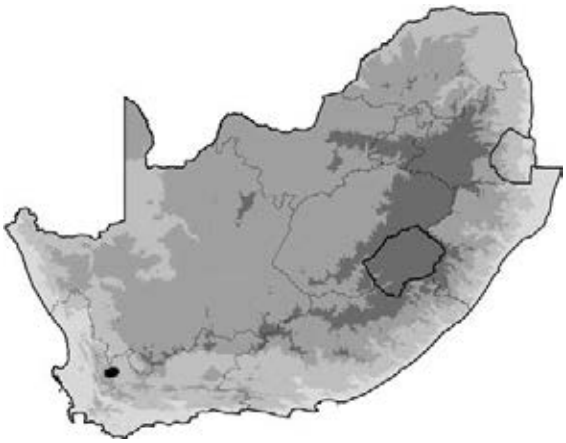
Plants mostly 80–150 mm high. *Corm* bell-shaped with flat base, 10–18 mm diam.; tunics woody, margins denticulate. *Stem* often branching from near base and from axil of uppermost leaf. *Leaves* 3, all basal or uppermost subbasal, lanceolate to falcate, reaching to ± middle or stem, 2–7 mm wide, slightly fleshy, main vein not visibly thickened, upper leaf sheathing stem with short free unifacial tip. *Spike* lightly flexuose, (2)3- to 7-flowered; bracts 10–14 mm long, green, often red along upper margins, divergent. *Flowers* salver-shaped, crepuscular, pale yellow, outer tepals flushed light brown outside; perianth tube slender, straight, 12–14(–16) mm long; tepals subequal, ovate, slightly spooned, 7–9(–10) × 4–5 mm, spreading ± at right angles to tube when fully open after 15:00. *Filaments* ± 2 mm long, inserted at tepal bases; anthers ± 4 mm long, erect, yellow; pollen yellow. *Style branches* ± 12 mm long, dividing in middle of tube, exserted ± 7 mm, then weakly diverging, reaching to ± upper ⅓ of anthers in closed flower. *Capsules* oblong-obovoid, (6–)7–9 × ± 4 mm. *Seeds* ± globose or weakly angled, ± 1.3 mm diam. *Chromosome number* 2*n* = 26. *Flowering time*: late July and August.

Distribution and ecology: local in the Malmesbury District of Western Cape, South Africa; in renosterveld on granitic gravel.

Diagnosis: *Hespernatha sufflava* at first appears to be intermediate between the common, usually white-flowered *H. falcata* and the rarer *H. spicata*, but at the type locality *H. spicata* grows together with *H. sufflava* and is obviously quite different in its secund spike of small, pure white flowers with slightly curved perianth tube 4–6 mm long and smaller tepals 4–7 mm long. Moreover, flowers of *H. spicata* open at about 18:30 when they release a strong, sweet, narcissus-like scent with a strong clove component. Flowers of *H. sufflava* are pale yellow and open at about 15:00 and have a quite different, slightly acrid, pyrethrum-like odour. Particularly unusual are the long style branches about 12 mm long



Distribution of ***Hesperantha sufflava***.



Distribution of ***Hesperantha lithicola***.

that divide in the middle of the perianth tube, with only the upper 7 mm exserted. In nearly all *Hesperantha* species the style divides just below the mouth of the tube and not within its narrow part.

Although easily confused with *Hesperantha falcata* the flowers of *H. sufflava* are somewhat smaller, with tepals 7–10 mm long but a substantially longer perianth tube, usually 12–16 mm long, and always longer than the tepals. In *H. falcata* the tepals are usually 12–18 mm long, exceptionally only 9–11 mm in southern Cape coastal populations, and the perianth tube is 4–9 mm long, thus usually shorter than the tepals. Apart from the flowers, *H. sufflava* is distinctive in always having only three leaves, all basal or the uppermost one subbasal, and the stem often has a branch produced from the axil of the upper leaf. Most populations of both *H. spicata* and *H. falcata* have three (rarely more) foliage leaves and one short, largely or entirely sheathing upper leaf.

68. **Hesperantha lithicola** *J.C.Manning & Goldblatt* in Bothalia 37: 180 (2007). Type: South Africa, Western Cape, Swartruggens, Farm Knolfontein, between Katbakkies Pass and Skitterykloof, in loam and leaf litter on sandstone pavement, 12 Sept. 2006, *P. Goldblatt & J.C. Manning 12817A* (NBG, holo.; MO, PRE, iso.).

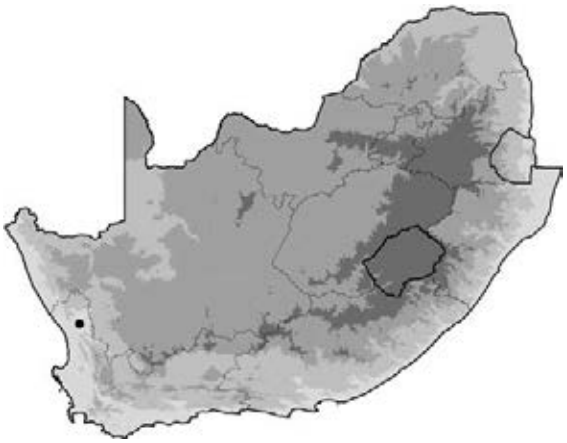
Plants (40–)80–200(–290) mm high. *Corm* bell-shaped with flat base, 7–10 mm diam.; tunics breaking into segments below, margins fringed and often with radiating spines. *Stem* unbranched or rarely with one branch from near base. *Leaves* 4, lower 2 basal, suberect or falcate, often undulate or loosely coiled, (30–)50–100(–160) × 1–2 mm, main vein prominently raised and margins squared and minutely scabrid along both edges, uppermost leaf entirely sheathing. *Spike* 1- to 4-flowered; bracts green, flushed reddish, becoming dry apically, 11–20 mm long. *Flowers* salver-shaped, crepuscular, white, outer tepals red outside, with rosy citrus fragrance; perianth tube 10–12 mm long, cylindric, wider near apex; tepals subequal, elliptic, spreading, 10–15 × 4.0–6.5 mm, outer slightly larger than inner. *Filaments* slightly diverging, 3–5 mm, exserted 2–3 mm from tube; anthers horizontal, ± 6 mm long, pale yellow. *Style branches* 4.0–5.5 mm long. *Capsules* ellipsoid, 9–10 × 4 mm. *Seeds* subglobose, golden-brown, 1.0–1.5 mm diam., rugose, testa cells domed. *Flowering time*: September.

Distribution and ecology: restricted to the Swartruggens Mtns in the eastern Cold Bokkeveld of Western Cape, South Africa; on sandstone pavement in rock crevices or shallow humus, often in the shelter of small shrubs.

Diagnosis: *Hesperantha lithicola* is distinctive in its symmetrical, bell-shaped corm and narrow, often twisted or coiled leaves. It is evidently most closely allied to *H. falcata*, which it resembles in general appearance but from which it differs in its consistently narrower leaves, 1–2 mm wide vs. 4–8 mm in *H. falcata*, and longer perianth tube, 10–12 mm vs. 4–9 mm. The two species differ also in their habitats, with *H. lithicola* restricted to shallow soils on sandstone rock pavement, whereas *H. falcata* is a common and widespread species of seasonally moist, deeper clay or sandy soils. This ecological difference is evident at the type locality, where *H. falcata* occurs nearby on sandy flats not far from rocky outcrops where *H. lithicola* is found. *Hesperantha lithicola* is remarkably similar in general appearance to *H. acuta* but this species has a globose, asymmetrical corm with one side flattened and extended downward. Without corms, however, the two taxa are almost indistinguishable, although *H. acuta* does not occur on the Cold Bokkeveld and is typically found on clay soils, rarely limestone or in pockets of loam on sandstone outcrops.

69. **Hesperantha dolomitica** *Goldblatt & J.C.Manning* in Bothalia 43: 145 (2013). Type: South Africa, Western Cape, Vanrhynsdorp, Knersvlakte, Farm Varsche Rivier 260, 300 m north of Vars River, south-facing limestone crevices, ledges and moss pads, 76 m, 25 July 2012, *Helme 7424* [not *7425* in protologue] (NBG, holo.; MO, iso.).

Plants mostly 180–250 mm high. *Corm* bell-shaped with flat base; tunics dark brown, softly woody, margins



Distribution of ***Hesperantha dolomitica***.

minutely toothed, outer layers irregularly broken. *Stem* unbranched, flaccid and inclined. *Leaves* 4, lower 2 basal, ± linear, flaccid, ± falcate, blades 60–80 × 3–4 mm, third leaf inserted shortly above ground and sheathing stem for most of its length, uppermost leaf bract-like, inserted on upper ⅓ of stem, entirely sheathing. *Spike* 2- to 4-flowered, bracts mostly 12–15 mm long, pale green, evidently becoming dry and pale straw-coloured during flowering, inner with 2 green keels, narrowed distally and tips sometimes recurved. *Flowers* evidently diurnal, white, tepals without darker colouring on reverse, remaining cupped when fully open, sweetly scented; perianth tube narrowly funnel-shaped, 12–14 mm long; tepals subequal, elliptic, 12–14 × 4 mm. *Filaments* ± 3 mm long; anthers 6–8 mm long, pale yellow; pollen yellow. *Style branches* ± 7 mm long, diverging. *Flowering time*: July, probably also August.

Distribution and ecology: local in the Knersvlakte in southern Namaqualand in Western Cape, South Africa, where it is restricted to limestone outcrops north of the Vars River; mostly wedged in cracks in the rocks, plants are also occasionally found in loamy, red soils at the base of the south-facing limestone cliffs.

Diagnosis: with bell-shaped corms with a flat base characteristic of sect. *Hesperantha*, *H. dolomitica* is recognised in the section by its relatively large, pure white flowers with tepals remaining cupped even when fully expanded and without darker pigmentation on the outside of the tepals. The perianth tube and tepals are about the same length, 12–14 mm long, relatively large for sect. *Hesperantha*. Additional observations are needed to confirm the ultimate orientation of the tepals which may not occur until after dark but they probably remain cupped.

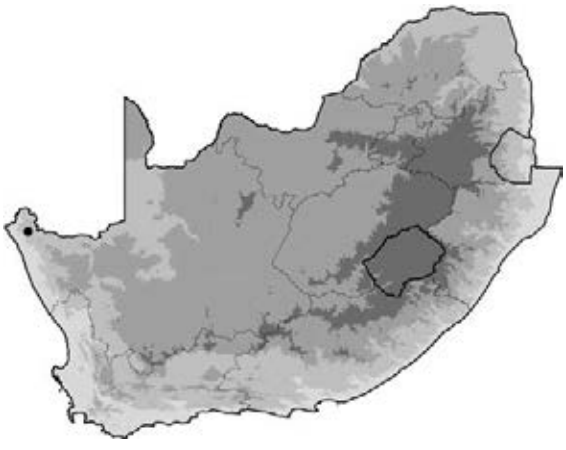
70. **Hesperantha eremophila** *Goldblatt & J.C.Manning* in South African Journal of Botany 98: 119 (2015). Type: South Africa. Northern Cape, Richtersveld National Park, Vandersterrberg, on road to Koeskopfontein within the Venstervalle Valley, ± 3 km from Koeskopfontein, 13 Aug 2014, *P.C.V. van Wyk 477* (NBG, holo.; MO, iso.).

Plants mostly 150–350 mm high. *Corm* bell-shaped with flat base; tunics dark brown, softly woody, outer layers irregularly broken, margins minutely toothed. *Stem* unbranched. *Leaves* 3, lower 2 basal, falcate, blades 50–100 × 2–6 mm, bright green to slightly glaucous, with thickened, raised main vein, margins translucent-hyaline, uppermost leaf inserted shortly above ground, sheathing stem for most of its length with short blade up to 10 mm long. *Spike* flexuose, 1- or 2(3)-flowered, outer bract ± 12 mm long, pale green flushed red to purple at tip, inner slightly shorter, with 2 green keels, narrowed distally. *Flowers* crepuscular, rotate, white without darker colouring on reverse, dull yellow-green in throat and tube, tepals remaining cupped when fully open, with sweet, rose-like scent; perianth tube narrowly funnel-shaped, 5–6 mm long; tepals subequal, elliptic, 15–17 × 4–5 mm. *Filaments* ± 3 mm long, inserted ± 2 mm above base of tepals; anthers held horizontally, 7–8 mm long, pale yellow; pollen yellow. *Style* dividing 2 mm below mouth of tube, branches ± 12 mm long, diverging. *Flowering time*: August.

Distribution and ecology: restricted to the slopes of the Vandersterrberg in the Richtersveld National Park, Northern Cape, South Africa; in shaded, seasonally moist sites along seepages in rock crevices and at the foot of sandstone and conglomerate rock slabs.

Diagnosis: with a bell-shaped corm with a flat base, *Hesperantha eremophila* conforms to sect. *Hesperantha*, where it is distinguished by pure white flowers lacking dark colour on the reverse of the outer tepals, a funnel-shaped perianth tube 5–6 mm long, and tepals remaining cupped when fully open. The tepals, 15–17 mm long, are much longer than the perianth tube, and the long style branches, ± 12 mm long, are distinctive. The flowers are crepuscular, opening mid- to late afternoon and closing after midnight.

Among the white-flowered species of the section and genus only *H. dolomitica* has similarly cupped tepals also without colouring on the outside of the tepals, which suggests a possible relationship with *H. eremophila*.



Distribution of ***Hesperantha eremophila***.

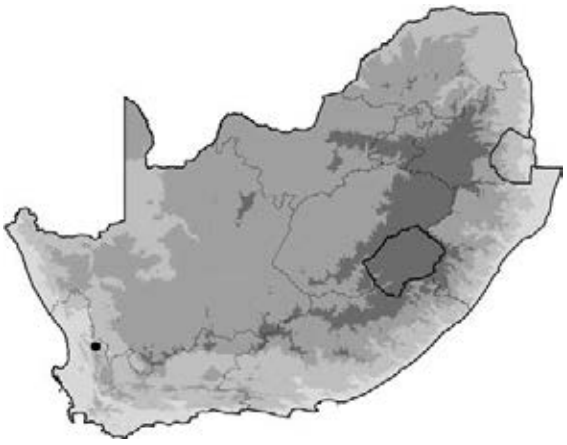
Flowers of *H. dolomitica* are larger, with a perianth tube 12–14 mm long and tepals about the same length, and style branches ± 7 mm long, just over half as long as those of *H. eremophila*.

71. **Hesperantha laxifolia** *Goldblatt & J.C.Manning* in Bothalia 43: 146 (2013). Type: South Africa, Western Cape, mtns north of Pakhuis Pass, occasional among sandstone rocks on S-facing slopes and banks, 12 Oct. 2012, *Goldblatt & Porter 13871* [not *13877*] (NBG, holo.; K, MO, PRE, iso.).

Plants 90–160 mm high. *Corm* bell-shaped with flat, sometimes oblique base, 10–15 mm diam.; tunics dark brown, inner layers ± woody, outer layers becoming soft and broken, margins minutely serrated. *Stem* unbranched, glabrous. *Leaves* 3(4), lower 2 leaves usually prostrate (suberect in deeply shaded sites), fleshy, flaccid, obtuse, 50–70 × 4–5 mm, with main vein raised, margins pale, slightly thickened, third leaf sheathing lower ⅓ of stem, slightly inflated, fourth leaf (when present) on upper part of stem, bract-like and entirely sheathing. *Spike* mostly 2- or 3(5)-flowered, outer bract 8–9 mm long, green flushed red distally, inner slightly shorter to ± as long, partly membranous with 2 green keels, notched apically. *Flowers* crepuscular, white, outer and sometimes inner tepals red to brown outside, rose-scented; perianth tube narrowly cylindric, slightly wider near apex, ± 5 mm long; tepals subequal, elliptic, ± 10 × 4 mm. *Filaments* ± 0.5 mm long; anthers ± 4 mm long, erect, pale yellow; pollen white. *Style branches* ± 2.5 mm long, arching upward, reaching to the lower ⅓ to slightly below middle of anthers in closed flower. *Capsules* and *seeds* unknown. *Flowering time*: September to late October.

Distribution and ecology: known from a single, extended population in the Pakhuis Mtns of Western Cape, South Africa; in peaty and loamy sand in rocky sites, mainly in sheltered, shady situations on south-facing slopes.

Diagnosis: with white, crepuscular flowers typical of the genus, *Hesperantha laxifolia* is distinguished by its small flowers, with tepals ± 10 mm long and a particularly short perianth tube only half as long. Also unusual, the short stamens have filaments only about 0.5 mm long and anthers ± 4 mm long. The style divides just below the mouth of the tube into ascending style branches only 2.5 mm long, likewise unusually small for the genus and reaching only between the lower third and below the middle of the anthers in the closed flower. The two basal leaves are slightly succulent and spreading to ± prostrate, although the leaves may be ascending to suberect in deep shade. The flowers are crepuscular, opening at ± 18:00 and closing again between 21:00 and 21:30. The bell-shaped corms with the tunic margins finely toothed are typical of sect. *Hesperantha*, but within the section the relationships of *H. laxifolia* are uncertain. *Hesperantha montigena* also has prostrate leaves but much larger flowers with a perianth tube 12–15 mm long and tepals 14–16 mm long, thus ± as long as the tube, and the corms are asymmetric, placing it in sect. *Concentricae*.



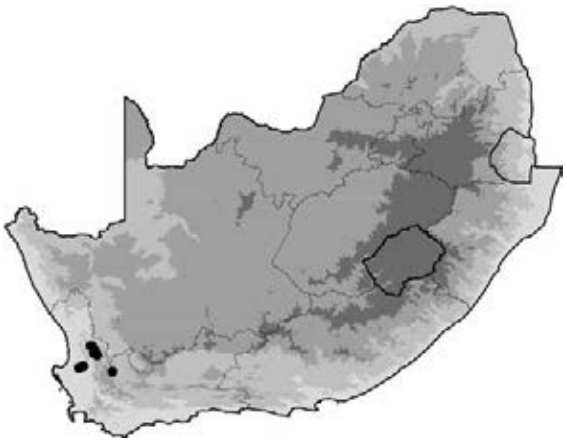
Distribution of ***Hesperantha laxifolia***.

72. **Hesperantha cedarmontana** *Goldblatt* in Journal of South African Botany 50: 106 (1984). Type: South Africa, [Western Cape], Pakhuis Mtns W of Leipoldt's Grave, 27 Sept. 1981, *P. Goldblatt 6403* (MO, holo.; K, NBG, PRE, iso.).

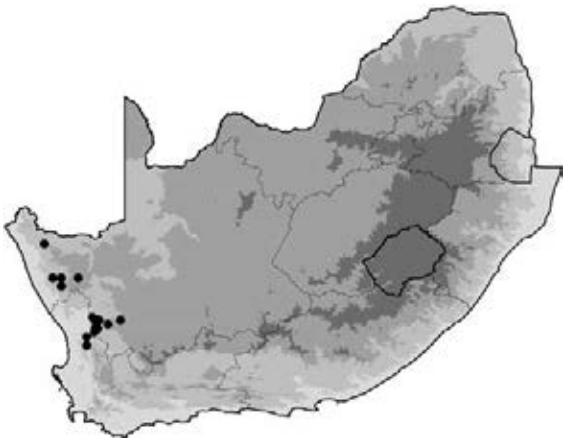
Plants mostly 120–250(–450) mm high. *Corm* bell-shaped with flat base, ± 12 mm diam.; tunics dark brown, woody, margins minutely serrated, outer layers breaking into segments below. *Stem* unbranched, smooth, sheathing at base by membranous pale to brown cataphyll. *Leaves* usually 4, lower 2 basal, often prostrate, ± lanceolate, flaccid, ± blades 60–80(–150) × 2–8 mm, often obtuse, with slightly thickened main vein, third leaf inserted shortly above ground and sheathing stem for most of its length, uppermost leaf bract-like, inserted on upper third of stem, entirely sheathing. *Spike* (1–)3- to 8-flowered; bracts mostly 10–14 mm long, often flushed red. *Flowers* possibly crepuscular, salver-shaped, white, tepals flushed pink outside, carnation-scented; perianth tube ± cylindric, 10–13 mm long; tepals subequal, elliptic, 10–12 × ± 4 mm, spreading. *Filaments* included, inserted below mouth of tube, ± 0.5 mm long; anthers ± 3.5 mm long, pale yellow, included with apices barely emerging. *Style* short, dividing in lower ⅓ of tube, branches ± 3 mm long, seldom reaching base of anthers. *Capsules* narrowly ovoid, 10–15 mm long. *Seeds* unknown. *Chromosome number* $2n = 26$. *Flowering time*: July, probably also August.

Distribution and ecology: occurring in the mountains of Western Cape, South Africa, from Pakhuis Pass in the north to the Cold Bokkeveld and Swartruggens and locally in the Piketberg in the south; on sandstone outcrops, often in seasonally wet sites as on wet sandstone pavement.

Diagnosis: *Hesperantha cedarmontana* is immediately distinguished by the white flowers with stamens, style and style branches included in the perianth tube. The tips of the comparatively short anthers, ± 3.5 mm long, just barely emerge from the mouth of the tube and the



Distribution of ***Hesperantha cedarmontana***.



Distribution of ***Hesperantha pauciflora***.

style branches reach no further than the bases of the anthers. The corms, fairly typical of sect. *Hesperantha,* are bell-shaped with the tunic margins minutely serrated. The two basal leaves have well-developed blades sometimes prostrate or flaccid but suberect when growing in dense vegetation. Flowers have been reported as beginning to open ± 12:30 and are fully open later in the day but the time of closing is not known.

73. **Hesperantha pauciflora** *G.J.Lewis* in Flowering Plants of Africa 18: t. 682 (1938); Goldblatt: 108 (1984). *Tritonia pauciflora* Baker: 193 (1892), illegitimate homonym, not *T. pauciflora* Klatt (1882). Type: South Africa, [Northern Cape], Namaqualand, near Naries, Sept. 1883, *H. Bolus 6622* [BOL, lecto., designated by Goldblatt: 108 (1984)].

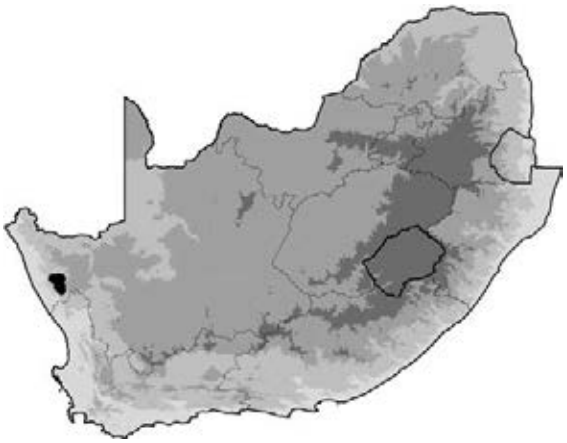
Plants mostly 100–200 mm high. *Corm* bell-shaped with flat base, ± 10 mm diam.; tunics woody, margin with radiating spines. *Stem* simple or 1- or 2-branched from near base. *Leaves* 3 to 5, plane, ± lanceolate, ½–⅔ as long as spike, 3–7 mm wide. *Spike* flexuose, (1)2- to 4-flowered; bracts green or flushed red, becoming dry above, 9–14 mm long. *Flowers* diurnal, salver-shaped, pink to red-purple, sometimes white in throat (rarely uniformly yellow), outer tepals darker outside, occasionally scented; perianth tube 6–11 mm long, cylindric, widening near apex; tepals unequal, elliptic, spreading horizontally, outer 18–23(–26) × 7–9 mm, inner shorter and narrower. *Filaments* 2–8 mm long; anthers 5.5–9.0 mm long, ?purple (yellow when flowers yellow). *Style branches* 9–15 mm long, shorter than or exceeding anther tips in closed flower, laxly spreading. *Capsules* ovoid, 5–10 mm long. *Seeds* unknown. *Chromosome number* 2*n* = 26. *Flowering time*: mid-August and September.

Distribution and ecology: extending through northern Namaqualand from the southern Richtersveld near Kosies to the Kamiesberg and in the Bokkeveld Mtns in Northern Cape, South Africa; typically in deep sand or stony ground and sometimes very common in fallow or shallowly tilled fields.

Diagnosis: typical pink to purple-flowered *Hesperantha pauciflora* is recognised by the flat-based, bell-shaped corms with radiating marginal spines and an aerial stem up to 200 mm high. The flowers are large and attractive with tepals 18–26 mm long and a short perianth tube 6–11 mm long. Plants from Namaqualand have dark pink to purple flowers with a white throat, stamens with filaments 4–8 mm long, anthers 6.5–9.0 mm long, and the style branches reaching the anther tips or exceeding them by up to 2 mm in the closed flower. On the Bokkeveld Escarpment, ± 100 km south of the nearest Namaqualand populations, the flowers are either uniformly pale to deep pink, or often with darker pigmentation at the base of the tepals and in the throat, and the stamens in these populations have filaments only 2–3 mm long, with anthers 7–9 mm long, and the style branches barely reach the anther tips or up to 2 mm below them. Plants with pale yellow flowers from the south of its range at Papkuilsfontein south of Nieuwoudtville are included here, expanding the range of variation in *H. pauciflora*. They appear to differ in no other significant way from the pink-flowered populations and have identical bell-shaped corms with prominent radiating spines, spikes of only 2 to 4 flowers, and submembranous bracts, dry near the tips. The flowers also have the same daily opening and closing pattern.

The flowers of *Hesperantha pauciflora* open on warm days after 13:00 and close again after 17:00, during which time they are visited by a variety of bees and by hopliine beetles. Closely related *H. latifolia*, which is restricted to the Kamiesberg in Namaqualand, is acaulescent or nearly so and has similarly coloured red-purple flowers but with a longer perianth tube, 15–25 mm long, and is pollinated by long-proboscid flies.

74. **Hesperantha latifolia** *(Klatt) M.P.de Vos* in Journal of South African Botany 40: 252 (1974); Goldblatt: 111 (1984). *Syringodea latifolia* Klatt: 403 (1882). Type: South Africa, [Northern Cape], Kamiesberg, Ellenboogsfontein, Sept. 1830, *J.F. Drège 2633* (B, lecto., designated by De Vos: 252 (1974); P, S, isolecto.).



Distribution of ***Hesperantha latifolia***.

Hesperantha pearsonii R.C.Foster: 21 (1948). Type: South Africa, [Northern Cape], Namaqualand, Khomsoap Ravine, *Pearson 6539* (B, holo.; MO, iso.)

Plants mostly 60–100(–180) mm high, including leaves. *Corm* bell-shaped with flat base, ± 10 mm diam.; tunics woody, margin with radiating spines. *Stem* reaching shortly above ground or underground, sometimes 1- or 2-branched but always concealed by leaf bases. *Leaves* 3 to 5, plane, falcate or erect and lanceolate, 60–120 × (3–)4–7 mm. *Spike* 1- to 3-flowered; bracts pale green to ± membranous, 10–20 mm long, largely concealed by leaf bases. *Flowers* diurnal, salver-shaped, deep pink to purple, tepals darker outside; perianth tube (15–)20–25 mm long, cylindric, widening near apex; tepals subequal, elliptic, 15–23 × 4–9 mm, spreading horizontally. *Filaments* (4–)7–10 mm long; anthers 4–7 mm long, ?purple. *Style branches* 10–12 mm long, suberect, barely exceeding anthers in closed flower. *Capsules* ovoid, 6–10 mm long. *Seeds* unknown. *Chromosome number* 2*n* = 26. *Flowering time*: mid-August and September.

Distribution and ecology: restricted to higher elevations in the Kamiesberg of central Namaqualand in Northern Cape, South Africa; in shallow soils overlying granite pavement.

Diagnosis: typically a short plant, usually less than 80 mm high but up to 180 mm when growing through bush, *Hesperantha latifolia* is usually acaulescent or with a short aerial stem covered by the bases of the leaves, and has dark pink to red-purple flowers with a perianth tube mostly 20–25 mm long and elliptic tepals 15–23 mm long. The flowers are pollinated by the long-proboscid fly, *Prosoeca peringueyi*, which also pollinates several other long-tubed species with similarly coloured flowers in Namaqualand (Manning & Goldblatt 1996). *Hesperantha latifolia* is closely allied to a second pink–purple-flowered species, *H. pauciflora*, which has a short perianth tube, 6–11 mm long, and a well-developed aerial stem. The two species co-occur in the Kamiesberg, *H. pauciflora* growing in deep, sandy ground.

75. **Hesperantha longistyla** *J.C.Manning & Goldblatt* in Bothalia 37: 177 (2007). Type: Namibia, Witpütz, south of Sebrafontein, 1 400 m, 28 Aug. 2003, *P. Bruyns 9484A* (NBG, holo.).

Plants ± 30 mm high, including leaves. *Corm* bell-shaped with flat base, ± 10 mm diam.; tunics woody, margin with radiating spines. *Stem* reaching up to 10 mm above ground, unbranched. *Leaves* 3, plane, falcate, 30–50 × 2.5–3.0 mm. *Spike* 1- or 2-flowered; bracts green, 7–10 mm long, inner forked at apex. *Flowers* ?diurnal, purple, yellow in mouth of tube; perianth tube 20–25 mm long, slender, widening near apex; tepals subequal, narrowly ovate, ± 10 × 6 mm, outer slightly wider than inner, spreading horizontally. *Filaments* ± 4 mm long, exserted ± 3 mm from tube; anthers ± 5 mm long, ?yellow. *Style branches* ± 10 mm long, laxly spreading, exceeding the anthers in the closed flower. *Flowering time*: mid-August to early September.

Distribution and ecology: a montane species restricted to southwestern Namibia near Rosh Pinah, in the winter-rainfall part of the country; in crevices in dolomite rocks at high elevation.

Diagnosis: distinctive in its short stature, falcate leaves, and purple flowers with a relatively long perianth tube, 20–25 mm long, and disproportionately long style branches, *Hesperantha longistyla* has the bell-shaped corm with a flat base that characterises sect. *Hesperantha*. Among members of the section, the two purple-flowered species *H. latifolia* and *H. pauciflora*, both occurring in Namaqualand, are its most likely relatives, based on their similar flower colour and corms with radiating marginal spines. Also with a relatively long tube, *H. latifolia* differs in its smaller flowers, with tepals ± 10 mm long, and in the marked difference in the relative proportions of stamens and style. The filaments in *H. longistyla* are relatively short, 3–4 mm long and the style branches project ± 3 mm beyond the tips of the anthers, thus appearing unusually long. The flowers of *H. latifolia*, in contrast, are



Distribution of ***Hesperantha longistyla***.

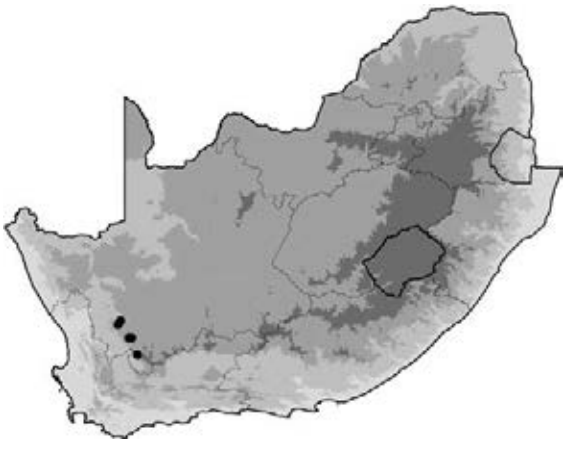
generally much larger, with tepals 15–23 mm long, filaments (4–)7–10 mm long and suberect style branches that barely extend beyond the tips of the anthers.

76. **Hesperantha luticola** *Goldblatt* in Journal of South African Botany 50: 113 (1984). Type: South Africa, [Northern Cape], between Middelpos and Calvinia, Farm Knechtsbank, 21 Aug. 1974, *M.F. Thompson 2529* (NBG, holo.; PRE, iso.).

Plants acaulescent, up to 100 mm high, including flowers. *Corm* ± bell-shaped flat base, 10–12 mm diam.; tunics of ± woody, overlapping layers, margins bearing short spines. *Stem* underground, sheathed at base by a pale, membranous cataphyll. *Leaves* 4 or 5, lanceolate to slightly falcate, 50–100 mm long, margins straight. *Spike* concealed by leaf sheaths, 1- or 2-flowered; bracts ± membranous, concealed by leaves 17–20 mm long. *Flowers* diurnal, borne at ground level, salver-shaped, white with large purple blotches at bases of outer tepals, lilac outside; perianth tube straight, cylindric, (15–)30–45 mm long, with thick walls tightly clasping style; tepals subequal, 10–15 × 4–6 mm long, spreading. *Filaments* diverging, ± 3 mm long; anthers horizontal, 3–5 mm long, yellow; pollen yellow. *Style branches* ± 12 mm long, laxly spreading. *Capsules* ovoid-oblong, (10–)15–25 mm long, raised above ground when mature. *Seeds* angular-prismatic. *Chromosome number* 2*n* = 26. *Flowering time*: July to mid-August.

Distribution and ecology: endemic to the western Karoo in Northern Cape, South Africa, extending from the Hantamsberg near Calvinia south along the Roggeveld Escarpment to Sneeukrans and the Farm Voëlfontein; in seasonally damp to waterlogged, shallow ground over rocky pavement, sometimes in standing water.

Diagnosis: *Hesperantha luticola* stands out in sect. *Hesperantha* as one of only two acaulescent species of the section. The white flowers have large purple blotches at the bases of the outer tepals and a remarkably long perianth tube, mostly 30–45 mm long. The tube has thick walls that tightly clasp the style so that nectar is forced into the top of the tube where it is accessible to insect visitors with short mouth parts. The corm, with short, radiating spines most closely resembles the corms of *H. latifolia* and *H. pauciflora* and it seems reasonable to infer that these are the closest relatives of *H. luticola*.



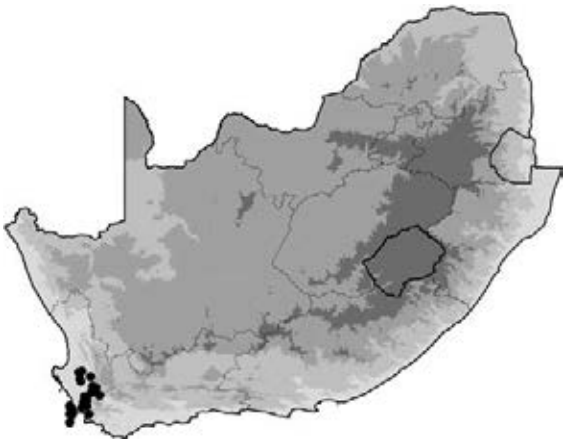
Distribution of ***Hesperantha luticola***.

77. **Hesperantha spicata** *(Burm.f.) N.E.Br.* in Bulletin of Miscellaneous Information, Kew 1929: 136 (1929); Goldblatt: 114 (1984). *Ixia spicata* Burm.f.: 1 (1768). *Ixia burmanni* F.Dietr.: 253 (1818), illegitimate superfluous name for *I. spicata* Burm.f. (1768). *Gladiolus burmanni* Schrank: 204 (1822), as a new name for *I. spicata* Burm.f. (1768) [not *G. spicatus* L.]. Type: South Africa. without precise locality or date, probably cultivated in Holland, *N.L. Burman s.n.* (G: Herb. Burman, holo.).

Plants 120–300(–500) mm high. *Corm* ± bell-shaped to obconic with flat base, 10–15 mm diam.; tunics of ± woody, overlapping layers, margins slightly flared, irregularly broken with edges frayed. *Stem* unbranched, sheathed at base by a pale, membranous cataphyll. *Leaves* usually 4, lower 2 ± basal, blades either terete and hollow or plane, straight, ± erect, falcate, sometimes with margins undulate to crisped, < half as long as stem, upper leaves cauline, shorter, the uppermost entirely sheathing. *Spike* straight, remote from leaves, up to 20-flowered; bracts green, often red-tipped, 5–7(–9) mm long, inner sometimes slightly longer than outer. *Flowers* crepuscular, ascending to half nodding, ± salver-shaped, white with outer tepals flushed red or brown outside; perianth tube straight, cylindric, 4–6 mm long; tepals subequal, obovate, 4–7(–9) mm long, spreading. *Filaments* diverging, ± 2 mm long; anthers spreading parallel to tepals, 3.5–4.5 mm long, white. *Style branches* ± 3 mm long, laxly spreading. *Capsules* narrowly ovoid, 7–9 mm long. *Seeds* angular-prismatic with ± white, spongy testa. *Chromosome number* 2*n* = 26. *Flowering time*: August to October.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, extending from the Piketberg and Porterville to the Cape Peninsula and inland in the Tulbagh and Franschhoek Valleys; usually on sandy, stony ground, but also on clay loam substrates; especially common after fire.

Diagnosis: *Hesperantha spicata* is recognised by the relatively small, white flowers with perianth tube ± 4 mm long and tepals as long as to 1.5× as long. The anthers, articulated on the filament tips spread horizontally over the tepals. The corms, usually ± bell-shaped or obconic, often have a flared margin and sometimes lack the serrated or spiny margins common in sect. *Hesperantha*. The seeds are notable, having a white, spongy coat, not known in other species of the genus. Variation in leaf morphology, correlated to some extent with height and number of flowers per spike, led to recognition of three subspecies: subsp. *graminifolia* with plane leaves with straight margins and often a taller plant; subsp.



Distribution of ***Hesperantha spicata***.

fistulosa with terete, hollow leaves; and subsp. *spicata* with strongly falcate leaves with undulate to crisped margins, a shorter stature and fewer-flowered spikes. Recent records of subsp. *fistulosa* in full bloom growing in a wet seep and subsp. *spicata* in fruit nearby in deep sand expands our understanding of this plant. The situation seems inconsistent with separation at subspecies rank and an alternative treatment as a separate species for subsp. *fistulosa* seems equally acceptable.

Key to subspecies

1a Basal leaves terete, hollow, without evident main vein; spike with 4 to 9 flowers . . . . . 77c. subsp. *fistulosa*
1b Basal leaves plane with evident main vein; spike with 4 to 20 flowers:
2a Leaf blades plane, strongly falcate with margins undulate to crisped; flowers mostly 5 to 12 per spike . . . . . .77a. subsp. *spicata*
2b Leaf blades plane, narrowly lanceolate to weakly falcate with margins straight; flowers mostly 9 to 20 per spike . . . . . .77b. subsp. *graminifolia*

77a. subsp. **spicata**

Ixia cinnamomea L.f.: 92 (1782). *Hesperantha cinnamomea* (L.f.) Ker Gawl.: 225 (1804a). *H. spicata* var. *cinnamomea* (L.f.) R.C.Foster: 25 (1948). Type: South Africa, [Western Cape], 'in collibis Leeuwestaart, *Thunberg s.n.* (UPS–THUNB 937, lecto., designated by Goldblatt: 116 (1984); S, isolecto.).

Plants 120–200 mm high. *Leaves* usually 4, lower 2 ± basal, blades ± plane, strongly falcate, margins undulate to crisped, much shorter than stem, 5–12 mm wide. *Spike* mostly 5- to 12-flowered. *Tepals* 4–7 mm long, spreading.

Distribution and ecology: extending from the lower slopes of the Piketberg to the Tulbagh Valley and the northern Cape Peninsula; usually on stony clay or clay loam.

Diagnosis: subsp. *spicata*, often low in stature but up to 200 mm tall, has plane, strongly falcate leaves with undulate to crisped margins, and a spike with up to 12 flowers, but often fewer.

77b. subsp. **graminifolia** *(Sweet) Goldblatt* in Journal of South African Botany 50: 118 (1984). *Hesperantha graminifolia* Sweet: 9 (1818). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 1254 (1810)

Plants mostly 200–500 mm high. *Leaves* usually 4, lower 2 ± basal, blades plane, narrowly lanceolate to weakly falcate, ± erect, margins straight, up to half as long as stem, 2–5(–8) mm wide. *Spike* mostly 9- to 20-flowered. *Tepals* 5–8(–9) mm long.

Distribution and ecology: extending from Malmesbury and Darling to the southern Cape Peninsula and inland to the Tulbagh Valley and Franschhoek Pass; on stony sandstone ground.

Diagnosis: a taller plant than subsp. *spicata*, standing usually up to 350 mm high, occasionally even taller, subsp. *graminifolia* has lanceolate to weakly falcate leaves with straight margins. The spikes bear 9 to 20 flowers, almost always more than in subsp. *spicata*, and the flowers are often slightly larger than in the other subspecies.

77c. subsp. **fistulosa** *(Baker) Goldblatt* in Journal of South African Botany 50: 119 (1984). *Hesperantha fistulosa* Baker: 1004 (1904). Type: South Africa, [Western Cape], near Porterville, 18 Aug. 1894, *Schlechter 4885* (G, lecto., designated by Foster: 12 (1948); B, BOL, GRA, K, SAM, WU, Z, isolecto.).

Plants up to 200 mm high. *Leaves* ?4, lower 2 basal, blades terete, hollow, without main vein, ± 2 mm diam. *Spike* 4- to 9-flowered; bracts 5–6 mm long. *Tepals* mostly 5–6 mm long. *Flowering time*: mid-August to late September.

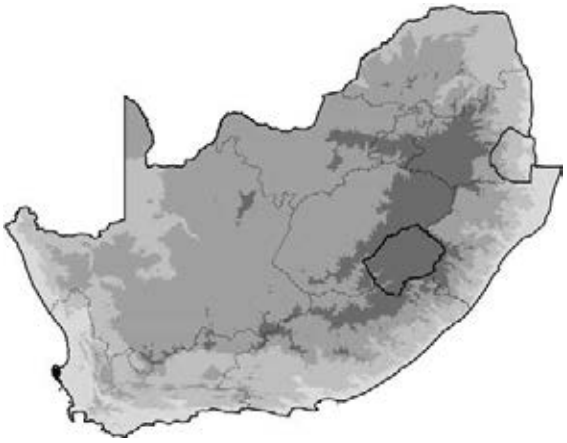
Distribution and ecology: a rare endemic of the Western Cape forelands, recorded near Porterville south to Elandsberg Nature Reserve and near Paarl; occurring in seasonally wet sites, especially seeps and shallow marshes.

Diagnosis: subsp. *fistulosa* is recognised by the terete, hollow leaves without evident main veins but is otherwise very much like subsp. *spicata* in its low stature and spikes of relatively few flowers. The flowers appear exactly like those of subsp. *spicata*, the tepals usually 5–6 mm long, thus slightly smaller than in subsp. *graminifolia.*

Long thought to be a local endemic of the Porterville area, more recent records of subsp. *fistulosa* from Elandsberg Nature Reserve and south of Paarl show the subspecies to have a far wider range, but it remains rare. A population of subsp. *fistulosa* recorded in flower growing close to subsp. *spicata*, then in fruit and in sandy ground, throws some doubt on their current treatment as subspecies, which merits additional investigation.

78. **Hesperantha saldanhae** *Goldblatt* in Journal of South African Botany 50: 119 (1984). Type: South Africa, [Western Cape], granite rocks at Vredenburg, 8 Aug. 1962, *G.J. Lewis 5977* (NBG, holo.).

Plants 120–150 mm high. *Corm* ± bell-shaped with flat base, 10–12 mm diam.; tunics of ± woody, overlapping layers, margins irregularly broken with edges frayed. *Stem* unbranched, sheathed at base by a pale, membranous cataphyll. *Leaves* usually 4, lower 2 ± basal, blades plane, straight, ± erect, ± ⅓ as long as stem, upper leaves cauline, shorter, uppermost entirely sheathing. *Spike* straight, 5- to 8-flowered, secund; bracts green, 7–10 mm long, inner sometimes slightly longer than outer. *Flowers* ± nodding, ± salver-shaped, white; perianth tube straight, cylindric, 9–12 mm long; tepals subequal, narrowly obovate, 9–10 mm long, spreading. *Filaments* diverging, ± 1 mm long; anthers spreading, 2–3 mm long, ?white. *Style* dividing in middle of perianth tube, branches ± 4 mm long, reaching to just beyond mouth of tube to base of anthers. *Flowering time*: August.



Distribution of ***Hesperantha saldanhae***.

Distribution and ecology: known only from the type collection, near Vredenburg in Western Cape, South Africa; on granite outcrops. Despite searches for the species it has never been recollected and may be extinct.

Diagnosis: readily mistaken for the more common and widespread *Hesperantha spicata*, *H. saldanhae* differs in its longer perianth tube, 9–10 mm long, thus ± twice as long as in *H. spicata*, filaments only 1 mm long and anthers 2–3 mm long, both shorter than in *H. spicata*. In addition, the style divides near the middle of the perianth tube with the short style branches barely reaching the mouth of the tube, and the base of the anthers. Flowers of *H. spicata* are fairly typical of the genus with the style dividing close to the mouth of the tube with the style branches spreading over the tepals.

Sect. 3. **Radiatae** *Goldblatt* in Annals of the Missouri Botanical Garden 69: 377 (1982) [as sect. *Radiata*]. Type: *Hesperantha radiata* (Jacq.) Ker Gawl.

Plants with relatively large symmetrical, bell-shaped corms with a flat, horizontal or oblique base; tunics often scalloped below and fringed at the lower margins, older corm tunics not splitting from the base into segments but often the tunics forming scalloped, concave segments. *Spike* with floral outer bract margins united around the spike axis for up to half their length. *Flowers* white to creamy yellow or pink, most species with a strongly curved perianth tube, nearly straight in *H. brevifolia* and *H. juncifolia*.

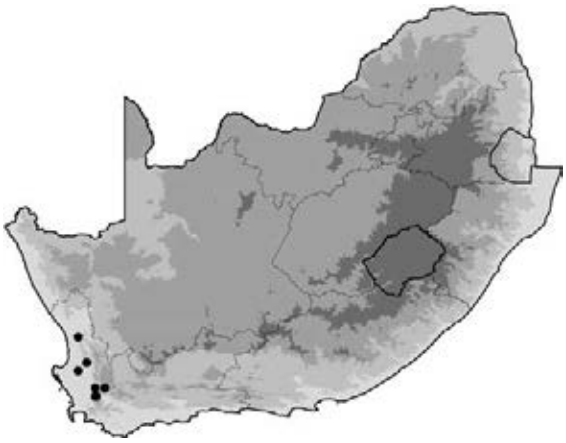
Species 10, 9 in southern Africa: mainly in the winter-rainfall zone, but *H. radiata* extends from Namaqualand, South Africa in the west to Eswatini in the east; *H. longicollis* is eastern southern African extending north to Malawi; and *H. ballii* Wild is endemic to the Chimanimani Mtns of eastern Zimbabwe.

79. **Hesperantha brevifolia** *Goldblatt* in Journal of South African Botany 50: 121 (1984). Type: South Africa, [Western Cape], Piketberg, Zebrakop, 16 Dec. 1971, *E.E. Esterhuysen 35320* (MO, holo.; B, BOL, BR, C, E, K, M, NBG, P, PRE, S, US, iso.).

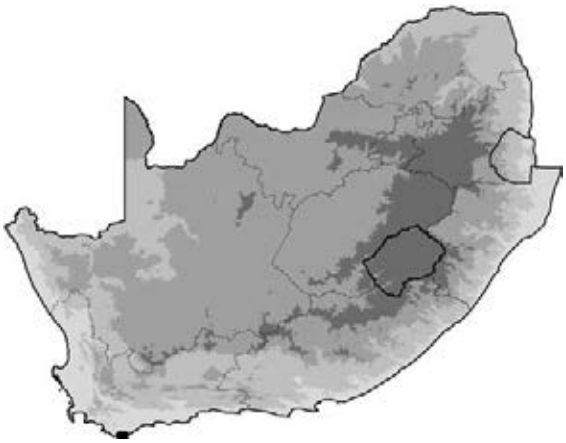
Plants (100–)150–400 mm high. *Corm* ± obconic with flat, oblique base, up to 6 mm diam.; tunics of ± woody, longitudinally ridged, overlapping layers, margins slightly flared and with edges frayed. *Stem* unbranched, sheathed by leaf bases and at base by a pale, membranous cataphyll. *Leaves* usually 4 or 5, lower 2 ± basal, blades plane, straight, ± erect, 20–30 mm long, upper leaves cauline, shorter, the uppermost entirely sheathing. *Spike* mostly 2- to 5-flowered, ± straight; bracts green, conspicuously veined, 10–14 mm long, outer with margins united around axis near base. *Flowers* upright to half nodding, ± salver-shaped, white with outer tepals flushed red outside; perianth tube 6–8 mm long, straight; tepals subequal, obovate, 8–13 × ± 4 mm, spreading to slightly reflexed. *Filaments* diverging, 3–5 mm long; anthers spreading, 5–6 mm long, white. *Style branches* 4–5 mm long, laxly spreading. *Capsules* narrowly ovoid, 6–8 mm long. *Seeds* light brown, angular-prismatic. *Flowering time*: late October to early December.

Distribution and ecology: endemic to Western Cape, South Africa, with a scattered distribution extending from the slopes of the Nardousberg, north of Clanwilliam to Tulbagh and the mountains north Bain's Kloof; evidently rare, usually flowering after fire.

Diagnosis: *Hesperantha brevifolia* is recognised in sect. *Radiatae* by the flexuose stem, leaves with unusually



Distribution of ***Hesperantha brevifolia***.



Distribution of ***Hesperantha juncifolia***.

short, plane blades, 20–30 mm long, and bract margins united around the axis only at the base. Unlike related *H. radiata*, the short perianth tube, 6–8 mm long, is ± straight rather than curved at the apex, and the flowers are thus suberect or half-nodding vs. nodding to almost pendent.

80. **Hesperantha juncifolia** *Goldblatt* in Journal of South African Botany 50: 135 (1984). Type: South Africa, [Western Cape], Bredasdorp, Ratelrivier, limestone flats, 29 Sept. 1970, *P. Goldblatt 403* (BOL, holo.).

Plants 180–200 mm high. *Corm* ± bell-shaped, with flat, oblique base, up to 15 mm diam.; tunics of ± woody overlapping layers, fragmenting into segments with raised edges. *Stem* unbranched. *Leaves* usually 4, lower 2 basal, terete, straight, ± erect, shorter than stem, ± 1.5 mm diam., uppermost leaf sheathing stem nearly to base of spike. *Spike* mostly 5- to 8-flowered; bracts green below, membranous above, (10–)12–14 mm long, outer with margins united around axis in lower ⅓–½. *Flowers* crepuscular, half nodding, ± salver-shaped, white with outer tepals red outside, ± zygomorphic with anthers held against upper tepals and style branches pendent; perianth tube 5–6 mm long, straight; tepals subequal, obovate, 13–15 × 5–6 mm, spreading. *Filaments* ± 2 mm long; anthers ± 6 mm long, white. *Style dividing* at mouth of tube, branches ± 9 mm long, held against lower tepal. *Flowering time*: late September and October.

Distribution and ecology: a rare endemic restricted to the western coast of the Agulhas Peninsula in Western Cape, South Africa, recorded from Ratelrivier to Brandfontein; in wet depressions on limestone flats.

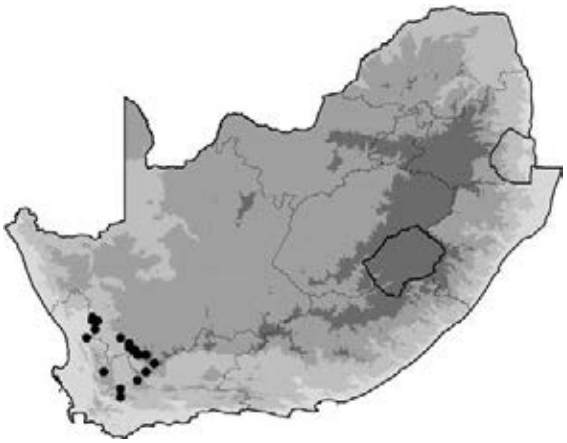
Diagnosis: *Hesperantha juncifolia* is readily recognised by the smooth, terete leaves, outer bracts united around the spike axis in the lower half to one third, and white flowers with a straight perianth tube only 5–6 mm long. The flat-based corm and bracts united around the spike axis are typical of sect. *Radiatae*. Related *H. radiata* has plane and often somewhat succulent leaves, the outer bracts united for ± half their length, and a longer perianth tube mostly 7–15 mm long, curved in the upper half. Unusual for white-flowered species of the genus and section, the flowers open early in the morning and close at ± 16:00.

81. **Hesperantha marlothii** *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 166: 20 (1948); Goldblatt: 130 (1984). Type: South Africa, [Northern Cape], Sutherland District, near Waterkloof, Sept. 1921, *Marloth 10412* (B, holo.; NBG, PRE, iso.).

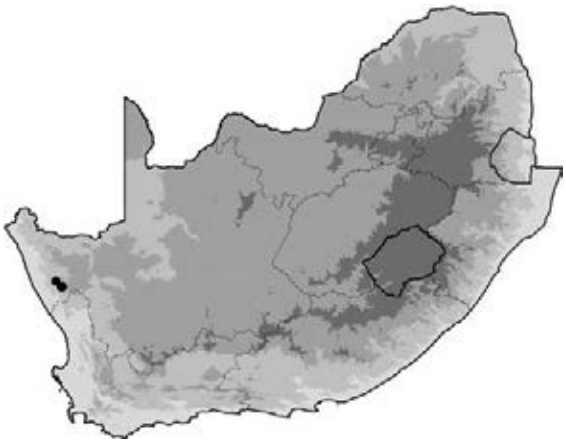
Plants mostly 60–200 mm high. *Corm* ± obconic, with flat base 8–13 mm wide; tunics of woody, overlapping layers, base with laterally projecting spines. *Stem* usually unbranched, sheathed by leaves and at base by a membranous cataphyll. *Leaves* 3(4), straight, ± erect, linear, longest ± as long as stem, mostly 1.5–3.5 mm wide, uppermost leaf largely sheathing, sometimes ± bract-like, reaching nearly to base of spike. *Spike* (1)2- to 5-flowered; bracts green or often flushed red, 10–20 mm long, outer with margins united around axis at base or for up to 4 mm. *Flowers* nodding to ± pendent, creamy white, outer tepals red to brown outside; perianth tube 10–12 mm long, curved at or near apex; tepals subequal, narrowly ovate-elliptic, 10–15 × 4–5 mm, slightly reflexed when fully open. *Filaments* diverging, 4–6 mm long; anthers 4–6 mm long, yellow. *Style branches* 7–10 mm long, spreading. *Chromosome number* 2*n* = 26. *Flowering time*: late July to September; flowers opening near sunset.

Distribution and ecology: relatively widespread, extending along the Roggeveld Escarpment near Sutherland in Northern Cape, South Africa and in the Cold Bokkeveld and mountains east of Hex River Pass in Western Cape; usually on rocky, sandstone pavement in shallow, seasonally wet, sandy ground.

Diagnosis: closely allied to the more widespread *Hesperantha radiata* and easily confused with it, *H. marlothii*



Distribution of ***Hesperantha marlothii***.



Distribution of ***Hesperantha decipiens***.

is often a smaller plant, sometimes only 40 to 100 mm high vs. up to 600 mm in *H. radiata*, with spikes of up to 5 flowers, with the outer bracts united for up to 4 mm, about a third of their length. It can always be distinguished by the corms, the tunics of which bear prominent, radiating horizontal spines at the base. Corms of *H. radiata* lack these spines and have the outer bracts united around the axis for at least half their length.

82. **Hesperantha decipiens** *Goldblatt* in Annals of the Missouri Botanical Garden 90: 439 (2003). Type: South Africa, Northern Cape, Kamiesberg, northern slopes of Rooiberg, 19 Sept. 1991, *P. Goldblatt 9258* (NBG, holo.; K, MO, PRE, iso.).

Plants 100–150 mm high. *Corm* ovoid with oblique flat base, 8–12 mm diam.; tunics woody, concentric, ± scalloped into concave segments with fringed edges. *Stem* usually unbranched, smooth. *Leaves* 4, lower 3 ± basal and largest, blades linear, 1.2–2.0 mm wide, slightly fleshy, slightly thickened in midline, uppermost leaf inserted in middle of stem, sometimes entirely sheathing or with short free unifacial tip. *Spike* mostly 3- to 6-flowered, flexuose; bracts 10–15 mm long, green, becoming dry above, outer with margins united around stem for 3–5 mm, inner ± as long as outer. *Flowers* crepuscular, white to cream-coloured, outer tepals pale pink to reddish or brown outside, strongly scented of stocks when open; perianth tube slender, curved near apex, 10–13 mm long; tepals subequal, lanceolate, 12–14 × 2.5–3.5 mm, spreading ± at right angles to tube when fully open. *Filaments* ± 4 mm long; anthers 5–7 mm long, yellow; pollen white. *Style branches* ± 12 mm long, weakly spreading, slightly shorter or slightly longer than anthers. *Capsules* oblong-obovoid, 6–8 × ± 3.5 mm. *Seeds* angular, ± winged on angles, ± 1 mm long. *Flowering time*: August and September; flowers opening near sunset.

Distribution and ecology: extending from near Springbok in Northern Cape, South Africa through the Kamiesberg to the northern Knersvlakte in Western Cape; on thin, sandy gravel, often on granite pavement.

Diagnosis: poorly collected and often confused either with the widespread *Hesperantha radiata* or the related western Karoo species *H. marlothii*, *H. decipiens* is distinguished by the few-flowered, flexuose spike with the outer bract margins united around the axis only near the base, and corms without prominent lateral spines. *Hesperantha decipiens* has the flexuose, few(or several)-flowered spike of *H. marlothii* but the outer bract margins in that species are united for up to 4 mm, ± a third of their length. The corms in *H. marlothii* bear prominent lateral spines, whereas those of *H. decipiens* closely resemble *H. radiata* in their scalloped, lightly fringed lobes. Close examination of the flowers shows that the style branches of *H. decipiens* usually exceed the anthers by 1–2 mm and the anthers are 5–7 mm long. Robust specimens of *H. marlothii* have anthers 6–8 mm long and the style branches reach only to about the middle of the anthers. Less robust specimens have anthers 4.5–6.0 mm long but the style branches are still slightly short of the anther apices. *Hesperantha radiata* has the outer bract margins united for ± half their length, and a straight spike usually bearing >8 flowers.

83. **Hesperantha radiata** *(Jacq.) Ker Gawl.* in König & Sims, Annals of Botany 1: 225 (1804a); Goldblatt: 123 (1984); Hilliard & Burtt: 436 (1986). *Ixia radiata* Jacq.: 7 (1795 [1788–1795]). Type: South Africa, without precise locality, illustration in Jacq.: t. 280 (1794 [1788–1795]).

Gladiolus recurvus Thunb.: 9 (1784), illegitimate homonym, not *G. recurvus* L. (1767) [= *G. recurvatus* Thunb. ex Baker: 96 (1877), orthographic error]. *Hesperantha recurvata* Aschers. & Graebn.: 540 (1906), as a new name for *G. recurvus* Thunb. Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB, holo.).

Ixia angusta Jacq.: 7 (1795 [1788–1795]), as a new name for *I. linearis* Jacq.: 183 (1791), illegitimate homonym, not *I. linearis* L.f. (1782). *Hesperantha angusta* (Jacq.) Ker Gawl.: 225 (1804a). *H. linearis* Fourc.: 77 (1932), as a new name for *I. linearis* Jacq. (1791), illegitimate homonym. Type: South

Africa, without precise locality or collector, illustration in Jacq.: t. 279 (1794 [1788–1795) '*I. linearis*'.

Ixia fistulosa Andrews: t. 59 (1799). *I. recurva* Vahl: 58 (1805), illegitimate superfluous name for *I. fistulosa* Andrews (1799). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 59 (1799).

Hesperantha angustifolia Ker Gawl. ex J.W.Loudon: 91 (1841). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 790 (1804b).

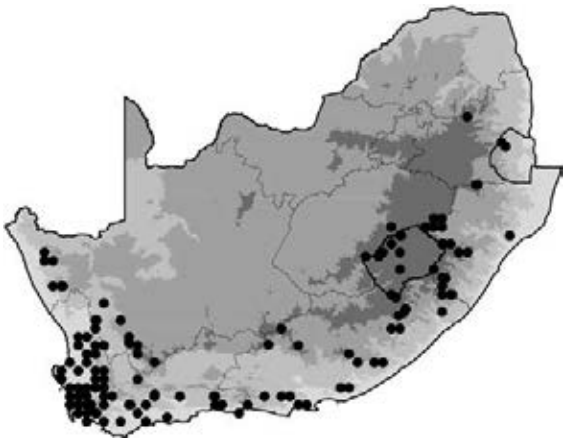
Hesperantha tysonii Baker: 151 (1892). Type: South Africa, [KwaZulu-Natal], streambanks near Kokstad, Oct. 1883, *W. Tyson 1585* (K, holo.; B, GRA, NH, SAM, iso.).

[*Hesperantha setacea* Eckl.: 23 (1827), invalid name without description.]

Plants (100–)200–500 mm high. *Corm* sometimes with collar of fibres around base, ± bell-shaped with flat, horizontal or oblique base, 7–14 mm diam.; tunics of dark brown overlapping layers, basal margin sometimes shortly toothed, outer layers splitting from base into segments often with fringed or acute edges. *Stem* usually erect, unbranched, sheathed at base by a dry membranous cataphyll. *Leaves* 5 or 6, lower 3 or 4 basal and longest, ± linear or falcate, often thicker in centre and somewhat succulent, reaching to between middle and near base of spike, 2.0–3.5 mm wide, uppermost 1 or 2 leaves often entirely sheathing and bract-like. *Spike* mostly 5- to 15-flowered, straight; bracts 10–15 mm long, sometimes overlapping the one above, outer with margins united around axis for at least half its length. *Flowers* nodding to half pendent, crepuscular, white, creamy white, dull yellow or sometimes brown, outer tepals red to purple outside, scented when open in late afternoon; perianth tube mostly 6–15 mm long, curved outward near apex; tepals 7–15(–17) × 2.5–5.0 mm. *Stamens* pendent; filaments 3–4 mm long; anthers 4.0–8.5 mm long, usually yellow; pollen yellow. *Style branches* mostly 5–11 mm long. *Capsules* ± cylindric, 10–18 mm long, apices exserted from bracts, splitting in upper ⅓. *Seeds* angular. *Chromosome number* 2*n* = 26. *Flowering time*: mainly August to November in winter-rainfall zone, November and December in summer-rainfall zone; flowers opening in late afternoon.

Distribution and ecology: widespread in southern Africa and extending from the Richtersveld of Northern Cape, South Africa through Western Cape into the mountains of Eastern Cape, KwaZulu-Natal and reaching Eswatini in the northeast; in a variety of habitats, both heavy clays and light, sandy soils and in well-drained and seasonally wet habitats.

Diagnosis: recognised in sect. *Radiatae* by the outer bracts united around the spike axis for at least half their length,



Distribution of ***Hesperantha radiata***.

Hesperantha radiata has nodding to half pendent flowers with a perianth tube of modest length, mostly 6–15 mm long, and tepals spreading to slightly reflexed when fully open near or after sunset. The leaves are unremarkable, although often slightly fleshy and thicker in the centre, sometimes even hollow near the midline. The corms, typical of the section in their horizontal to oblique flat base are somewhat variable, the outer layers splitting from the base into rounded to acute segments. Two subspecies are currently recognised: the taller, more robust subsp. *radiata* with broader leaves, larger flowers, and blooming in the winter-rainfall zone mainly in August and September; and subsp. *caricina*, usually a smaller plant, typically with a collar of fibres around the base, and a crowded spike of overlapping bracts 10–13 mm long, and blooming mainly from September to December in the winter-ranfall zone.

Populations from KwaZulu-Natal and nearby have been regarded as a separate species, *Hesperantha tysonii*, but plants cannot be distinguished from robust specimens of subsp. *radiata* from the winter-rainfall zone except by their provenance and sometimes slightly softer textured corm tunics.

Key to subspecies

1a Outer floral bract 11–15 mm long and not overlapping the one above; outer tepals 13–15 × 3–5 mm; style branches 8–11 mm long . . . . . .83a. subsp. *radiata*

1b Outer floral bract 10–13 mm long and shortly overlapping the one above; outer tepals 7–12 × 2.5–3.5 mm; style branches 5–6 mm long . . . . . .83b. subsp. *caricina*

83a. subsp. **radiata**

Corms without collar of fibres around base. *Leaves* 2.0–3.5 mm wide, uppermost leaf reaching close to base of spike. *Spike* crowded with outer bracts 11–15 mm long, not overlapping. *Flowers* cream-coloured to dull yellow, outer tepals reddish on reverse; perianth tube 8–14 mm long; tepals 13–15(–17) × 3–5 mm. *Filaments* mostly

± 4 mm long; anthers 5.0–8.5 mm long. *Style branches* mostly 8–11 mm long. *Flowering time*: late July to mid-September in the winter-rainfall zone; October to December in eastern southern Africa.

Distribution and ecology: extending from the Richtersveld of Northern Cape through Western and Eastern Cape to Eswatini; in a range of habitats, on both heavy clay and well-drained sandy soils.

Diagnosis: subsp. *radiata* is readily distinguished by the key characters, including larger floral bracts 11–15 mm long, not overlapping the one above, and larger flowers with outer tepals 13–15 × 3–5 mm, anthers 5.0–8.5 mm long, and style branches 8–11 mm long. In Western Cape, where its range partly coincides with that of subsp. *caricina*, it always flowers earlier in the season.

83b. subsp. **caricina** *(Ker Gawl.) Goldblatt & J.C.Manning* in Bothalia 42: 139 (2012). *Hesperantha radiata* var. γ *caricina* Ker Gawl.: t. 790 (1804b). *H. tenuifolia* Salisb.: 321 (1812), as a new name for *H. radiata* var. *caricina* Ker Gawl. *H. caricina* (Ker Gawl.) Klatt: 395 (Erganz. 61) (1882), illegitimate superfluous name for *H. tenuifolia* (based on the same type). Type: South Africa, without precise locality or collector, Ker Gawl.: t. 790 (1804b).

Corms often with a collar of fibres around base. *Leaves* 1–2 mm wide, uppermost leaf entirely sheathing, often reaching close to base of spike, often dry at flowering. *Spike* crowded with outer bracts 10–13 mm long, imbricate. *Flowers* with perianth tube 6–10 mm long; tepals 7–12 × 2.5–3.5 mm. *Filaments* 4–5 mm long; anthers 4(–5) mm long. *Style branches* mostly 5–6 mm long. *Flowering time*: mostly late September and October, but until December at higher elevations.

Distribution and ecology: restricted to the southwestern corner of Western Cape, from Piketberg and Riebeeck Kasteel in the north to Hermanus in the southeast; often in sandy ground.

Diagnosis: subsp. *caricina* is usually recognised by the crowded spike of relatively small flowers, the tepals 7–12 × 2.5–3.5 mm and the perianth tube 6–10 mm long, and the shortly overlapping bracts 10–13 mm long are particularly distinctive. Plants are typically later flowering than subsp. *radiata*, usually in later September and October but have been recorded in bloom as late as December at high elevations. Populations of typical subsp. *radiata* occur throughout the range of subsp. *caricina* but invariably bloom earlier, from late July to mid-September, and have larger flowers, with tepals 13–15(–17) × 3–5 mm, perianth tube 8–14 mm long, and anthers mostly 4 mm long. The leaves of subsp. *caricina* are also somewhat narrower than in subsp. *radiata*, 1–2 mm wide, and often dry at flowering time vs. 2.0–3.5 mm wide and green at flowering.

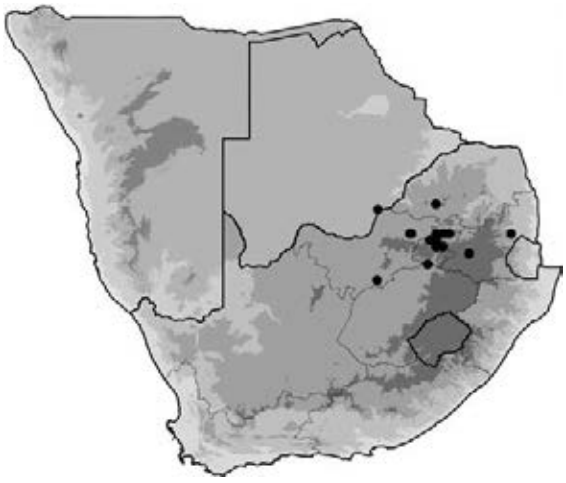
84. **Hesperantha longicollis** *Baker* in Bulletin de l'Herbier Boissier, sér. 2, 4: 1004 (1904); Oberm.: t. 1810 (1980). Type: South Africa, [Gauteng, as Transvaal], Modderfontein, 11 Sept. 1898, *P. Conrath 600* (K, Z, syn.).

Hesperantha widmeri Beauverd: 990 (1905). Type: South Africa, [Gauteng], Modderfontein, *Widmer s.n.* (G, syn.).

Hesperantha matopensis L.S.Gibbs: 471 (1906). Type: Zimbabwe, Matopo Hills, banks of Malami R., *Gibbs 44* (BM, BOL, K, syn.).

Plants 300–500(–700) mm high. *Corm* ± bell-shaped, with flat base, ± 10 mm diam.; tunics of ± woody overlapping layers, fragmenting below into segments with minutely fringed margins. *Stem* simple or rarely with branch from near base, sheathed at base by membranous, pale or rarely brown cataphyll. *Leaves* usually 5, lower 2 or 3 basal and with long blades, linear, straight, often trailing, reaching to ± base of spike, wide, upper 2 leaves sheathing lower ⅔ of stem. *Spike* 3- to 6(9)-flowered, ± secund; bracts green, often flushed red distally, 12–25 mm long, outer with margins united around axis for 1–2 mm. *Flowers* nodding, ± white or creamy white, outer tepals brown to purplish outside; perianth tube 18–25 mm long, curved in distal half and becoming pendent; tepals subequal, narrowly ovate-elliptic, 14–18 × 5–6 mm, spreading. *Filaments* evidently unilateral, ± pendent, ± 6 mm long; anthers mostly 8–10 mm long, decumbent, purple-brown; pollen brown. *Style branches* 10–12 mm long, pendent, reaching ± to anther tips on closed flower. *Capsules* ovoid-oblong, 10–12 × 4 mm, enclosed in bracts, splitting in upper ⅓. *Seeds* unknown. *Flowering time*: October and November.

Distribution and ecology: widespread in central and eastern southern Africa, extending from near Douglas in Northern Cape through North West and Gauteng to Mpumalanga and Limpopo in South Africa, and in eastern Botswana, Zimbabwe and Malawi; mainly in



Distribution of ***Hesperantha longicollis***.

grassland, often in wet sites including marshes, vleis and streambanks.

Diagnosis: allied to *Hesperantha radiata* and sometimes mistaken for that species, *H. longicollis* is recognised by the outer bracts united around the spike axis barely at all or up to 2 mm at most, and the larger flower with a longer, strongly curved perianth tube, 18–25 mm long, the flower nodding to pendent, and the purple-brown anthers and brown pollen. *Hesperantha radiata* always has the outer bracts united around the spike axis for ± half their length, a shorter perianth tube 6–15 mm long, also curved distally, thus with the flower nodding to half pendent, and usually yellow anthers and pollen. The type of *H. matopensis,* from the Matopos, Zimbabwe, differs hardly at all from some collections of *H. longicollis* from South Africa.

85. **Hesperantha elsiae** *Goldblatt* in Journal of South African Botany 50: 136 (1984). Type: South Africa, [Western Cape], Cederberg, Krom River Kloof, above Disa Pool, 11 Nov. 1979, *P. Goldblatt 5331* (MO, holo.; K, NBG, PRE, S, US, WAG, iso.).

Plants 250–300 mm high. *Corm* ± bell-shaped–ovoid, with oblique flat base, 10–12 mm diam.; tunics of ± woody overlapping layers, notched below into triangular segments. *Stem* unbranched, sheathed below by dry, brown cataphylls. *Leaves* ± 5, lower 2 longest, usually dry at flowering, soft and ± falcate, ± half as long as stem, ± 1 mm wide, upper 2 or 3 leaves short, largely to entirely sheathing. *Spike* (1)2- to 4-flowered; bracts ± membranous, drying from apex, often flushed red, 18–30(–40 mm long, outer with margins united around axis near base for ± 1 mm. *Flowers* half nodding, deep, glossy pink, unscented; perianth tube 13–21 mm long, cylindric, slightly curved toward apex; tepals subequal, lanceolate, laxly spreading, 13–55 × 5–7 mm, spreading. *Filaments* inserted in middle of tube, ± 1.5 mm long; anthers ± 5.5 mm long, included, yellow. *Style* dividing opposite base of anthers near middle of tube, branches ± 8 mm long, tips emerging from tube thus exceeding anthers. *Capsules* ovoid-oblong, ± 9 mm long. *Seeds* light brown, angular-prismatic. *Chromosome number* 2*n* = 26. *Flowering time*: December.

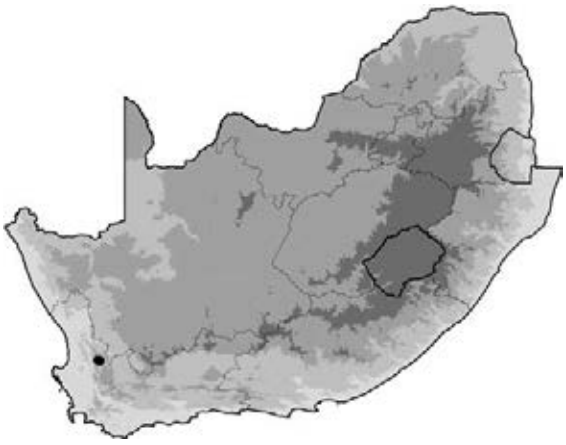
Distribution and ecology: known only from the southern Cederberg of Western Cape, South Africa; on sandstone slopes at ± 1 200 m elevation.

Diagnosis: the flat-based corm and outer bracts united near the base around the spike axis place *Hesperantha elsiae* in sect. *Radiatae*. It is remarkable in its flowers, deep pink with a perianth tube up to 21 mm long, the stamens included in the middle of the tube, and the style dividing at the level of the anthers with long style branches, ± 8 mm long, reaching the mouth of the tube with only the tips of the style branches visible outside the tube mouth. That series of features is unique in the section and rare in the genus. We suspect that *H. elsiae* has a wider range but it is currently known only from a single population.

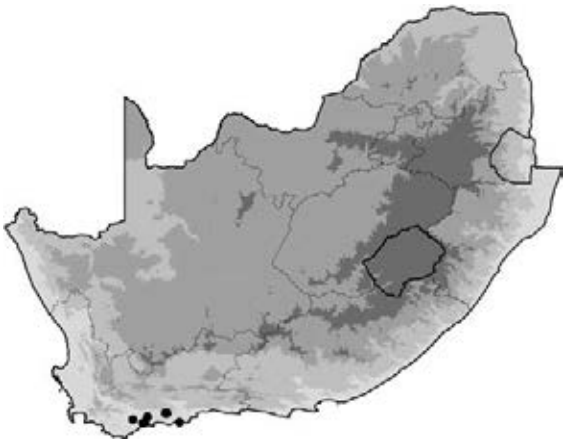
86. **Hesperantha muirii** *(L.Bolus) G.J.Lewis* in Journal of South African Botany 7: 32 (1941); Goldblatt: 133 (1984). *Acidanthera muirii* L.Bolus: 195 (1915). Type: South Africa, [Western Cape], Riversdale District, Farm Plattekop, Oct. 1931, *J. Muir 1087* (BOL, holo.).

Hesperantha muirii var. *robusta* G.J.Lewis: 33 (1941). Type: South Africa, [Western Cape], Plattekop Farm, Riversdale, *Ferguson s.n.* (BOL, lecto., designated by Goldblatt: 133 (1984); K, iso.).

Plants 100–200 mm high. *Corm* ± bell-shaped, with flat, oblique base, 6–8 mm wide; tunics of ± woody overlapping layers, fragmenting into segments with minutely fringed margins. *Stem* unbranched, sheathed by leaves and at base by a brown cataphyll. *Leaves* 2 to 4, straight, ± erect, 30–80 mm long, 1.5–2.0 mm wide, uppermost leaf largely sheathing and reaching nearly to base of spike. *Spike* (1)2- or 3-flowered; bracts green, often flushed red, 18–30(–40 mm long, outer with margins united around axis for 2–3 mm. *Flowers* nodding,



Distribution of ***Hesperantha elsiae***.



Distribution of ***Hesperantha muirii***.

± white or pale pink especially with age, zygomorphic with unilateral stamens; perianth tube 15–25 mm long, curved toward apex; tepals subequal, narrowly ovate-elliptic, 15–25 × 6–9 mm, spreading. *Stamens* unilateral, pendent; filaments 8–10 mm long; anthers 6–10 mm long, white. *Style branches* 12–15 mm long, loosely twisted, pendent. *Chromosome number* 2*n* = 26. *Flowering time*: October and November.

Distribution and ecology: occurring on the coastal hills of southern Western Cape, South Africa, from north of Bredasdorp to near Albertinia; on clay and shale flats and slopes.

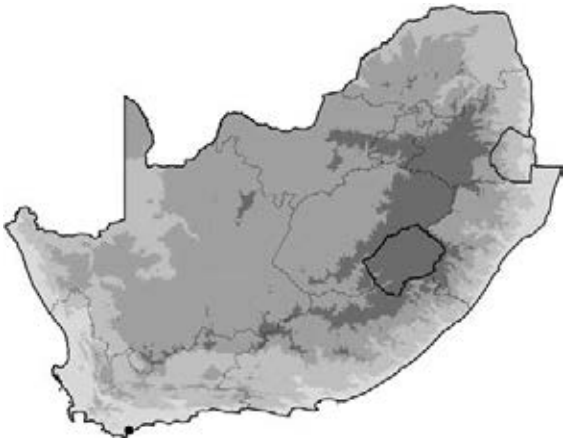
Diagnosis: largest-flowered species of sect. *Radiatae*, *Hesperantha muirii* has white to pale pink flowers with a perianth tube up to 25 mm long, curved at the apex, and spreading, ± vertically oriented tepals up to 25 mm long. The stamens are ± unilateral and pendent and the long style branches are twisted and sometimes tangled together, an unusual feature in the genus but one shared by pink-flowered *H. kiaratayloriae*, in which the style divides near the tips of the coherent anthers and the style branches are held erect.

87. **Hesperantha kiaratayloriae** *Goldblatt & J.C.Manning* in Bothalia 43: 211 (2013). Type: South Africa, Western Cape, Rûens Hills, northeast of Bredasdorp, Farm Plaatjieskraal, upper slopes of ridge in stony quartzite gravel over shale, 8 Nov. 2011, *Goldblatt & Porter 13729* (NBG, holo.; K, MO, PRE, iso.).

Plants 150–200(–300) mm high. *Corm* obliquely bell-shaped, 6–8 mm diam.; tunics ± woody, dark grey, fragmenting from lower margins into tile-like segments. *Stem* smooth, unbranched. *Leaves* several, dry at flowering time, linear, mostly 10–60 × 1.0–1.5 mm, uppermost 2 or 3 leaves sheathing for entire length. *Spike* 2- to 4(–7)-flowered, flexuose; bracts dry and brown at flowering, outer mostly 12–15 mm long with margins united near base for 1–2 mm sheathing spike axis, inner forked apically. *Flowers* diurnal, pink with white throat, unscented, anthers yellow, prominently displayed; perianth tube cylindric, slightly expanded at apex, 13–16 mm long, distal half exserted from bracts; tepals subequal, spreading, elliptic, ± 12 × 4–5 mm, outer slightly larger than inner. *Filaments* erect, 2.5 mm long, exserted ± 1 mm from tube; anthers ± 5 mm long, yellow, remaining coherent around style; pollen yellow. Style exserted, enclosed by stamens, dividing just below anther apices, branches ± 5 mm long, remaining erect, slightly twisted and often interlaced. *Capsules* subcylindric, 7–8 mm long. *Seeds* angular, ± 0.7 × 0.4 mm, with membranous raphal ridge expanded into a wing at micropylar end. *Flowering time*: (late October) November.

Distribution and ecology: known from a single population in the Bredasdorp District of Western Cape, South Africa; on a low, south-facing ridge in silcrete-quartzite stones over a shale substrate among tufts of grasses.

Diagnosis: unique in the genus, *Hesperantha kiaratayloriae* has the style extending well beyond the mouth of the perianth tube and overtopping the anthers, these also unusual in being parallel and contiguous. The stamens thus enclose the style, which divides immediately below the anther tips into upright, loosely twisted branches sometimes interlaced around one another. The margins of the floral bracts are united basally for up to 2 mm, and the bell-shaped corm with a flat base place the species in sect. *Radiatae*. Also unusual in the section for the pink flowers and leaves dry at flowering, *H. kiaratayloriae* mostly closely resembles *H. muirii*, which also has twisted style branches and relatively short leaf blades but larger, white or rarely pale pink flowers with the style dividing at the mouth of the perianth tube.



Distribution of ***Hesperantha kiaratayloriae***.

REFERENCES

ANDREWS, H.C. 1799. *Ixia fistulosa. The Botanist's Repository* 1: t. 59.

ASCHERSON, P.F.A. & GRAEBNER, K.O.R.P.P. 1906. *Synopsis de mitteleuropäischen Flora*, vol. 3(4). Engelmann, Leipzig.

BACKHOUSE, J. & HARVEY, W. 1864. *Schizostylis coccinea*. Crimson Schizostylis. *Curtis's Botanical Magazine* 90: t. 5422.

BAKER, J.G. 1876a. New species of Ixieae. *Journal of Botany, British and foreign* 14: 236–239.

BAKER, J.G. 1876b. On new bulbous plants from the eastern provinces of Cape Colony. *Journal of Botany, British and foreign* 14: 181–184.

BAKER, J.G. 1876c. New Gladioleae. *Journal of Botany, British and foreign* 14: 333–339.

BAKER, J.G. 1877. New garden plants: *Hesperantha longituba*. *The Gardeners' Chronicle* 7: 652.

BAKER, J.G 1892. *Handbook of the Irideae*. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1896. Iridaceae. In W. T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.
BAKER, J.G. 1901. Iridaceae. In H. Schinz, Beiträge zur Kenntnis der Afrikanischen Flora (Neue Folge). *Bulletin de l'Herbier Boissier*, sér. 2, 1: 853–868.
BAKER, J.G. 1904. Beiträge zur Kenntnis der Afrikanischen-Flora. XVI. Iridaceae. *Bulletin de l'Herbier Boissier*, sér. 2, 4: 1003–1007.
BAKER, J.G. 1906. Diagnoses Africanae XIV. *Bulletin of Miscellaneous Information, Kew* 1906: 15–30.
BEAUVERD, G. 1905. Une nouvelle Iridacée du Transvaal. *Bulletin de l'Herbier Boissier*, sér. 2, 5: 990–991.
BOLUS, L. 1915. Novitates africanae. *Annals of the Bolus Herbarium* 1: 185–197.
BOLUS, L. 1927. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 113–118.
BOLUS, L. 1931a. Novitates Africanae. *Journal of Botany, British and foreign* 69: 10–15.
BOLUS, L. 1931b. Plants — new or noteworthy. *South African Gardening and Country Life* 21: 281, 282.
BROWN, N.E. 1929. The Iridaceae of Burman's Florae Capensis Prodromus. *Bulletin of Miscellaneous Information, Kew* 1929: 129–139.
BROWN, N.E. 1931. LX. Decades kewenses. Plantarum novarum herbario horti regii conservatorum. Decas CXXVII. *Bulletin of Miscellaneous Information, Kew* 1931: 448–453.
BURMAN, N.L. 1768. *Prodromus florae capensis*. Cornelius Haek, Amsterdam.
DE VOS, M.P. 1974. Die Suid-Afrikaanse genus *Syringodea*. *Journal of South African Botany* 40: 201–254.
DIELS, F. 1909. Formationen und Florenelemente im nordwestlichen Kapland. *Botanische Jahrbücher für Systematik* 44: 92–124.
DIETRICH, F. 1818. Nachtrag zum vollständigen Lexicon der Gärtnerei und Botanik, vol. 4. Gädicke Gebruder, Berlin.
ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung der C.F. Ecklon*. Reiseverein, Esslingen.
FOSTER, R.C. 1936. Notes on nomenclature in Iridaceae. *Contributions from the Gray Herbarium of Harvard University* 114: 37–50.
FOSTER, R.C. 1941. Studies in the Iridaceae. II. A revision of *Geissorhiza* Ker-Gawl. *Contributions from the Gray Herbarium of Harvard University* 135: 1–178.
FOSTER, R.C. 1948. Studies in Iridaceae V. Some new or noteworthy species of *Hesperantha*. *Contributions from the Gray Herbarium of Harvard University* 166: 3–27.
FOURCADE, G.H. 1932. Contributions to the flora of the Knysna and neighbouring Divisions. *Transactions of the Royal Society of South Africa* 21: 75–102.
GIBBS, L.S. 1906. A contribution to the botany of Southern Rhodesia. *Journal of the Linnean Society, Botany* 37: 425–494.
GOLDBLATT, P. 1970. The Iridaceae of Daniel de la Roche. *Journal of South African Botany* 36: 291–318.
GOLDBLATT, P. 1982. Corm morphology in *Hesperantha* (Iridaceae, Ixioideae) and a proposed infrageneric taxonomy. *Annals of the Missouri Botanical Garden* 69: 370–378.
GOLDBLATT, P. 1984. A revision of *Hesperantha* (Iridaceae) in the winter rainfall area of southern Africa. *Journal of South African Botany* 50: 15–141.
GOLDBLATT, P. 1987. New species and notes on southern African *Hesperantha* (Iridaceae). *South African Journal of Botany* 53: 459–463.
GOLDBLATT, P. 2003. A synoptic review of the African genus *Hesperantha* (Iridaceae: Crocoideae). *Annals of the Missouri Botanical Garden* 90: 390–443.
GOLDBLATT, P. & MANNING, J.C. 1996. Reduction of *Schizostylis* (Iridaceae: Ixioideae) in *Hesperantha*. *Novon* 6: 262–264.
GOLDBLATT, P. & MANNING, J.C. 2007. New species and notes on *Hesperantha* (Iridaceae) in southern Africa. *Bothalia* 37: 167–182.
GOLDBLATT, P. & MANNING, J.C. 2012. New species and subspecies of *Babiana, Hesperantha* and *Ixia* (Iridaceae: Crocoideae) from southern Africa, range extensions, and morphological and nomenclatural notes in *Babiana* and *Geissorhiza*. *Bothalia* 42: 137–145.
GOLDBLATT, P. & MANNING, J.C. 2013. New taxa of *Hesperantha* Ker Gawl. (Iridaceae: Crocoideae) from the southern African winter rainfall region and a review of the *H. pilosa* complex. *Bothalia* 43: 145–151.
GOLDBLATT, P., MANNING, J.C. & CURTIS, O.E. 2013. Iridaceae. A new species of *Hesperantha* Ker Gawl. (Iridaceae: Crocoideae) from the Overberg, Western Cape, and a novel strategy for pollen transfer in the genus and family by a hesperid butterfly. *Bothalia* 43: 211–214.
GOLDBLATT, P., MANNING, J.C. & VAN WYK, P.C.V. 2015. New species, combinations and range extensions in *Hesperantha* (Iridaceae: Crocoideae) from western South Africa. *South African Journal of Botany* 98: 114–121.
HILLIARD, O.M. & BURTT, B.L. 1979. Notes on some plants from southern Africa chiefly from Natal: VIII. *Notes from the Royal Botanic Garden, Edinburgh* 37: 284–325.
HILLIARD, O.M. & BURTT, B.L. 1982. Notes on some plants of southern Africa chiefly from Natal: IX. *Notes from the Royal Botanic Garden, Edinburgh* 40: 247–298.
HILLIARD, O.M. & BURTT, B.L. 1986. *Hesperantha* (Iridaceae) in Natal and nearby. *Notes from the Royal Botanic Garden, Edinburgh* 43: 407–438.
JACQUIN, N.J. 1788–1795 ['1786–1793']. *Icones Plantarum Rariorum*, vol. 2. C.F. Wappler, Vienna.
JACQUIN, N.J. 1791 ['1790']. *Collectanea*, vol. 4 C.F. Wappler, Vienna.
KER GAWLER, J.B. 1804a ['1805']. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.
KER GAWLER, J.B. 1804b. *Hesperantha radiata* var. *caricina*. Carex-leaved hesperantha. *Curtis's Botanical Magazine* 21: t. 790.
KER GAWLER, J.B. 1810. *Hesperantha pilosa* (β). Grass-leaved Evening-flower. *Curtis's Botanical Magazine* 31: t. 1254.
KER GAWLER, J.B. 1827. *Genera Iridearum*. De Mat, Brussels.
KLATT, F.W. 1867. Diagnoses Iridearum novarum. *Linnaea* 35: 377–384.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
KLATT, F.W. 1894 ['1895']. Irideae. In T. Durand & H. Schinz, *Conspectus florae africae* 5: 143–230. Jardin botanique de l'Etat, Bruxelles etc.
LEWIS, G.J. 1933. Plants — new or noteworthy. *South African Gardening and Country Life* 23: 255, 266.
LEWIS, G.J. 1938. *Hesperantha pauciflora* G.J.Lewis. *Flowering Plants of Africa* 18: t. 682.
LEWIS, G.J. 1941. Iridaceae. New genera and species and miscellaneous notes. *Journal of South African Botany* 7: 18–59.
LINNAEUS, C. 1767. *Mantissa plantarum*, vol. 1. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.
LOUDON, J.W.F. 1841. *The ladies flower garden of ornamental bulbous plants.* W. Smith, London.
MANNING, J. C. & P. GOLDBLATT. 1996. The *Prosoeca peringueyi* (Diptera: Nemestrinidae) pollination guild in

southern Africa: Long-tongued flies and their tubular flowers. *Annals of the Missouri Botanical Garden* 83: 67–86.
OBERMEYER, A.A. 1980. *Hesperantha longicollis*. *Flowering Plants of Africa* 46: t. 1810.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium secundum*, vol. 1. J.G. Cotta, Stuttgart.
SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.
SCHRANK, F. DE P. 1822. Commentarius in Irideas capenses. *Denkschriften Königlich-Baierischen Botanischen Gesellschaft in Regensburg* 2: 165–224.
SWEET, R. 1818. *Hortus Suburbanus Londinensis*. Ridgeway, London.
SWEET, R. 1836. *Geissorhiza vaginata*. *British Flower Garden* 2: t. 138.
THUNBERG, C.P. 1784. *Dissertatio de Gladiolo*. Edman, Uppsala.
VAHL, M. 1805. *Enumeratio Plantarum*, vol. 2. Copenhagen.

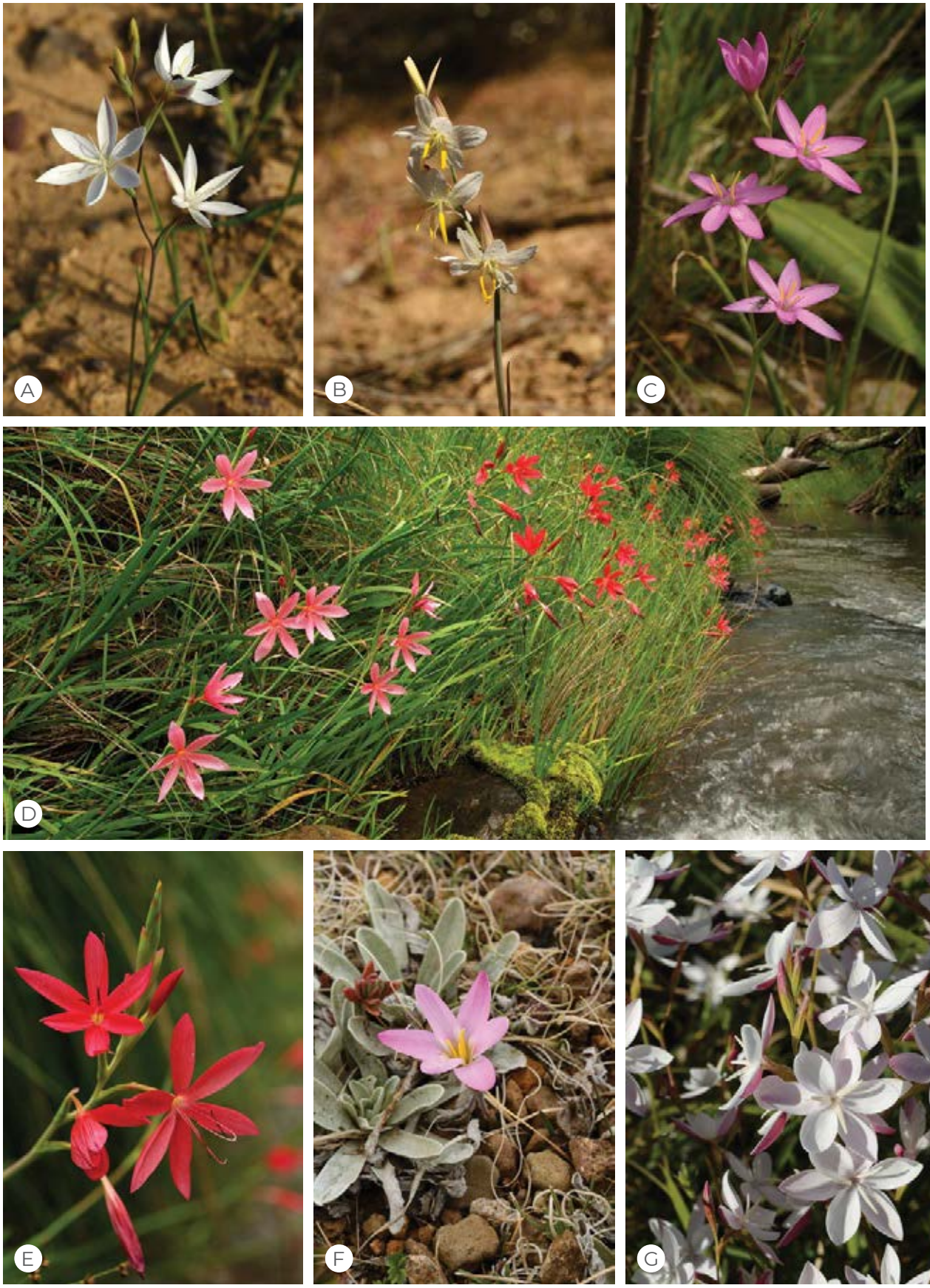


Plate 41. A, ***Hesperantha acuta***, Worcester, WC; B, ***H. bachmannii***, Montagu, WC; C, ***H. baurii***, Witsieshoek, FS; D & E, ***H. coccinea***, Golden Gate, FS; F, ***H. crocopsis***, Sani Pass, KZN; G, ***H. cucullata***, Nieuwoudtville, NC.













Plate 42. A, ***Hesperantha falcata*** subsp. ***falcata***, Caledon, WC; B, ***H. falcata*** subsp. ***lutea***, Napier, WC; C, ***H. grandiflora***, Witsieshoek, FS; D, ***H. hantamensis***, Calvinia, NC; E, ***H. humilis***, Sutherland, NC; F, ***H. huttonii***, Hogsback, EC.

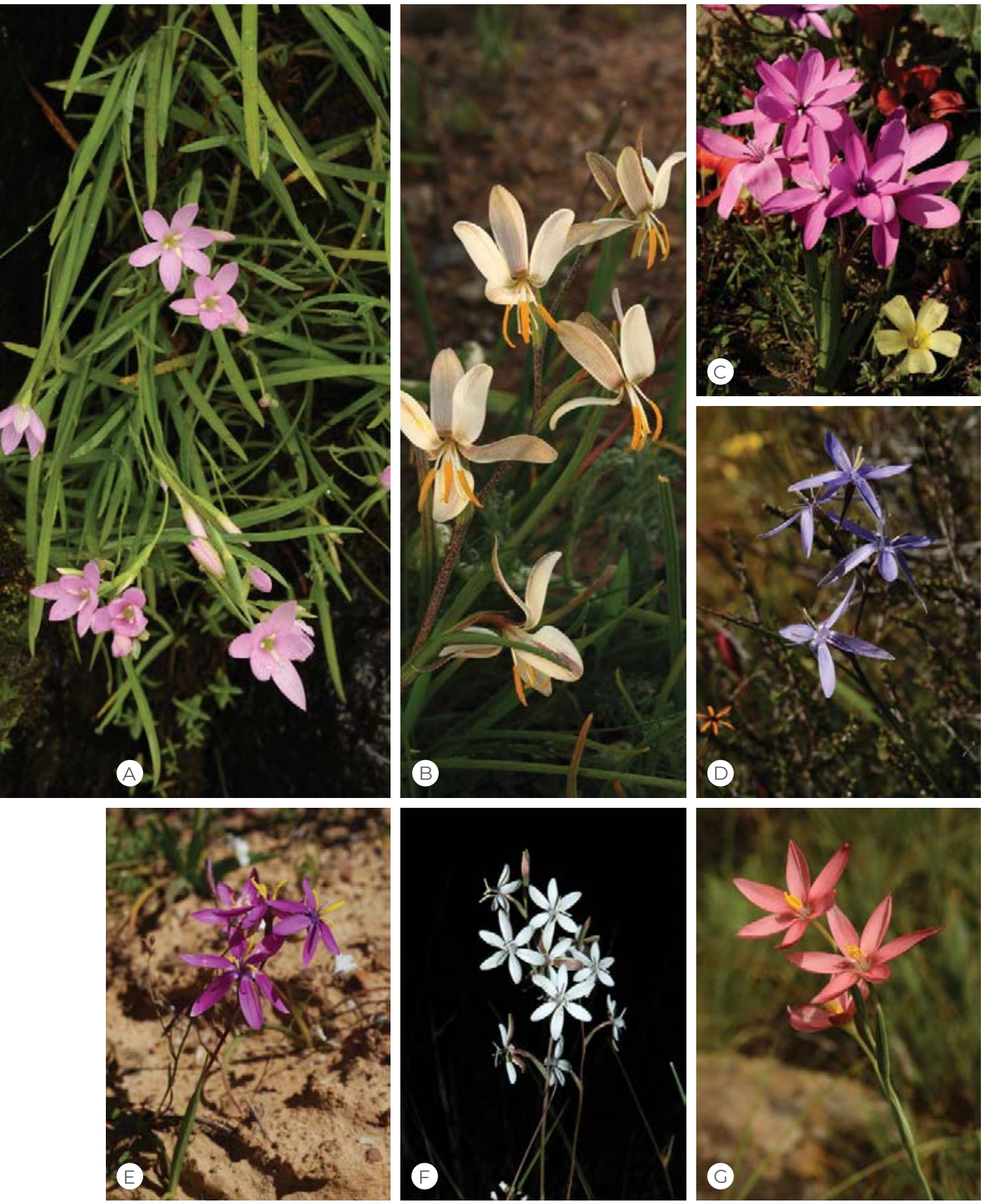


Plate 43. A, ***Hesperantha leucantha***, Witsieshoek, FS; B, ***H. marlothii***, Sutherland, NC; C, ***H. pauciflora***, Nieuwoudtville, NC; D, ***H. pilosa*** subsp. ***bracteolata***, Nieuwoudtville, NC; E, ***H. pilosa*** subsp. ***bracteolata***, Sutherland, NC; F, ***H. pilosa*** subsp. ***pilosa***, Hermon, WC; G, ***H. pubinervia***, Witsieshoek, FS.



Plate 44. A & B, ***Hesperantha radiata*** subsp. ***radiata***, Hermon, WC; C, ***H. rivulicola***, Nieuwoudtville, NC; D, ***H. scopulosa***, Witsieshoek, FS; E, ***H. spicata***, Hermon, WC; F, ***H. vaginata***, Nieuwoudtville, NC; G, ***H. woodii***, Rhodes, EC.

Subtribe 5. **Tritoniinae**

Tritoniinae *Goldblatt* in Journal of South African Botany 37: 441 (1971). Type: *Tritonia* Ker Gawl.

Subtribe *Babianinae* Goldblatt: 442 (1971). Type: *Babiana* Ker Gawl.

Corm tunics fibrous or sometimes papery. *Flowering stem* well developed or contracted and subterranean. *Leaf* margins either with a subepidermal sclerenchyma strand or with columnar epidermis. *Inflorescence* a spike. *Flowers* zygomorphic or actinomorphic; style branches simple or notched apically. *Seed* epidermis smooth with cell outlines obscure; ovular vasculature intact or excluded; x = ?11 (10, 7).

Genera 7, mainly southern Africa; ± 288 spp.: *Babiana* 93, *Chasmanthe* 3, *Sparaxis* 16, *Duthieastrum* 1, *Dierama* ± 45, *Tritonia* 30, *Ixia* 100.

22. **Babiana**

Babiana *Ker Gawl.* in Curtis's Botanical Magazine 16: t. 576 (1802a), name conserved against *Beverna* Adans. Type: *B. plicata* Ker Gawl. = *B. fragrans* (Jacq.) Ker Gawl. ex Steud.

Beverna Adans.: 20 (1763) [possibly a Latinised orthographic or typographic error for baviaan, a common name for the genus in the 18th century]. Type: not designated.

Anaclanthe N.E.Br.: 269 (1932a). Type: *A. plicata* (L.f.) N.E.Br. = *Babiana hirsuta* (Lam.) Goldblatt & J.C.Manning

[*Antholyza* L.: 37 (1753), in part, excluding the lectotype, *A. cunonia* L. = *Gladiolus cunonius* (L.) Gaertn., designated by Hitchcock & Green (1929).]

[*Acaste* Salisb.: 332 (1812), invalid name without description. Type: *A. venusta* Salisb. = *Babiana rubrocyanea* (Jacq.) Ker Gawl.]

Revisionary accounts: Lewis (1959); Goldblatt & Manning (2007).

From the Cape Dutch *babiaan*, baboon, for the fondness of this native African primate for *Babiana* corms.

Deciduous cormous perennials, corm rooting from below, basal in origin, tunics of tough closely fibrous layers, or sometimes netted. *Stem* aerial or subterranean, more-or-less terete, simple or branched, erect to arching outward, usually hairy to scabrid, or smooth, usually sheathed below by a collar of tough fibrous layers. *Leaves* several, lower 2 or 3 cataphylls; foliage leaves unifacial, blades pleated, with prominent veins at angles, without definite midrib, set obliquely to sheaths, sometimes nearly at right angles and thus held horizontally, rarely sheath extended upward as a pseudopetiole, ovate to linear, sometimes abruptly truncate, and then cuneate, sometimes undulate, sinuate or terete, usually pubescent or puberulous, or smooth, upper margins sometimes with long hairs; margin with marginal bundle and epidermal cells unspecialised. *Inflorescence* a spike, flowers few to many, often secund, or spiral or in two ranks; bracts paired, abaxial (outer) usually larger, short or long, green with dry brown apices, variously hairy or smooth, entirely dry in a few species, papery and translucent in 3 species, adaxial (inner) forked apically or to middle, or divided to base. *Flowers* usually zygomorphic and bilabiate or salver-shaped, or actinomorphic and with tepals spreading or cupped, usually shades of blue to violet, sometimes yellow, red, pink, purple, or white, when bilabiate usually with pale markings on lower lateral tepals, when actinomorphic centre often darker or lighter, often sweetly fragrant, usually with nectar from septal nectaries; perianth tube short to long, cylindric and straight to curved or funnel-shaped; tepals equal, subequal or unequal and dissimilar, then dorsal enlarged, hooded, reflexed or erect with margins involute and enclosing filaments, lower tepals sometimes clawed. *Stamens* unilateral and arcuate or symmetrically disposed and erect; filaments arising in mouth of tube; anthers linear and extrorse, or occasionally latrorse with connective very broad, exserted. *Ovary* smooth, hairy on ribs or densely hairy; style exserted or included, dividing opposite or beyond anther tips, or sometimes below level of anthers, style branches filiform or slightly to prominently expanded above. *Capsules* globose to ovoid, cartilaginous, hairy or smooth. *Seeds* pear-shaped, smaller at micropylar end, lightly wrinkled, surface smooth and usually shiny. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number* x = 7.

Species 93, divided among three sections; mostly of the winter-rainfall zone of southern Africa, extending into the Upper Karoo, northeastern South Africa, Namibia, Zimbabwe and Zambia.

Babiana is easily recognised by the pleated leaves (sometimes almost terete but with several grooves) and presence of fine to prominent hairs on the leaves, stem and even bracts, the vestiture ranging from finely velvety to long-hairy. The floral bracts are usually green, often drying and rust-coloured at the tips with the inner notched at the tips or divided to the base or almost so, then evidently a pair. Rarely, as in the *B. scariosa* group, the bracts are dry and papery. Flowers are zygomorphic or in a few species radially symmetric, and most often shades of blue to violet but sometimes red, pink or other colours, and the style branches are undivided. The genus stands out in Crocoideae in its low basic chromosome number, $x = 7$ (other genera of subtribe Tritoniinae have $x = 11$ or 10). The genus is subdivided into three sections, mainly based on the nature of the inner floral bracts, notched at the tips (sect. *Teretifolieae*), divided to the base or almost so (sect. *Babiana*) or the bracts are short, divided to about the middle and the lower tepals specialised in being abruptly narrowed at the base and with ear-like lobes at the base of the limb (sect. *Antholyzoides*). Most species of sect. *Babiana* have a hairy ovary, a character rarely seen elsewhere in Iridaceae. Three species of sect. *Antholyzoides*, including *B. ringens*, have red flowers with elongate perianth tubes and are pollinated by sunbirds. Pollination is otherwise by large-bodied bees, or in several species of sect. *Babiana* and sect. *Teretifolieae* by long-proboscid flies. Pollination by hopliine beetles is indicated in species with radially symmetric flowers but has been little studied.

Within the sections, species are arranged in series, based on their morphology and important features, including perianth tube length, floral bract texture and presence and type of vestiture of the ovary.

Molecular phylogenetic studies have been remarkably unhelpful in assessing relationships in *Babiana*. Plastid and nuclear sequences differ substantially and neither is congruent with the classification based on morphology. We have not, therefore, been able to restructure the classification proposed by Goldblatt & Manning (2007). Sect. *Babiana* is broadly supported, but includes several species of the other two sections. There is no support for sect. *Antholyzoides*, but the red-flowered *B. ringens* group is retrieved as a clade; the remaining species of the section appear unrelated to one another and instead are linked to a range of species that appear very different morphologically. It seems unlikely that additional sequences will resolve the lack of congruency. That the zygomorphic flower is ancestral in *Babiana* is supported by molecular study, thus radial symmetry is derived, and according to both molecular evidence and morphology radial floral symmetry arose independently four times across the genus.

Key to sections

For leaf characters, examine only well-developed leaves; the lower leaves are often smaller than normal and upper leaves may grade into bracts. It is useful to examine more than one plant in a collection or population, as leaf characters are, to some extent, variable. Measure leaf width at ± the middle of a leaf. Measure bracts in the middle of the spike; the lower and upper flowers often have larger or smaller bracts than normal for a species.

Measure perianth tube length from the top of the ovary to the point at which the dorsal tepal separates from the upper lateral tepals. Thus not only the narrow lower portion of the tube is included in this measure, but also the wider, funnel-shaped portion. Inner floral bracts must be examined carefully to determine the point at which the apex is forked or if the inner bracts are divided to the base, thus evidently a pair.

A hand lens is useful for examining leaf and stem vestiture and the surface of the ovary.

1a Inner bracts divided to base or rarely close to base but then joined only by transparent membranous tissue; bracts green with dry brown or rust-coloured tips, or dry and brown, or completely papery and translucent; ovary often densely hairy (smooth or minutely hairy on ribs in a few species). . . . . Sect. 3. *Babiana*

1b Inner bracts forked at tips or divided in upper ⅓–½; bracts green with dry, light brown to rust-coloured tips, or sometimes brown throughout; ovary mostly smooth, rarely hairy:

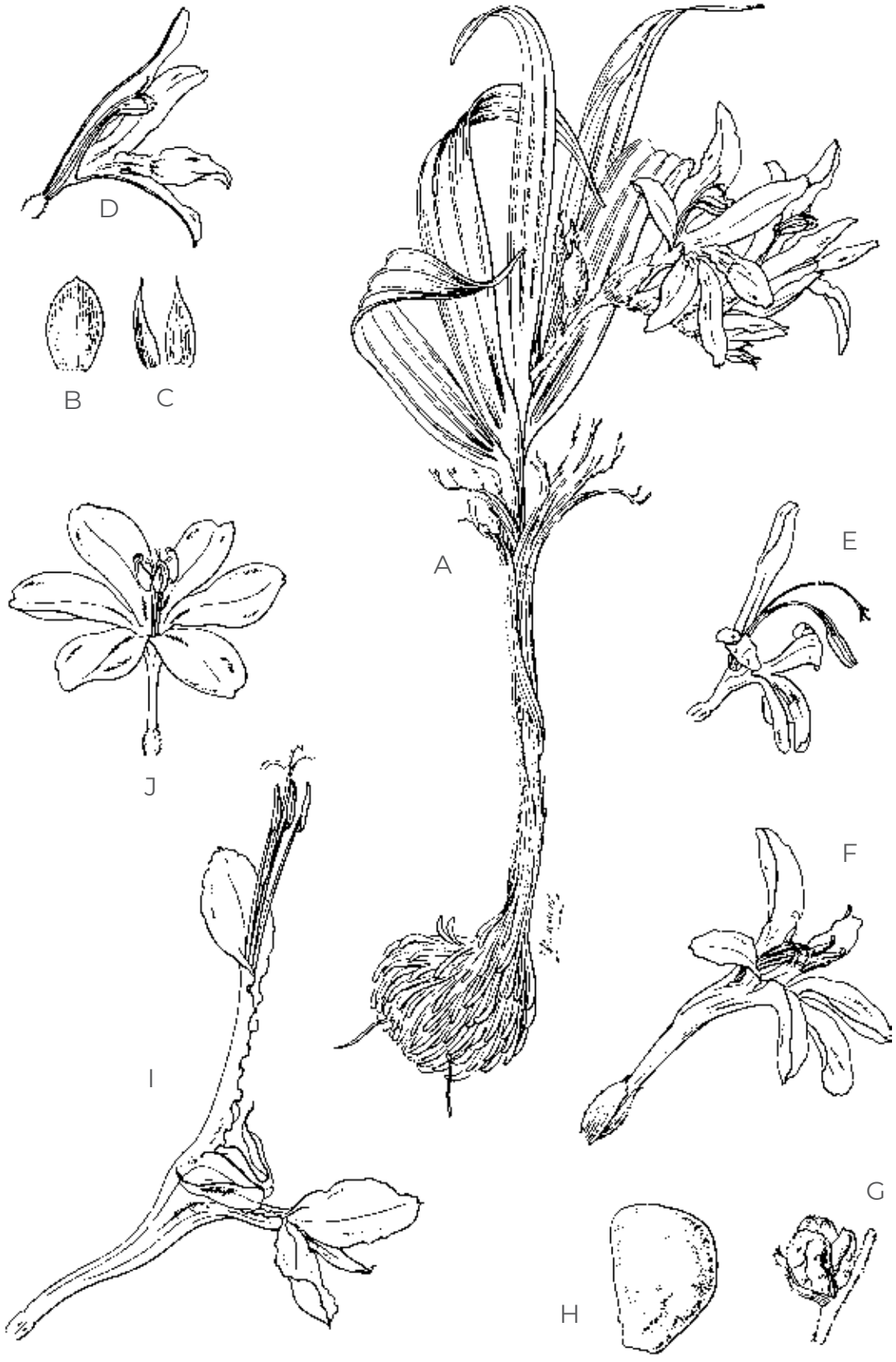
2a Tepals narrowed below into claws, lower three abruptly so, with claw linear and limbs often with prominent auricular lobes at base; dorsal tepal initially arched, often curving upward and erect to recurving when fully open (margins curving forward and enclosing filaments in three species); bracts mostly 5–15 mm long, rarely to 22 mm; plants never acaulescent with spike borne at or below ground level. . . . . Sect. 2. *Antholyzoides*

2b Tepals not as above, limbs without prominent auricular lobes at base; dorsal tepal arched, erect, or fully patent, never initially arched and later curving back; bracts mostly 16–50 mm long, occasionally 13–15 mm; plants often acaulescent or nearly so with spike borne close to ground level or sometimes below ground . . . . Sect. 1. *Teretifolieae*

Keys to species

Sect. 1. *Teretifolieae*

1a Flowers actinomorphic, tepals ± equal and spreading horizontally or almost so; stamens erect, symmetrically arranged around central style:



BABIANA. B. toximontana: A, flowering plant; B, outer bract; C, inner bract divided to base; D, half-flower. ***B. sinuata***: E, flower; ***B. noctiflora***: F, flower. ***B. villosula***: G, dehisced capsule; H, seed. ***B. ringens*** subsp. ***ringens***: I, flower. ***B. melanops***: J, flower.

2a Stem aerial; flowers cream-coloured to pale yellow with brown to dull purple centre; leaves lanceolate to ovate; perianth tube 15–25 mm long; ovary sparsely hairy. . . . . 2. *B. pygmaea*
2b Stem subterranean; flowers blue or violet; leaves linear; perianth tube > 25 mm long; ovary hairless:
3a Flowers mauve-pink with red centre and throat; perianth tube 30–75 mm long; tepals 10–12 mm wide; anthers violet. . . . . 30. *B. radiata*
3b Flowers without red centre; perianth tube 45–75 mm long; tepals 5–7 mm wide; anthers white 36. *B. symmetrantha*
1b Flowers zygomorphic, tepals differentiated, with lower bearing contrasting markings and dorsal usually somewhat to much larger, often held apart, sometimes erect or recurved above; stamens arched or erect, unilateral with anthers parallel, rarely diverging, and facing lower tepals:
4a Leaves ± truncate with apex ragged and irregularly toothed:
5a Perianth tube funnel-shaped, widening toward throat, (18–)32–36 mm long:
6a Leaves and bracts softly long-hairy; leaf blades widest below apex; perianth tube ± 24 mm long; filaments straight; dorsal tepal erect to recurved . . . . . 6. *B. lanata*
6b Leaves and bracts smooth, scabrid or rarely roughly hairy; leaf blades widest at apex; perianth tube 18–36 mm long; filaments arching beneath ascending dorsal tepal . . . . . 21. *B. flabellifolia*
5b Perianth tube cylindric for most of length, 40–60 mm long:
7a Perianth tube sharply curved in upper 10 mm; plants of central Namaqualand . . . . . 24. *B. pubescens*
7b Perianth tube straight or nearly so; plants of Bokkeveld Mtns, Cold Bokkeveld and western Karoo:
8a Tepals spreading horizontally, 18–22 × 3.5–5.0 mm; filaments 8–9 mm long . . . . . 23. *B. praemorsa*
8b Tepals laxly ascending, straight or distally recurving, 26–32(–40) × 6–12 mm; filaments 15–18 mm long . . . . . 22. *B. cuneata*
4b Leaves acute to attenuate, sometimes pungent, or ± obtuse with rounded apex:
9a Stem and spike axis not reaching ground level, flowers arising below ground; bracts ± dry, membranous:
10a Flowers blue to violet with white markings on lower tepals; perianth tube 35–55(–70) mm long; dorsal tepal 30–50 mm long; filaments mostly 10–12 mm long; flowering mainly February to May . . . . . 44. *B. bainesii*
10b Flowers yellowish to buff-coloured (when dry, tepals often with broad purple median streak); perianth tube 30–40 mm long; dorsal tepal 24–40 mm long; filaments 15–18 mm long; flowering mainly July to September. . . . . 43. *B. hypogaea*
9b Spike always above ground, stem reaching shortly to well above ground level, flowers always arising above ground; bracts usually green, sometimes with dry tips, sometimes ± dry:
11a Perianth tube 22–105 mm long; perianth tube as long or up to three times as long as dorsal tepal:
12a Flowers pale pink, mauve, or white to yellow, suffused with mauve or pink, lower tepals sometimes with purple, pink or red marks in lower half:
13a Leaves smooth or at most with few scattered long hairs, deeply pleated or terete and grooved:
14a Leaves lanceolate, deeply pleated, stiff and pungent; perianth tube 25–52 mm long; tepals ± 10 mm long . . . . . 42. *B. lapeirousioides*
14b Leaves ± terete and with narrow longitudinal grooves; perianth tube 70–75 mm long; tepals 16–24 mm long:
15a Dorsal tepal ± 30 × 4 mm, remaining tepals twisted in propeller fashion; filaments ± 12 mm long and exserted ± 9.5 mm from the tube . . . . . 41. *B. teretifolia*
15b Dorsal tepal 20–24 × 6–8 mm, remaining tepals ± plane; filaments 4–5 mm long, exserted 1–3 mm from tube. . . . . 40. *B. brachystachys*
13b Leaves variously hairy, lanceolate to linear, plane or lightly pleated:
16a Leaves minutely hairy or almost hairless, with sparse scattered silky hairs on margins; blade loosely coiled in upper half and tips often recurved; plants of southern Namibia . . . . . 17. *B. longicollis*
16b Leaves velvety, usually lacking scattered silky hairs on margins; blade ± plane, straight or rotated for entire length; plants of South Africa:
17a Leaves lanceolate; perianth tube 40–65 mm long, less than twice as long as dorsal tepal; tube flaring gradually from base:
18a Flowers white, sometimes suffused with mauve; anthers 9–11 mm long . . . . . 31. *B. virginea*
18b Flowers yellow, sometimes suffused with mauve; anthers 7–8 mm long . . . . . 28. *B. vanzijliae*
17b Leaves linear to lanceolate or sword-shaped; perianth tube mostly 60–90 mm long, two to three times as long as dorsal tepal, narrow and cylindric in lower ⅔, flared, if at all, only toward apex:
19a Perianth tube 65–105 mm long, expanded in upper 5–10 mm into a wide gullet; dorsal tepal 30–34 mm long, lower tepals 18–23 × 8 mm; filaments 20–22 mm long, anthers 5–7 mm long; style branches ± 6 mm long . . . . . 38. *B. tubulosa*
19b Perianth tube (45–)60–100 mm long, straight and cylindric or nearly so, often slightly expanded in upper 5–7 mm; dorsal tepal 18–23 mm long, lower tepals 15–20 × 3–4 mm; filaments 13–16 mm long, anthers 4–5 mm long; style often dividing below (sometimes above) anther tips and branches 3–4 mm long. . . . . 39. *B. tubiflora*
12b Flowers shades of red, blue to violet, lower lateral tepals with white or yellow markings often edged in darker blue, violet or red:
20a Flowers red to purple with yellow markings on lower tepals and yellow in throat; filaments ± 40 mm long. . . . . 37. *B. carminea*
20b Flowers blue to violet with white to pale yellow splashes or streaks on lower lateral tepals; filaments 10–20 mm long:
21a Ovary hairy above base; filaments diverging above and anthers held widely apart; style dividing below anthers, style branches 11–13 mm long . . . . . 27. *B. geniculata*

21b Ovary hairless; filaments and anthers parallel and contiguous; style dividing opposite upper half of anthers or above them, style branches 3–6 mm long:
22a Leaves smooth, hairless, sometimes with prominent fibrous veins and margins (turning yellow on drying):
23a Perianth tube 45–70 mm long; leaves lanceolate, (5–)10–25 mm wide, with leaf tips hard and pungent . . . . . 33. *B. dregei*
23b Perianth tube 42–44 mm long; leaves linear, 5–10 mm wide, with leaf tips acute, not hard and pungent . . . . . 34. *B. rivulicola*
22b Leaves scabrid to velvety or long-hairy, lacking prominent fibrous veins and margins and leaf tips not or only weakly pungent:
24a Perianth tube 25–45 mm long; dorsal tepal ± as long as tube:
25a Leaves oblong-lanceolate, upright, subacute, soft-textured and weakly pleated; flowering June to July . . . . . 5. *B. pauciflora*
25b Leaves sword-shaped, rarely linear, often inclined toward ground, firm-textured and distinctly pleated; flowering (late July to)August . . . . . 25. *B. attenuata*
24b Perianth tube (30–)40–70 mm long; dorsal tepal ± as long to 3 times as long as tube:
26a Perianth tube slightly to sharply curved below throat; bract of lowermost flower never with blade-like, leafy tip; tepals unequal, dorsal 20–33 mm long:
27a Leaves usually arching toward ground, conspicuously hairy; perianth tube 36–43 mm long; dorsal tepal 20–23 mm long . . . . . 26. *B. curviscapa*
27b Leaves erect, sparsely short-hairy; perianth tube 60–70 mm long; dorsal tepal 23–33 mm long . . . . . 35. *B. framesii*
26b Perianth tube straight or nearly so, not curved below the throat; bract of lowermost flower with a blade-like, leafy tip; tepals nearly equal, dorsal (25–)30–45 mm long:
28a Flower bilabiate, lower tepals joined to upper laterals for 3–5 mm and to one another for ± 2 mm; dorsal tepal 35–43 mm long. . . . . 32. *B. rigidifolia*
28b Flower not noticeably bilabiate, lower tepals not joined to upper laterals for any distance; dorsal tepal 25–35 mm long . . . . . 29. *B. sambucina*
11b Perianth tube 12–30 mm long; dorsal slightly longer to twice as long as tube:
29a Flowers pale yellow sometimes flushed mauve, lower tepals yellow with paler edges . . . . . 28. *B. vanzijliae*
29b Flowers blue to violet or pink to magenta, lower tepals marked white to yellow:
30a Flowers magenta-pink, pale yellow on lower tepals (but see *B. nana*):
31a Leaf blades narrowly sword-shaped, borne on slender pseudopetioles; stem lightly retrorse-hairy; ovary rarely minutely hairy on ribs, or smooth . . . . . 4. *B. pilosa*
31b Leaf blades ovate to oblong, borne directly on sheaths and at nearly right angles to them, conspicuously long-hairy; stem densely long-hairy; ovary always smooth. . . . . 3. *B. rubella*
30b Flowers variously coloured, but not predominantly magenta-pink or yellow (but see *B. nana*):
32a Leaf margins undulate or crisped, and/or blade loosely coiled above middle:
33a Leaf blades broadly ovate, 30–40 × 20–25 mm, held at right angles to sheaths. . . . . 18. *B. cinnamomea*
33b Leaf blades linear to sword-shaped, 3–12 mm wide, erect or falcate:
34a Leaf blades with prominent central vein, margins undulate and crisped; bracts mostly 28–30 mm long . . . . . 10. *B. crispa*
34b Leaf blades less than 6 mm wide with two or more main veins, margins plane or undulate, rarely somewhat crisped; bracts mostly 17–27 mm long:
35a Flowers pale greyish green; leaf margins thickened . . . . . 14. *B. virescens*
35b Flowers pale blue, mauve or whitish; leaf margins usually unthickened:
36a Leaf blades lightly undulate, occasionally crisped in lower part, often twisted above; flowers violet; bracts lightly hairy, mostly 17–20 mm long. . . . . 15. *B. torta*
36b Leaf blades with margins plane, loosely coiled in upper half; flowers pale mauve to whitish; bracts smooth, 17–27 mm long . . . . . 16. *B. namaquensis*
32b Leaf margins plane, blades ± flat, sometimes twisted from base:
37a Flowers large, dorsal tepal 45–50 mm long; filaments ± 10 mm long . . . . . 7. *B. grandiflora*
37b Flower medium to large but dorsal tepal 25–40 mm long; filaments mostly 12–17 mm long:
38a Corm tunics not forming collar or rarely with short and sparse collar enclosing only below-ground portion of stem:
39a Perianth tube 12–17 mm long; tepals 25–30 mm long . . . . . 1. *B. nana*
39b Perianth tube 23–30 mm long; tepals 35–40 mm long . . . . . 9. *B. confusa*
38b Corm tunics forming well-developed collar enclosing stem below ground:
40a Anthers 7–9 mm long; ovary densely hairy above base. . . . . 8. *B. cedarbergensis*
40b Anthers 5–9 mm long; ovary smooth:
41a Perianth tube ± 14 mm long. . . . . 12. *B. tanquana*
41b Perianth tube 20–30 mm long:
42a Leaf blades lanceolate to linear, mostly 3–12 mm wide, erect or suberect:
43a Leaves shortly hairy or puberulous, more than twice as long as spike; filaments 10–11 mm long; flowers blue to violet . . . . . 13. *B. karooica*
43b Leaves softly long-hairy, ± as long as spike and mostly 3–6 mm wide, pleated at base; filament 15–17 mm long; flowers yellowish to reddish mauve . . . . . 11. *B. minuta*
42b Leaf blades broadly lanceolate to ± ovate, at least 13 mm wide, extended nearly horizontally, shallowly pleated along entire length:

44a Flowers lilac, inner tepals pale yellow edged lilac or entirely yellow; leaf blades 30–40 × 13 mm, smooth or upper margin sparsely long-hairy; perianth tube ± 25 mm long. . . . . 19. *B. horizontalis*
44b Flower greenish to grey-blue; leaf blades (40–)70–100 × 18–25 mm, scabrid on veins and margins; perianth tube 20–22 mm long . . . . . .20. *B. gariepensis*

Sect. 2. *Antholyzoides*

1a Flowers predominantly red; dorsal tepal erect, with margins curving inward, twice to three times as long as lower tepals; filaments enclosed by involute dorsal tepal, 25–60 mm long:
2a Main axis of spike and several lateral branches all bearing flowers; stem borne well above ground; leaves velvety hairy . . . . . 54. *B. hirsuta*
2b Main axis of spike sterile only lateral branches bearing flowers; stem extending shortly above ground; leaves smooth or minutely velvety:
3a Perianth tube 27–45 mm long, lower part not kinked and not abruptly expanded; dorsal tepal (18–)23–50 mm long; leaves firm to rigid, straight; style dividing between base and apex of anthers or exceeding anthers . . 55. *B. ringens*
3b Perianth tube 16–21 mm long with lower part kinked near apex and abruptly expanded; dorsal tepal 15–18 mm long; leaves relatively soft, falcate; style dividing below bases of anthers . . . . . 56. *B. avicularis*
1b Flowers variously coloured, but never predominantly red; dorsal tepal as long to 1.5× as long as lower tepals and ± plane; filaments mostly 6–20 mm long:
4a Stem and/or bracts hairy, hispid or velvety, at least above:
5a Leaf blades oblong, held nearly at right angles to sheath and stem, at least 12 mm wide and with 3 or 4 prominent veins; bracts sparsely hairy . . . . . 47. *B. lewisiana*
5b Leaf blades narrowly lanceolate or linear, blade not markedly oblique to sheaths and stem, mostly less than 8 mm wide; bracts minutely scabrid or smooth:
6a Bracts 8–10 mm long; anthers ± 4 mm long; leaves twisted to loosely coiled in upper half . . . . . 45. *B. spiralis*
6b Bracts mostly 14–20 mm long; anthers ± 6 mm long; leaves sword-shaped, not coiled above . . . . . 46. *B. stenomera*
4b Stem and bracts smooth or largely so:
7a Leaf margins strongly undulate and crisped; cataphylls and leaf sheaths cobwebby or woolly:
8a Anthers cohering; leaf margins and sheaths bearing scattered long hairs; lower lateral tepal limbs without auriculate lobes. . . . . 49. *B. sinuata*
8b Anthers free; leaves without hairs; lower lateral tepal limbs with prominent auriculate lobes at base . . . . 50. *B. striata*
7a Leaf margins not strongly undulate and never crisped; cataphylls and leaf sheaths sometimes cobwebby to woolly:
9a Bracts 12–20 mm long, hairless or sparsely hairy; flowers borne in erect or inclined spikes; sheaths and cataphylls cobwebby to woolly:
10a Leaf blades ascending, narrowly lanceolate or linear, blade not markedly oblique to the sheaths and stem, mostly less than 5 mm wide, loosely twisted in upper half . . . . . 48. *B. fimbriata*
10b Leaf blades borne obliquely to sheaths and stem, mostly more than 5 mm wide, hardly twisted in upper half, margins plane or lightly undulate . . . . . 51. *B. planifolia*
9b Bracts 4–7 mm long, hairless; flowers borne in horizontal spikes; sheaths and cataphylls smooth, not cobwebby to woolly:
11a Leaf blades ascending, not held markedly oblique to sheaths, narrowly lanceolate to linear, loosely twisted for entire length . . . . . 52. *B. lobata*
11b Leaf blades held nearly at right angles to sheaths, oblong to lanceolate, twisted distally and becoming erect. . . . . 53. *B. tritonioides*

Sect. 3. *Babiana*

1a Bracts entirely dry at flowering; outer bracts always smooth (series *Scariosae*):
2a Outer bract firm and solid in texture, tricuspidate with long central cusp . . . . . 62. *B. secunda*
2b Outer bract dry-membranous and translucent, clear or brownish, long-attenuate:
3a Flowers actinomorphic with stamens erect and symmetrically arranged around style; plants acaulescent or stem reaching just above ground. . . . . 78. *B. papyracea*
3b Flowers zygomorphic with stamens unilateral and arcuate, and perianth bilabiate; plants with well-developed aerial stem:
4a Perianth tube shorter than tepals, 12–20 mm long; flowers mauve with white or cream-coloured markings on lower tepals . . . . . 76. *B. scariosa*
4b Perianth tube longer than tepals, 35–45 mm long; flowers cream-coloured or lilac with red to purple markings on lower tepals . . . . . .77. *B. spathacea*
1b Bracts green in lower half or almost entirely, tips often dry and rust-brown, occasionally somewhat attenuate; outer bracts usually scabrid to hairy:
5a Tepals equal or subequal, symmetrically arranged and spreading with dorsal tepal not differentiated from others in size or colour; all tepals similarly marked; stamens symmetrically or asymmetrically arranged:
6a Tepals bicoloured deep blue with dark red base; anthers reddish brown, linear, less than 1 mm wide:
7a Stamens unilateral, facing base of spike; style dividing opposite middle of anthers, style branches widening into broad, glossy flattened stigmas; tepals narrowed below . . . . . 83. *B. rubrocyanea*
7b Stamens symmetrically arranged in centre of flower, enclosing style; style dividing below anthers, style branches filiform with apices not or barely expanded; tepals not narrowed below . . . . . 85. *B. regia*
6b Tepals either uniformly pink, red, purple, pale to dark blue, violet or mauve, or darker blue at bases and sometimes white in throat; anthers white, cream-coloured or blue to blackish, linear or arrow-shaped:

8a Anthers dark blue to blackish, either linear and less than 1.5 mm wide, or arrow-shaped with broad connective tapering to apex and 2–4 mm wide:
9a Flowers shades of pale to mid-blue or mauve, usually darker in centre; perianth salver-shaped with tepals narrowed into claws below; stem erect or nearly so . . . . . 92. *B. melanops*
9b Flowers shades or scarlet, purple or mauve-pink; perianth shallowly bowl-shaped; stem usually strongly arching outward. . . . . 93. *B. villosa*
8b Anthers white to cream-coloured, pale blue or turquoise, linear and less than 1 mm wide:
10a Bracts entirely green; leaf blades borne obliquely from stem; filaments ± 10 mm long . . . . . 88. *B. foliosa*
10b Bracts brown and scarious at apices; leaf blades not notably oblique:
11a Filaments 8–10 mm long, anthers well exserted from perianth tube; anthers and pollen white to pale yellow; flowers with darker centre . . . . . 84. *B. leipoldtii*
11b Filaments 5–8 mm long, anthers partly included within perianth tube; pollen mauve, blue or cream-coloured; flowers uniformly coloured or with white throat sometimes edged with dark pigment:
12a Flowers mauve to white; tepals oblong to obovate, 6–13 mm wide; style dividing between base and lower half of anthers . . . . . 86. *B. villosula*
12b Flowers pink; tepals obovate to suborbicular, 14–20 mm wide; style dividing below anthers . . . . . 87. *B. blanda*
5b Tepals subequal or unequal, but flower zygomorphic with unilateral stamens and dorsal tepal usually differentiated, often erect or arching over lower; tepals opposite dorsal with contrasting markings; stamens always asymmetrically arranged:
13a Ovary hairless or thinly hairy, sometimes only on ribs:
14a Underground part of stem without collar of fibres (or collar poorly developed); corm tunics of reticulate or netted fibres; stem reaching shortly or not at all above ground:
15a Leaf blades inclined toward ground, minutely hairy or evidently smooth; blades hardly pleated, usually borne on slender, terete pseudopetioles up to 140 mm long . . . . . 61. *B. petiolata*
15b Leaf blades suberect, usually obviously hairy; blades prominently pleated, borne directly on sheaths . . . . . 60. *B. ambigua*
14b Underground part of stem with well-developed collar of dry fibres; corm tunics of ± matted fibres not obviously netted; stem aerial or mostly underground:
16a Stem usually well developed, mostly 150–250 mm high and usually branched several times; perianth tube ± as long or longer than tepals, 25–30 mm long . . . . . 57. *B. fourcadei*
16b Stem often ± subterranean or extending above ground; perianth tube as long as or shorter than tepals, 10–20 mm long:
17a Bracts not noticeably rust-coloured at tips; inner bracts with broad membranous margins; ovary thinly hairy above or only on ribs . . . . . 71. *B. scabrifolia*
17b Bracts with conspicuous rust-coloured tips; ovary minutely hairy on ribs or smooth:
18a Perianth tube 10–14 mm long; stamens equal, filaments 12–14 mm long; inner tepals widest at or near apices. . . . . 58. *B. patula*
18b Perianth tube 17–20 mm long; stamens unequal in length, filaments 7–10 mm long; inner tepals widest near middle . . . . . 59. *B. montana*
13b Ovary hairy, often densely so:
19a Perianth tube 30–50 mm long, mostly 1.5–2.0× as long as dorsal tepal but at least 10 mm longer:
20a Perianth pale yellow; perianth tube narrow below, wide and tubular above, 35–50 mm long; tepals 27–32 mm long; flowers strongly scented . . . . . 75. *B. noctiflora*
20b Perianth shades of violet to mauve with either white or dark red or purple markings on lower tepals; tube slender, widening slightly in upper half; flowers unscented:
21a Aerial stem produced shortly above ground; spike horizontal . . . . . 65. *B. engysiphon*
21b Aerial stem produced well above ground; spike erect or slightly inclined:
22a Spike ± erect; perianth tube 35–47 mm long; tepals acute; outer bracts attenuate, 14–40 mm long; style branches slender . . . . . 73. *B. ecklonii*
22b Stem arching outward above and spike inclined; perianth tube 30–40 mm long; tepals obtuse (or obtuse-apiculate); outer bracts ± truncate, 10–30 mm long; style branches orbicular at tips and noticeably ciliate. . . . . 72. *B. latifolia*
19b Perianth tube shorter to ± as long as dorsal tepal, or if longer, then less than 32 mm long and less than 8 mm longer than dorsal:
23a Flowers blue or violet and inverted, with spike inclined; perianth tube recurved and dorsal tepal abaxial and ± horizontal, lower tepals suberect:
24a Tepals overlapping, forming cup, subequal, dorsal not held apart, 20–22 mm long; filaments 8–10 mm long. . . . . 81. *B. angustifolia*
24b Tepals not forming cup, dorsal held apart from others, 22–24 mm long; filaments 12–15 mm long. . . . . 82. *B. inclinata*
23b Flowers various colours, blue to violet, purple, red, cream-coloured, white or yellow, not inverted; perianth tube straight or arching forward and dorsal tepal erect or arching toward spike apex:
25a Anthers ovate or arrow-shaped, connective expanded below:
26a Perianth tube 10–18 mm long and shorter than to as long as dorsal tepal; style dividing below or opposite anther bases. . . . . 89. *B. nervosa*
26b Perianth tube 18–30 mm long and ± as long to slightly longer than dorsal tepal; style dividing opposite upper half of anthers:
27a Flowers pink to reddish purple; perianth tube 18–28 mm long . . . . . 90. *B. purpurea*

27b Flowers cream-coloured, pale pink or pale blue; perianth tube 20–30 mm long . . . . . 91. *B. patersoniae*
25b Anthers ± linear, connective not expanded below:
28a Perianth tube at least 18 mm long and ± as long as or longer than dorsal tepal:
29a Leaves strongly pleated, ± smooth or minutely hairy; dorsal tepal ± 32 mm long; style dividing below base of anthers. . . . . 70. *B. arenicola*
29b Leaves lightly pleated, hairy throughout; dorsal tepal 18–30 mm long; style dividing between base and apex of anthers:
30a Dorsal tepal 24–30 mm long; perianth tube 24–30 mm long . . . . . 80. *B. tubaeformis*
30b Dorsal tepal 18–22 mm long; perianth tube 18–20 mm long . . . . . 79. *B. fragrans*
28b Perianth tube 10–15(–25) mm long and ½ to nearly as long as dorsal tepal:
31a Flowers pale yellow, rarely light mauve, lower tepals deep yellow, highly fragrant; perianth tube 10–14(–15) mm long:
32a Plants with well developed ascending to suberect aerial stem; bracts 6–8 mm long . . . . . 67. *B. unguiculata*
32b Plants with stem extending shortly above ground and strongly inclined to horizontal; bracts 15–25 mm long . . . . . 74. *B. odorata*
31b Flowers blue to mauve with yellow markings on lower tepals, weakly scented or evidently unscented; perianth tube 9–25 mm long:
33a Plants flowering May to June rarely after mid-July; aerial stem short, seldom reaching more than 50 mm above ground; leaf blades broadly lanceolate to ovate, held nearly horizontally and ± at right angles to sheaths:
34a Leaves spreading at right angles to the sheaths, stiff-textured and straight; flowers smaller, the tube ± 9 mm long and the dorsal tepal ± 23 mm long; tepals spreading or recurved, with the lower lateral tepals mostly or entirely yellow; plants of quartz patches . . . . . 69. *B. salteri*
34b Leaves suberect and held at 45° to the sheaths, medium-textured and lightly coiled at the tips; flowers larger, the tube 12–14 mm long and the dorsal tepal 28–30 mm long; tepals suberect, with the lower lateral tepals blue with a median white marking; plants of sandy soils. . . . . 68. *B. toximontana*
33b Plants flowering (late July–)August to October; aerial stem short or well developed; leaf blades linear to lanceolate, ascending to erect:
35a Leaves narrow, deeply pleated, often rigid and almost pungent, mostly 2–8 mm wide; floral bracts 7–12 mm long; perianth tube 8–15 mm long. . . . . 64. *B. lineolata*
35b Leaves lanceolate, relatively firm but not rigid or pungent, shallowly to deeply pleated, mostly 8–20 mm wide; floral bracts 15–25 mm long; perianth tube (12–)15–18(–25) mm long:
36a Lower lateral tepals clawed and with prominent auriculate lobes at base of limb; inner bracts forked in upper ½–⅔ and membranous in lower midline. . . . . 66. *B. auriculata*
36b Lower lateral tepals not noticeably clawed and without auriculate lobes at base of limb; inner bracts divided to base. . . . . 63. *B. mucronata*

Sect. 1. **Teretifolieae** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 125 (1959), emended by Goldblatt & J.C.Manning: 15 (2007). Type: *Babiana brachystachys* (Baker) Ker Gawl.

Stem often mostly or entirely underground, spike suberect to decumbent and borne shortly above, or sometimes shortly below ground level; bracts usually green, fairly large, lightly hairy, dry and light brown at tips, inner forked apically or to about middle. *Flowers* usually zygomorphic, rarely actinomorphic, usually shades of blue to mauve, occasionally white to pink, or yellow; perianth tube short or elongate; tepals not or scarcely clawed and dorsal not widely separated from others; anthers oblong-linear, without expanded connective. *Ovary* usually smooth, rarely sparsely hairy throughout or on ribs.

Species 44; occurring over the entire range of the genus, from southwestern Western Cape, South Africa, to northern Namibia, Zimbabwe and Zambia.

Ser. **Brevitubae** *Goldblatt & J.C.Manning*, new series. Type: *Babiana nana* (Andrews) Spreng.

Flowers zygomorphic or actinomorphic (*Babiana pygmaea, B. radiata*); perianth tube ⅓–⅔ as long as dorsal tepal, obliquely funnel-shaped or straight, slender, only slightly expanded at apex when flower radially symmetric.

1. **Babiana nana** *(Andrews) Spreng.*, Systema vegetabilium 1: 156 (1824); Lewis: 77 (1959); Goldblatt & Manning: 16 (2007). *Gladiolus nanus* Andrews: t. 137 (1801). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 137 (1801).

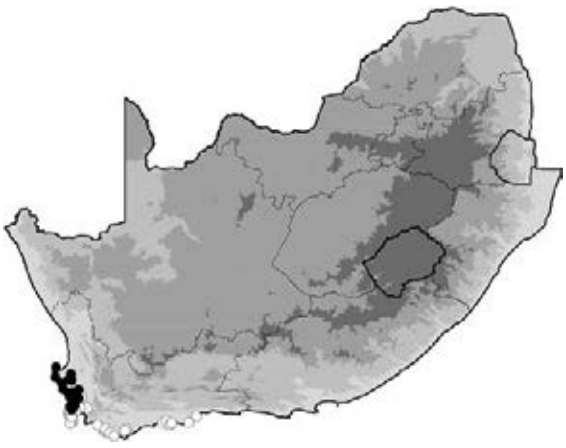
Plants 60–150(–250) mm high. *Stem* reaching shortly above ground, often 1- or 2-branched. *Leaves* ovate to narrowly lanceolate to ± linear, 15–35 mm wide (subsp. *nana*) or 5–15 mm wide (subsp. *maculata*), densely soft-hairy, moderately to lightly pleated, suberect or held ± at right angles to sheaths. *Spike* suberect to weakly inclined, 2- to 6-flowered; bracts green, densely hairy, 16–30 mm long, inner slightly shorter than outer, forked apically. *Flowers* zygomorphic, blue or violet, rarely pale pink, with white markings on lower lateral tepals, usually strongly rosy violet-scented; perianth tube obliquely funnel-shaped, 12–17 mm long; tepals

subequal or upper 3 slightly larger, dorsal 25–30 mm long, lower 3 tepals united for a short distance, 22–25 mm long. *Stamens* unilateral; filaments arched, 10–14 mm long, sometimes shortly hairy at base; anthers 5.0–6.5 mm long. *Ovary* smooth (rarely shortly hairy on ribs); style usually dividing opposite or close to anther tips, branches 3(–5) mm long. *Flowering time*: mainly September, also in late August.

Distribution and ecology: South Africa, Western Cape, extending from the Piketberg and Hopefield in the north to Mossel Bay in the southeast; sandy flats and dunes along the coast, rarely a short distance inland.

Diagnosis: the moderate-sized blue, violet, or sometimes purple to pink flowers marked with white or pale yellow on the lower tepals of *Babiana nana* are a striking sight in spring along the coast of the Western Cape Province, and are rendered even more attractive at close range by their intense, rosy violet perfume. The species appears to have a combination of the most unspecialised characteristics of *Babiana,* including green floral bracts becoming dry at the tips, inner bracts forked only at the tips, and zygomorphic, bilabiate flowers. In addition, it is one of relatively few members of the sect. *Teretifolieae* that has an aerial (though short) stem that is often branched. The relatively short, funnel-shaped perianth tube and blue perianth are likewise ancestral features for the genus. A few other species of the section also have an aerial stem but appear specialised in their leaf morphology, notably *B. pilosa* and *B. rubella*.

Typical *B. nana* is the broad-leaved form common in deep sands along the coast north of Cape Town, while subsp. *maculata* includes the narrow-leaved southern populations that extend from the Cape Peninsula east of Cape Town to Mossel Bay. *Babiana confusa* (previously *B. nana* var. *confusa*), from between the Berg River and the sandy flats between Lambert's Bay and the Heerenlogement Cave, has an underground, unbranched stem, undulate to lightly twisted leaves, and larger flowers with a longer perianth tube, 23–30 mm long, and anthers 8–9 mm long (vs. a tube 12–17 mm long and anthers 5.0–6.5 mm long in *B. nana*).



Distribution of ***Babiana nana*** subsp. ***nana***, ●; subsp. ***maculata***, ○.

Babiana nana flowers relatively late in the season, mainly in September, while the superficially similar, but often fully acaulescent *B. ambigua*, which is often confused with *B. nana*, blooms in the same habitat in late July and August. *Babiana ambigua* has the inner floral bracts divided to the base, and also has narrowly sword-shaped or linear leaf blades like the southern *B. nana* subsp. *maculata*, and quite different from the relatively broad, oblong or lanceolate, soft-textured leaf blades of *B. nana* subsp. *nana*. Flowers of *B. nana* have the dorsal tepal suberect, whereas that of *B. ambigua* is arched over the stamens. A series of hybrids between *B. nana* and *B. ambigua* were discussed at length by Lewis (1959), who noted that the hybrids, intermediate between the parental taxa, tended to obscure the distinction between these two otherwise quite separate species.

Key to subspecies

1a Plants with broad, ovate to broadly lanceolate leaves 15–35 mm wide. . . . . 1a. subsp. *nana*
1b Plants with narrow, sword-shaped to linear leaves 5–12(–15) mm wide . . . . . .1b. subsp. *maculata*

1a. subsp. **nana**

Babiana sprengelii Baker: 182 (1882) [Baker: 165 (1877), invalid name]. Type: South Africa, [Western Cape], Saldanha Bay, *Zeyher s.n.* (B, ?holo.).

Babiana plicata var. *forsteri* Baker: 184 (1892). Type: South Africa, Western Cape, without precise locality, *Forster s.n.* (location of type not known).

[*Babiana fragrans* Eckl.: 31 (1827), invalid name without description.]

[*Babiana pygmaea* Spreng. ex Steud.: 176 (1840), invalid name only in synonymy.]

Plants with ovate to broadly lanceolate leaves (15–)20–35 mm wide, held obliquely or sometimes ± at right angles to sheaths, lightly pleated. *Flowers* shades of blue to violet; perianth tube mostly 14–17 mm long; dorsal tepal mostly 25–30 mm long.

Distribution and ecology: relatively common along the Atlantic Coast of Western Cape, South Africa, between Saldanha and Milnerton; on sandy coastal flats and dunes.

Diagnosis: subsp. *nana* is recognised by the broad leaves, held obliquely to the sheaths and often more-or-less horizontally. Flowering mainly in September, plants are often seen at the Hopefield and Darling wild flower shows where their form and wonderfully rich, violet-like scent can be admired comfortably. It is readily distinguished from the narrow-leaved subsp. *maculata* of the southern Cape coast by leaf shape.

1b. subsp. **maculata** *(Klatt) Goldblatt & J.C.Manning* in Strelitzia 18: 17 (2007). *Babiana maculata* Klatt: 349 (1882). *B. nana* var. *maculata* (Klatt) B.Nord.: 442 (1970). Type: South Africa, [Western Cape], Cape Flats, Doornhoogte, without date, *C.F. Ecklon & C.L. Zeyher Irid. 124* (B, K, S, syn.).

Babiana schlechteri Baker: 865 (1901). Type: South Africa, [Western Cape], littoral dunes at Muizenberg, *Schlechter 1277* (Z, holo.).

Babiana angusta N.E.Br.: 467 (1932b). Type: South Africa, [Western Cape], Riversdale Division, Aug. 1932, *J. Muir 4851* (K, holo.).

Babiana nana var *angustifolia* G.J.Lewis: 80 (1959). Type: South Africa, [Western Cape], Doornhoogte, *C.F.Ecklon & C.L.Zeyher Irid. 124* (B, holo.).

[*Babiana angustifolia* Eckl: 31 (1827), invalid name without description (based on *C.F.Ecklon & C.L.Zeyer Fud. 124*).]

Plants with lanceolate to sword-shaped leaves 5–15 mm wide, blades ascending to suberect, lightly pleated, usually overtopping flowers. *Flowers* shades of blue to violet; perianth tube 12–15 mm long, ± straight; dorsal tepal mostly 20–25 mm long.

Distribution and ecology: Western Cape, South Africa, extending from the Cape Peninsula to Mossel Bay; on sandy coastal flats and dunes.

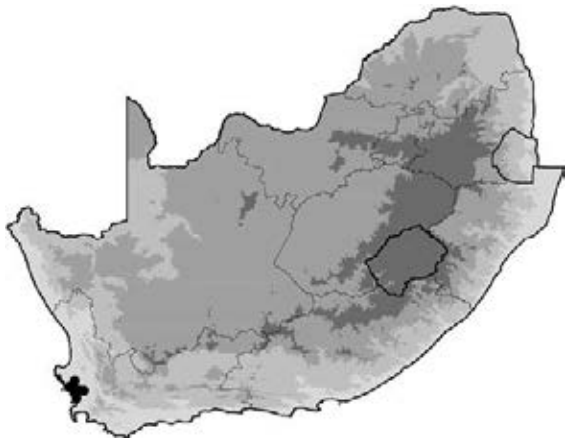
Diagnosis: the narrow-leaved populations of *Babiana nana* are now recognised as a subspecies, both for the consistent difference in leaf width and orientation and the slightly smaller flowers, and for their largely separate range.

2. **Babiana pygmaea** *(Burm.f.) Baker* in Journal of the Linnean Society, Botany 16: 165 (1877), name misapplied to *B. nana*; Lewis: 32 (1959) [as *B. pygmaea* (Burm. f.) N.E.Br.]; Goldblatt & Manning: 17 (2007). *Ixia pygmaea* Burm.f.: 1 (1768) (as *I. pigmaea*). Type: South Africa, without precise locality or collector (G: Herb. Burman, holo.).

Babiana macrantha MacOwan: 394 (1890). Type: South Africa, [Western Cape], near Darling, Oct. 1877, *P. MacOwan sub Herb. Norm. Austr. Afr. 811* (SAM, holo.; B, K, P, iso.).

[*Gladiolus pygmaeus* (Burm.f.) Roem. & Schult.: 441 (1817), invalid name only in synonymy of *Ixia pygmaea* Burm.f.]

Plants up to ± 100 mm high. *Stem* erect, rarely branched, velvety hairy. *Leaves* lanceolate, 6–20 mm wide, pleated, softly hairy, spreading ± at right angles to sheaths. *Spike* erect, 2- to 5-flowered; bracts 30–36 mm long, velvety hairy, inner bract slightly shorter than outer, shortly forked or divided ± half its length. *Flowers* actinomorphic, yellow with a brown to dull purplish centre, unscented, tepals spreading when fully open;



Distribution of ***Babiana pygmaea***.

perianth tube cylindric, slightly expanded at throat, 15–25 mm long; tepals subequal, spreading when fully open, obovate, 23–33 × 14–20 mm. *Stamens* symmetrically arranged; filaments partly included, erect, enclosing style, 3–6 mm long; anthers 8–10 mm long. *Ovary* hairy above or on ribs; style dividing opposite middle of anthers, branches ± 3 mm long, rarely reaching anther tips. *Flowering time*: August to early September.

Distribution and ecology: restricted to the Atlantic coastal forelands of Western Cape, South Africa, between Hopefield and Darling; on sandy and gravel flats and lower slopes. Once relatively common, *Babiana pygmaea* has become increasingly rare in the last 20 years as its lowland habitat has become invaded by introduced *Acacia* species or reduced by expanding agriculture on the well-watered western coastal plain of Western Cape. Only a few small populations are now known near Hopefield, northeast of Malmesbury.

Diagnosis: the general aspect of *Babiana pygmaea* suggests an affinity with the *B. nana* group of species of sect. *Teretifolieae*, which have a similar vegetative morphology but conventional zygomorphic, more-or-less bilabiate blue to violet or purple flowers with the lower lateral tepals bearing nectar guides. One aspect of *B. pygmaea* that does not entirely accord with section *Teretifolieae* is the short, erect aerial stem and erect, rather than inflexed or decumbent spike. This feature may be associated with the actinomorphic flower, which is best displayed on an upright stalk. The apparently related *B. nana* also has a short, suberect aerial stem and only slightly deflexed spike. The bowl-shaped flowers of *B. pygmaea* are adapted for pollination by hopliine beetles. The pale yellow flowers with a dark centre and absence of scent are typical of this pollination strategy.

3. **Babiana rubella** *Goldblatt & J.C.Manning* in Strelitzia 18: 18 (2007). Type: South Africa, Northern Cape, Namaqualand, ± 8 km N of Kotzesrus, road to Hardevlei, 3 Sept. 2001, *P. Goldblatt & L.J. Porter 11825* (NBG, holo.; K, MO, PRE, US, iso.).

Plants 100–120 mm high. *Stem* extending above ground level and inclined, simple or with one branch, covered by leaf sheaths, densely long-hairy where exposed; sheathed below by a thick collar of fibres. *Leaves* broadly lanceolate to ovate, blade held obliquely to ± at right angles to short, broad, imbricate leaf sheaths, lightly plicate, veins and margins densely long-hairy, hairs up to 4 mm long, sheaths hairy or almost hairless. *Spike* suberect to inclined, (2)3- to 6-flowered; bracts green, densely hairy, apices dry and rust-brown, 15–24 mm long, inner ± as long as outer, forked apically or to ± middle, or transparent in upper mid-line. *Flowers* zygomorphic, bilabiate, pale to deep pinkish purple, lower lateral tepals yellow with pink tips, lightly rose-scented; perianth tube 12–15 mm long; dorsal tepal 28–30 × ± 8–9 mm, lower tepals joined to upper laterals for ± 5 mm and to one another for ± 3 mm, upper laterals ± 24 mm long, 23–25 mm long, lower margins crisped. *Stamens* unilateral; filaments arched, ± 14 mm long; anthers ± 4.5 mm long, pale blue; pollen white. *Ovary* smooth, ± 3 mm long; style arching over stamens. *Flowering time*: August to early September.

Distribution and ecology: known from a single locality on the southern coastal plain of Namaqualand north of Kotzesrus in Northern Cape, South Africa; on flats in deep sand.

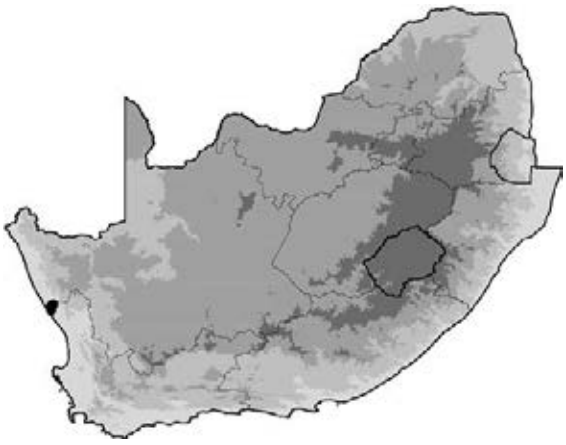
Diagnosis: *Babiana rubella* is distinctive both in the densely long-hairy stem and leaves, and in the pink to light purple perianth with pale yellow lower lateral tepals. The flowers are of moderate size with a perianth tube 12–15 mm long, a dorsal tepal 28–30 mm long, and have a pleasant sweet, rose-like scent and the leaves have short, oblong-ovate blades held nearly horizontally to the sheaths. Superficially *B. rubella* resembles a second Namaqualand endemic, *B. horizontalis*, in the unusual pink flower colour, but that species has almost hairless leaves and bracts, and the stem reaches only shortly above ground. *Babiana pilosa* also has pink flowers and is densely hairy, though with retrorse hairs. Both *B. nana*, a species of coastal sandveld in Western Cape, and *B. rubella* may have a branched aerial stem, suberect to weakly inclined spikes, and relatively short, broad leaves, often held nearly at right angles to the sheaths but the flowers of *B. nana* are usually blue to violet with white markings.

4. **Babiana pilosa** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 87 (1959); Goldblatt & Manning: 19 (2007). Type: South Africa, [Western Cape], 15 miles west of Nuwerus, cultivated at Kirstenbosch Botanical Garden, 5 Aug. 1956, *H. Hall s.n. as Nat. Bot. Gard. 414/56* (NBG, holo.).

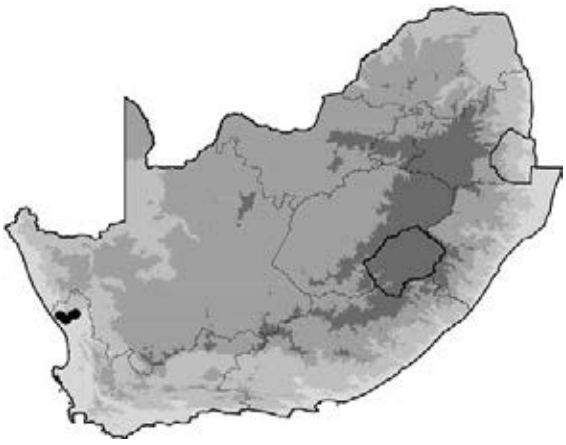
Plants 100–150 mm high. *Stem* erect, reaching well above ground, usually unbranched, with retrorse hairs above, with thick collar of fibres enclosing base. *Leaves* narrowly lanceolate, on long pseudopetioles, scarcely pleated, lightly retrorse-hairy. *Spike* decumbent, secund, 2- to 5-flowered; bracts green with dry rust-coloured tips, with short retrorse hairs, 20–30 mm long, inner slightly shorter than outer, forked apically and acuminate. *Flowers* zygomorphic, magenta-pink, lower lateral tepals with pale yellow markings; perianth tube 15–18 mm long; tepals unequal, dorsal 30–34 mm long, lower 3 tepals joined to upper laterals for ± 4 mm and forming a prominent lip, 20–28 mm long. *Stamens* unilateral; filaments ± 15 mm long; anthers ± 6 mm long. *Ovary* smooth, rarely sparsely hairy on ribs; style dividing opposite middle of anthers, branches ± 5 mm long. *Flowering time*: late July and August.

Distribution and ecology: restricted to southern Namaqualand south and west of Nuwerus in Western Cape, South Africa; on stony hills, often on quartzite patches.

Diagnosis: *Babiana pilosa* is readily recognised by the narrow leaves with a long pseudopetiole and the light magenta-pink perianth, an unusual colour in the genus. Both the stem, leaves and floral bracts bear slightly retrorse hairs, also rare in the genus. The pink flower colour is known in a few other species, notably the densely hairy *B. rubella*, also from Namaqualand, which has short, relatively broad leaves.



Distribution of ***Babiana rubella***.



Distribution of ***Babiana pilosa***.

5. **Babiana pauciflora** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 99 (1959); Goldblatt & Manning: 29 (2007). Type: South Africa, [Northern Cape], farm Menzieskraal, between Nieuwoudtville and Botterkloof, June 1953, *G.J. Lewis 2750* (SAM, holo.).

Plants up to 100 mm high. *Stem* short, unbranched, inclined above ground level, enclosed basally by collar of fibres. *Leaves* oblong-lanceolate, lightly pleated at base, hairy on veins. *Spike* compact, suberect, 2- to 4-flowered; bracts sparsely hairy above, green, 35–55 mm long, inner ± as long as outer, forked apically, strongly 2-keeled. *Flowers* zygomorphic, violet to deep purple, lower lateral tepals with bright yellow blotches outlined in lilac, sweetly rose-violet-scented, closing at night; perianth tube cylindric below, funnel-shaped above, 35–45 mm long; tepals unequal, dorsal 30–50 mm long, lower tepals joined basally for a short distance, 25–40 mm long. *Stamens* unilateral; filaments arched, 15 mm long; anthers 8 mm long. *Ovary* smooth; style dividing opposite anther apices, branches ± 4 mm long, tips expanded. *Flowering time*: June.

Distribution and ecology: poorly documented but evidently locally common, restricted to the Bokkeveld Mtns and Plateau of Northern Cape, South Africa; on stony clay flats.

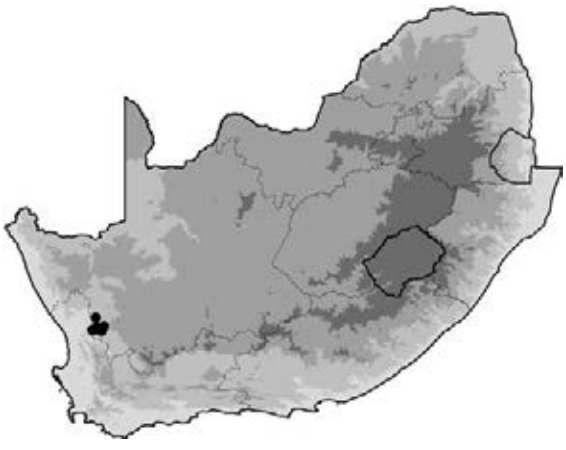
Diagnosis: flowering in June, soon after the first winter rains have fallen, *Babiana pauciflora* is recognised by the violet flowers with relatively long perianth tube, 35–45 mm long, smooth ovary and large green bracts, 35–55 mm long, with the inner forked apically. It lacks any obvious specialisations that would help determine its possible relationships. The perianth tube, about as long as or slightly longer than the dorsal tepal, suggesting a possible relationship with the yellow-flowered *B. vanzijliae* of the section. Also from the Bokkeveld Mtns and Plateau, *B. vanzijliae* blooms later, in August and September, whereas *B. pauciflora* blooms in June.

6. **Babiana lanata** *Goldblatt & J.C.Manning* in Strelitzia 18: 20 (2007). Type: South Africa, Northern Cape, Namaqualand coast near Kleinzee, 2 Aug. 2001, *G.D. Duncan 447* (NBG, holo.).

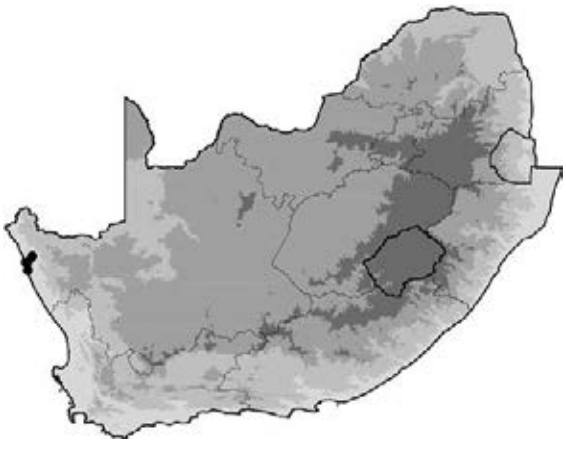
Plants 50–90 mm high, with deep-seated corm up to 20 mm diam. *Stem* erect, simple or 1-branched, reaching shortly above ground, enclosed at base by well-developed fibrous collar. *Leaves* 3 to 6, broadly lanceolate to ovate, 2–3 mm long, blade held very obliquely to overlapping leaf sheaths, lightly plicate, apex truncate, veins drawn into short teeth, with long silky hairs up to 3 mm long on veins and margins. *Spike* erect, long-hairy, 3- to 5-flowered; bracts green, silky-hairy, 12–16 mm long, inner ± as long as outer, forked apically, membranous in midline. *Flowers* zygomorphic, upper 3 tepals yellow or maroon with yellow margins, lower 3 tepals pale yellow with pale median maroon streak, presence of scent unknown; perianth tube narrowly funnel-shaped, ± 24 mm long; tepals spreading, lanceolate, dorsal ± 17 × 5 mm, lower tepals 15–17 mm long, channelled below. *Stamens* unilateral; filaments ± 14 mm long; anthers ± 5 mm, yellow; pollen yellow. *Ovary* smooth; style dividing opposite middle of anthers, branches ± 3 mm long. *Capsules* globose, ± 6 mm long. *Seeds* unknown. *Flowering time*: late July to early September.

Distribution and ecology: known from just three collections from the Namaqualand coastal plain at Kleinzee and near Port Nolloth in Northern Cape, South Africa; occurring on stony red sand.

Diagnosis: with relatively small flowers, although with a relatively long perianth tube, ± 24 mm long, *Babiana lanata* has a dorsal tepal ± 17 mm long and the lower tepals only slightly smaller. The upper three tepals are pale yellow or maroon with yellow edges, an unusual colour for the genus, while the lower tepals are pale creamy yellow with a pale maroon central streak. The most striking feature of the species is the leaf, the blade



Distribution of ***Babiana pauciflora***.



Distribution of ***Babiana lanata***.

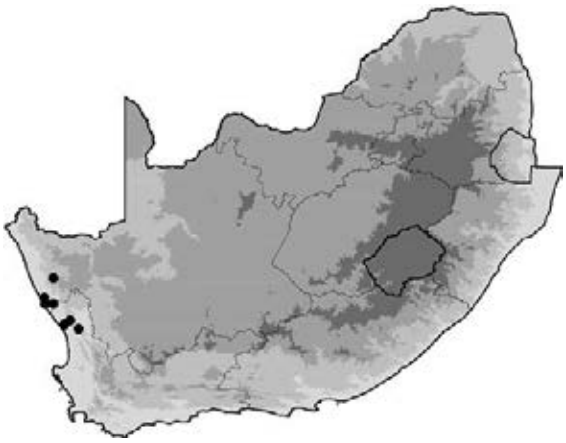
abruptly truncate, widest about the middle and the apex serrated, with the surface covered with long silky hairs as are the spike axis and bracts. The truncate leaf blades recall those of *B. flabellifolia* and its immediate allies but *B. lanata* is probably not immediately related to this group of species, which always has fairly large, blue to mauve or purple flowers, less conspicuous vestiture, and leaves more obviously truncate, usually widest at the apex. The long silky pubescence and leaf blades set obliquely to the sheaths recall *B. rubella*, also from coastal Namaqualand, but that species is readily distinguished by its magenta-pink perianth, hooded dorsal tepal and acute leaf tips.

7. **Babiana grandiflora** *Goldblatt & J.C.Manning* in Strelitzia 18: 21 (2007). Type: South Africa, Northern Cape, 3.5 km east of Kotzesrus on road to Garies, 3 Sept. 2001, *P. Goldblatt & L.J. Porter 11823* (NBG, holo.; K, MO, PRE, iso.).

Plants 80–140 mm high, including leaves. *Stem* reaching shortly above ground or subterranean, densely hairy, occasionally with 1 or 2 branches. *Leaves* lanceolate to sword-shaped, lightly twisted, shortly velvety, 6–11(–15) mm wide. *Spike* decumbent, 2- to 5-flowered; bracts green with dry brown tips, velvety, 24–35 mm long, inner often slightly longer than outer, forked apically. *Flowers* zygomorphic, pale to deep blue with white splashes on lower tepals, strongly spicy-acrid scented with undertones of violet; perianth tube funnel-shaped, 18–20 mm long, lower part ± 12 mm long, thick-walled and blocked in lower half; tepals lanceolate, dorsal 45–55 × 13 mm, margins undulate, upper laterals joined to lower 3 tepals for ± 8 mm, lower tepals joined basally for ± 4 mm, ± 35 mm long. *Stamens* unilateral; filaments arched, ± 10 mm long, hairy at base, shortly exserted from upper part of tube; anthers 8–9 mm long, pale bluish; pollen off-white. *Ovary* smooth; style arching over stamens. *Flowering time*: late July to early September.

Distribution and ecology: restricted to the Namaqualand coastal plain between Soutfontein, south of Wallekraal in Northern Cape, to Koekenaap near the mouth of the Olifants River in Western Cape, South Africa; on sandy flats, usually in deep sand.

Diagnosis: currently included in sect. *Teretifolieae*, which comprises species with apically forked inner bracts, often a more-or-less underground flowering stem and a smooth ovary, *Babiana grandiflora* is distinctive mainly in its large flower, the perianth tube 18–20 mm long and dorsal tepal 45–55 mm long. The flowers have a strong odour of violets mixed with a spicy acrid odour, a common scent in the genus. Despite the large flowers, the stamens are disproportionately short, with the filaments ± 10 mm long, so that the anthers are held within the floral cup and largely hidden from view inside the funnel-shaped perianth. It may be most closely allied to the Western Cape coastal species, *B. nana*, but is easily distinguished from that species by the narrow, erect leaves with short, velvety pubescence and the mostly unbranched spikes borne at ground level and



Distribution of ***Babiana grandiflora***.

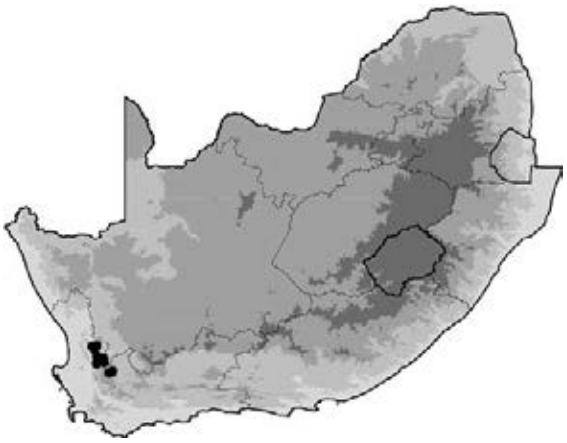
bearing 2 to 5 flowers. *Babiana grandiflora* has in the past been confused with the widespread *B. ambigua* of deep sands in coastal and inland sites in Western Cape, and although *B. grandiflora* resembles that species superficially, *B. ambigua* has inner bracts divided to the base, somewhat smaller flowers with the dorsal tepal 28–40 mm long and longer filaments 13–16 mm.

8. **Babiana cedarbergensis** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 82 (1959); Goldblatt & Manning: 23 (2007). Type: South Africa, [Western Cape], Cederberg, flats near Bushman's Cave, 23 Sept. 1930, *J.A. Lamb s.n. as Nat. Bot. Gard. 1613/30* (BOL, holo.; K, iso.).

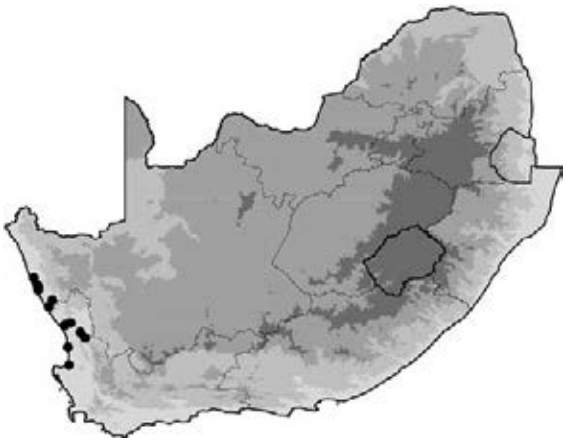
Plants 40–60 mm high. *Stem* mostly underground, with collar of thick fibres around base. *Leaves* sword-shaped, rigid, almost pungent, pleated, 40–60 mm long, velvety hairy. *Spike* decumbent, 2- to 5-flowered; bracts green, outer often with a minute brown mucro at apex, 18–25 mm long, inner slightly shorter, forked in upper ⅓, margins membranous. *Flowers* zygomorphic, pale to deep violet with white markings outlined in dark blue on lower lateral tepals, lightly musk-scented; perianth tube obliquely funnel-shaped, 16–18 mm long; tepals unequal, dorsal largest, 28–35 mm long, lower tepals joined to upper laterals for ± 3 mm forming prominent lip, lower 3 tepals 21–27 mm long. *Stamens* unilateral; filaments arched, ± 13 mm long; anthers 7–9 mm long. *Ovary* hairy above base; style dividing at or beyond anther tips, branches ± 4 mm long. *Flowering time*: mainly in September.

Distribution and ecology: restricted to the Cederberg Mtns of Western Cape, South Africa; on rocky sandstone slopes and flats above 900 m elevation.

Diagnosis: superficially resembling the widespread and well-known *Babiana ambigua* in the narrow leaves and acaulescent habit, *B. cedarbergensis* has inner bracts divided only in the upper third, whereas *B. ambigua* has the inner bracts divided to the base. Other differences between these two species are the thick fibrous neck



Distribution of ***Babiana cedarbergensis***.



Distribution of ***Babiana confusa***.

around the base of the stem, stiff, straight leaves, and hairy ovary of *B. cedarbergensis*, whereas *B. ambigua* has a poorly developed neck of fibres around the base, firm but not rigid leaves, and a hairless ovary. The resemblance to *B. ambigua* is presumably convergent. *Babiana cedarbergensis* is restricted to higher elevations in the Cederberg and is endemic to the Northwest Centre of the Cape Floristic Region. The hairy ovary of *B. cedarbergensis* is unusual in section *Teretifolieae*.

9. **Babiana confusa** *(G.J.Lewis) Goldblatt & J.C.Manning* in Strelitzia 18: 23 (2007). *Babiana nana* var. *confusa* G.J.Lewis: 81 (1959). Type: South Africa, [Western Cape], near Berg River Station, July 1946, *G.J. Lewis 4798* (SAM, holo.).

Plants 40–80 mm high. *Corm* globose, up to 20 mm diam.; tunics of fairly fine fibres. *Stem* usually mostly underground but sometimes reaching up to 10 mm above ground, unbranched, without well-developed collar of fibres around base, bearing cormlets in underground axils. *Leaves* ovate to broadly lanceolate, 8–14 mm wide, sparsely hairy to smooth except on margins, often somewhat glaucous, lightly pleated to almost plane, margins usually slightly raised. *Spike* suberect to inclined, 2- to 6-flowered; bracts green or becoming dry in upper half, sparsely hairy, 20–35 mm long, inner slightly longer than outer, forked apically. *Flowers* zygomorphic, white to pale blue with pale markings edged in blue on lower lateral tepals, scent unknown; perianth tube obliquely funnel-shaped, 23–30 mm long; tepals subequal or upper 3 slightly larger, dorsal 35–40 mm long, lower tepals joined to upper laterals for 4–5 mm and to one another for ± 2.5 mm, forming prominent lip, 25–28 mm long. *Stamens* unilateral; filaments arched, 12–15 mm long, sometimes shortly hairy at base; anthers 8–9 mm long. *Ovary* smooth; style usually dividing opposite or close to anther tips, branches ± 3 mm long. *Flowering time*: mid-June to August.

Distribution and ecology: South Africa, Western Cape, from the Atlantic Coast and near interior, extending from Koekenaap, Lambert's Bay and Heerenlogement Mtn to near Hopefield; on sandy flats and mountain plateaus.

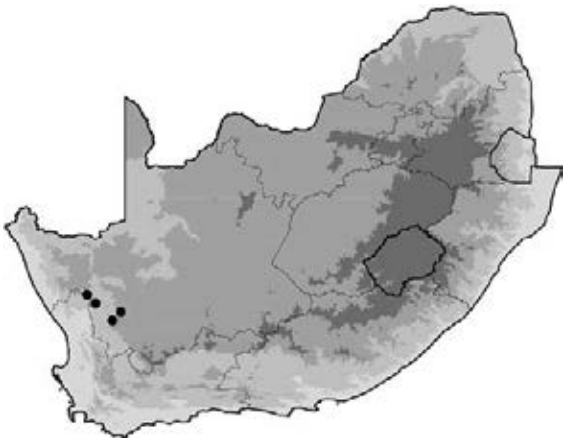
Diagnosis: *Babiana confusa* is distinguished from *B. nana* by the larger flower with a longer perianth tube 23–30 mm long, subequal tepals, longer anthers, 8–9 mm long, and sparsely hairy to smooth, often glaucous leaves.

10. **Babiana crispa** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 84 (1959); Goldblatt & Manning: 24 (2007). Type: South Africa, [Western Cape], Clanwilliam to Doornbosch, Farm Langekraal, July 1933, *P. Ross Frames s.n.* (BOL 20837, holo.).

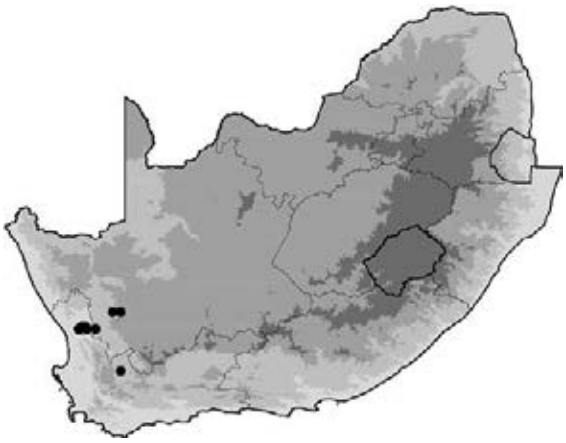
Plants 60–130 mm high, including leaves. *Stem* underground, sheathed a thick collar of fibres, unbranched. *Leaves* sword-shaped to linear, often slightly twisted, up to 13 × 3–6 mm, scarcely pleated, hairy, margins crisped and undulate. *Spike* short, suberect, 2- to 4-flowered; bracts with brown attenuate tips, outer hairy in upper half, 28–30 mm long, inner ± as long, forked apically. *Flowers* zygomorphic, pale blue, lower lateral tepals with white median markings, acrid-scented; perianth tube funnel-shaped, 14–20 mm long; tepals unequal, dorsal 25–30 mm long, lower tepals 16–18 mm long, margins crisped. *Stamens* unilateral; filaments arched, 15 mm long; anthers 6–7 mm long. *Ovary* smooth; style dividing opposite anther apices, branches ± 4 mm long. *Flowering time*: May to July.

Distribution and ecology: extending from the Langberg west of Loeriesfontein in Northern Cape to Biedouw Valley in Western Cape, South Africa; in hard clay and shale ground.

Diagnosis: *Babiana crispa* has relatively large flowers and large bracts, with the inner forked only at the tips, and is evidently allied to a group of early flowering species with short-tubed, scented flowers that extend across the dry northern interior of Western and Northern Cape



Distribution of ***Babiana crispa***.



Distribution of ***Babiana minuta***.

from the western Karoo to northern Namaqualand. Among these species, all of which have few-flowered spikes borne at ground level, *B. crispa* can be recognised by the narrow leaves, 3–6 mm wide on mature flowering individuals, the blades undulate or lightly crisped, hardly or not at all pleated, and lightly twisted in the upper half.

11. **Babiana minuta** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 74 (1959). Type: South Africa, [Western Cape], near Vanrhynsdorp, July 1932, *T.M. Salter 2508* (BOL, holo., K, iso.).

Plants mostly 40–60 mm high, often growing in tufts. *Stem* barely reaching above ground, decumbent above ground. *Leaves* often inclined toward ground, narrowly lanceolate to linear, mostly 3–6 mm wide, pleated at base, hairy, lightly twisted above; juvenile plants with linear, falcate leaves 1–2 mm wide. *Spike* short, horizontal, 1- to 3-flowered; bracts green with dry brown attenuate tips, 20–32 mm long, inner slightly shorter than outer, forked at apex. *Flowers* zygomorphic, yellow or mauve with reddish mauve to violet in centre of tepals, with yellow marks on lower lateral tepals, evidently unscented; perianth tube funnel-shaped, 20–22 mm long; tepals subequal, dorsal tepal 25–40 mm long, lower tepals joined for 2–4 mm, 20–25 mm long. *Stamens* unilateral; filaments arched, 15–17 mm long; anthers 5–6 mm long. *Ovary* smooth; style dividing opposite anther tips, branches ± 4 mm long, abruptly expanded apically. *Flowering time*: mainly June and July, rarely later.

Distribution and ecology: South Africa in Northern and Western Cape, extending from southern Namaqualand and the western Karoo to Karoopoort; in rock outcrops, either in shale, sandstone or marble.

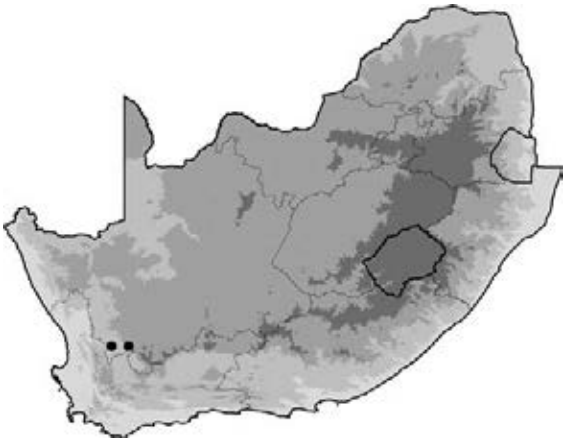
Diagnosis: winter-flowering *Babiana minuta* remains poorly known and inadequately documented but is more widespread than originally believed and is even locally quite common. The reddish mauve to violet flowers are typical of the short-tubed species of sect. *Teretifolieae* and surprisingly large for the small leaves: a single open flower may be larger than the rest of the above ground parts of an individual. Plants grow in small tufts with adult, flowering individuals surrounded by the narrow juvenile leaves of young plants derived from cormlets produced from the base of mature corms.

12. **Babiana tanquana** *J.C.Manning & Goldblatt* in Strelitzia 18: 25 (2007). Type: South Africa, Western Cape, Tanqua Karoo, Farm De Syfer, among dolerite boulders, 3 July 2002, *J.C. Manning 2748* (NBG, holo.; K, MO, iso.).

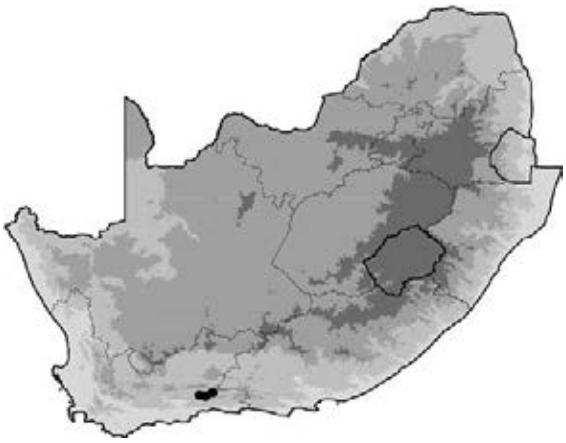
Plants 60–120 mm high, including leaves. *Stem* largely subterranean or reaching up to 100 mm above ground, smooth, simple or with 1 or 2 branches produced close to ground. *Leaves* ascending, blades slightly oblique to sheaths and stem, lanceolate to narrowly ovate, 7–13 mm wide, shortly hairy on lamina, long-hairy on margins, rough to touch, hardly pleated but with 3 or 4 main veins. *Spike* decumbent or suberect, 3- to 6-flowered; bracts lightly striate, green with slender brown apices, slightly striate, lightly hairy above, outer 22–25 mm long, inner 2–5 mm longer than outer, forked apically. *Flowers* zygomorphic, upper tepals dark violet with pale lilac edges, lower laterals pale yellow in upper half, with acrid, spicy odour; perianth tube ± 14 mm long, slender below, curving outward and wider in upper 6 mm; tepals unequal, dorsal 25–30 mm long, arching over stamens, upper laterals joined to lower 3 for ± 4 mm, lower tepals 18–20 mm long. *Stamens* unilateral; filaments arched, ± 12 mm long; anthers ± 6 mm long. *Ovary* smooth; style arching over stamens, dividing opposite upper half of anthers, branches slender, ± 4 mm long. *Flowering time*: June and July.

Distribution and ecology: restricted to the Tanqua Karoo in interior Western Cape, South Africa; only in dolerite outcrops in clay soil.

Diagnosis: usually acaulescent *Babiana tanquana* is distinguished by the almost plane leaves with light pubescence on the blade surface and long-hairy on the margins, a spike borne at or shortly above ground level, and flowers with dark purple upper tepals, pale lilac on the



Distribution of ***Babiana tanquana***.



Distribution of ***Babiana karooica***.

edges, and the pale yellow lower lateral tepals. The inner floral bracts are forked only near the apices and the ovary is hairless. *Babiana tanquana* most closely resembles the western Karoo *B. salteri* in general aspect, particularly the broad leaves held obliquely to the sheaths and short spike, but that species has inner bracts divided to the base and a densely hairy ovary. The attractive flowers have a distinctive acrid-musky scent characteristic of several other species of the genus. *Babiana tanquana* keys closest to *B. minuta*, the tepals of which also have pale margins, but this species has narrow leaves and the inner bracts shorter than the outer, whereas in *B. tanquana* the inner bracts exceed the outer by 2–5 mm. The species remains poorly documented.

13. **Babiana karooica** *Goldblatt & J.C.Manning* in Strelitzia 18: 26 (2007). Type: South Africa, Western Cape, ± 10 km W of De Rust, next to R62, locally abundant on Enon Conglomerate, 21 June 2006, *J.H.J. Vlok 2867* (NBG, holo.; K, MO, iso.),

Plants 120–200 mm high, including leaves. *Stem* reaching shortly above ground level, unbranched or rarely with a single branch, smooth. *Leaves* lanceolate to narrowly sword-shaped, 70–150 × 4–12 mm, shallowly pleated, shortly hairy but long-hairy at base and upper part of sheath; seedling leaves long-hairy. *Spike* decumbent, compact, 2- to 6-flowered; bracts (20–)25–30(–35) mm long, green with rust-coloured tips, long-hairy near margins otherwise sparely short-hairy or smooth, inner slightly shorter than outer, forked at apex. *Flowers* zygomorphic, blue to violet, lower lateral tepals each with a white median mark edged below in dark blue, intensely fragrant; perianth tube 20–35 mm long, curved and slightly flared at apex, tightly enclosing style below, puberulous in upper part, hairs extending onto bases of filaments; tepals subequal, dorsal 24–28 × ± 7 mm, suberect, lower 3 united basally for up to 4 mm, 20–22 mm long, extended horizontally. *Stamens* unilateral; filaments ± straight, 10–11 mm long, puberulous at base; anthers 6–7 mm long, lilac. *Ovary* smooth, those of lowermost flowers sometimes shortly stipitate; style dividing at apex or shortly beyond anthers tips, branches spreading, 3–6 mm long. *Capsules* subglobose, ± 8 mm long. *Flowering time*: late May to early July.

Distribution and ecology: a narrow endemic of southern Western Cape, South Africa, restricted to the central Little Karoo; on rocky slopes of Enon Conglomerate.

Diagnosis: an early flowering species, *Babiana karooica* is recognised in sect. *Teretifolieae* by the acaulescent habit, blue to violet flowers with perianth tube 20–35 mm long and puberulous in the throat, and violet anthers. The style divides beyond the anther tips. The species is easily confused with larger-flowered *B. sambucina*, which blooms later, mostly in August and September, but that species has a straight perianth tube 35–65 mm long and at least 1.5× as long as the dorsal tepal in length, and the tepals are broader, mostly 30–35 × 5–12 mm. In addition, the perianth tube is smooth inside, the anthers are cream-coloured to pale yellow, and the style typically divides opposite the base to middle of the anthers. *Babiana karooica* also lacks the distinctive leafy outer bract of the lowermost flower of the spike characteristic of *B. sambucina*.

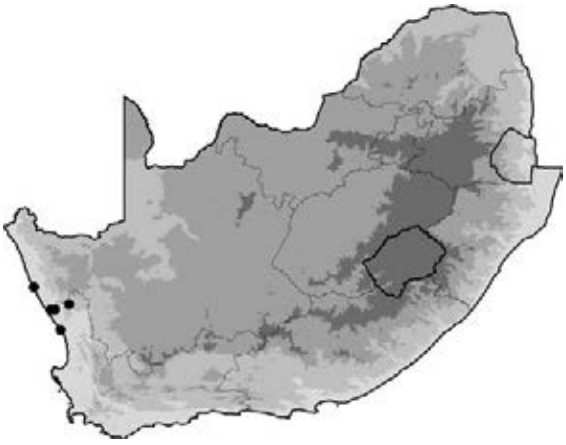
Babiana karooica may also be confused with *B. bainesii* but this species always has the spike underground, the flowers thus arising below ground level. A widespread species of the southern African summer-rainfall zone, *B. bainesii* typically flowers in late summer, mainly February to April, but later, in July and August in colder parts of the high mountains of the Great Karoo. *Babiana karooica* has broader and shorter leaves than *B. bainesii*, usually sparsely hairy on the veins and margins, slightly smaller flowers, and green floral bracts tipped rust-brown.

14. **Babiana virescens** *Goldblatt & J.C.Manning* in Goldblatt *et al.* Bothalia 38: 51 (2008). Type: Western Cape, Farm Kamagap, 1 km along Bitterfontein–Pofadder road, hillside on S side, 26 May 2007, *Manning 3093* (NBG, holo.; MO, iso.).

Plants 70–200 mm high. *Corm* with outer tunics of fine-textured, reticulate fibres. *Stem* reaching to ground level or up to 100 mm above ground, erect but strongly inflexed above uppermost leaf sheath, simple or with 1 short branch, glabrous below, becoming velvety near spike; sheathed by smooth cataphylls and leaf sheaths. *Leaves* 3 or 4, oblong to lanceolate, slightly twisted distally, blade suberect at ± 30° degrees, 40–100(–150) × (5–)10–18 mm, thinly velvety, lightly pleated, midrib and margins slightly thickened, margins hyaline, minutely hairy; seedling leaves linear-lanceolate and coiled, hairy. *Spike* 3- to 7-flowered, ± horizontal, secund; bracts green with brown tips, outer ovate, 20–30 mm long, margins narrowly hyaline, thinly and minutely velvety, especially distally, truncate or emarginate-apiculate, inner ± as long as outer, forked for 5–8 mm, with broad hyaline margins in lower half. *Flowers* zygomorphic, pale grey-green or flushed with greyish lilac, lower lateral tepals with yellowish green median blotches and purple streaks, with sweet, spicy scent; perianth tube obliquely funnel-shaped, hollow to base, 18–23 mm long; tepals unequal, narrowly lanceolate, margins crisped, dorsal suberect, recurving distally, 32–38 × 6.5–8.0 mm, upper laterals narrower, joined to lower tepals for 5–7 mm forming lip, lower tepals 25–30 × 4–5 mm. *Stamens* unilateral; filaments suberect, 12–16 mm long; anthers 7–8 mm long, whitish. *Ovary* smooth; style dividing opposite middle ⅓ of anthers, branches 4–6 mm long. *Capsules* subglobose, 8–9 mm long. *Flowering time*: late May to early June, fruiting in August to September.

Distribution and ecology: restricted to southern Namaqualand in Northern and Western Cape, South Africa, between Nuwerus and Bitterfontein; on gently sloping granite hills and valley bottoms in gravelly ground in open succulent karroid shrubland.

Discussion: *Babiana virescens* accords with sect. *Teretifolieae* in its apically forked inner floral bracts but is unusual in its well-developed aerial stem. The bilabiate flowers stand out in having particularly narrow, ± linear tepals, the dorsal 32–38 × 6.5–8.0 mm and the remaining tepals 4–5 mm wide. Although quite large, the greenish flowers are not conspicuous but have a characteristic spicy-acrid, chemical odour that is common in the genus. *Babiana virescens* may be most closely allied to *B. torta* and *B. namaquensis* on account of the slightly coiled leaves and early flowering but it is easily distinguished from them by its greenish flowers with particularly narrow tepals, and by the subglabrous or very short-hairy leaves and the aerial stem up to 100 mm high. The slightly thickened leaf margins are most evident in herbarium specimens, drying whitish or pale. Both blue-flowered *B. torta* and pale mauve–white-flowered *B. namaquensis* have distinctly hairy leaves without conspicuous margins and typically occur in rock outcrops, granite in the former but often limestone in the latter, with their corms wedged in crevices. *Babiana torta* typically occurs in granite rock outcrops, whereas *B. virescens* always occurs in open ground and relatively deep, loamy gravel. Both species have been collected within a few kilometres of one another east of Bitterfontein.



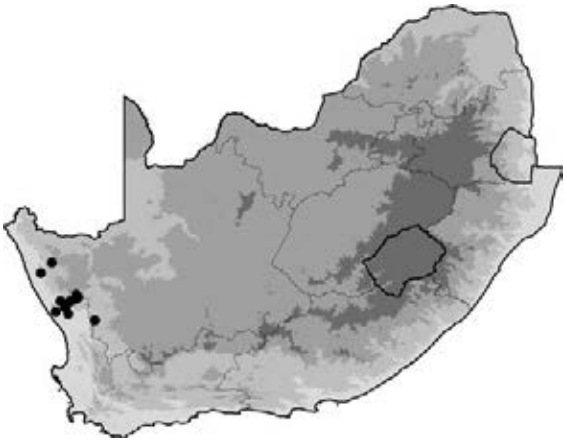
Distribution of ***Babiana virescens***.

15. **Babiana torta** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 86 (1959); Goldblatt & Manning: 27 (2007). Type: South Africa, [Northern Cape], ± 10 miles E of Kliprand to Brakfontein, 1 May 1958, *H. Hall s.n. as Natl. Bot. Gard. 385/54* (NBG, holo.).

Plants 40–80(–120) mm high. *Stem* largely underground or extending up to 10 mm above ground, unbranched. *Leaves* lanceolate, 7–12(–18) mm wide, soft-textured, undulate, sometimes lightly crisped, twisted above middle, margins and usually only one major vein prominently thickened, lying close to upper margin, softly hairy to ± smooth, juvenile leaves ± linear and loosely coiled, prominently hairy. *Spike* compact, at ground level, 1- to 3(–5)-flowered; bracts green with tips drying light brown, lightly hairy, 17–20 mm long, inner ± as long or slightly longer than outer, forked in upper ⅓. *Flowers* zygomorphic, pale slate-blue to mauve, or white, lower lateral tepals with pale yellow to white median blotch usually edged in dark blue, sweetly scented; perianth tube 20–22 mm long; tepals unequal, dorsal 30–34 mm long, lower tepals 22–25 mm long. *Stamens* unilateral; filaments arched, ± 15 mm long; anthers ± 6 mm long. *Ovary* smooth; style dividing opposite anther apices, branches ± 2 mm long. *Flowering time*: mainly May to mid-June.

Distribution and ecology: occurring across Namaqualand and extending from Springbok to Kliprand in Northern Cape, South Africa, to Nuwerus in Western Cape; mainly in crevices in granite outcrops or granitic gravel.

Diagnosis: *Babiana torta* flowers early in the season, mainly in late autumn, when little collecting is normally done. Plants are most often seen growing in cracks in granite outcrops with the narrow, coiled juvenile leaves mixed with the broader, less hairy leaves of mature individuals. Although plants usually have softly hairy leaves and bracts, the leaves may occasionally be almost smooth and the bracts sparsely hairy. Flowers are usually pale to mid-blue with white to pale yellow



Distribution of ***Babiana torta***.



Distribution of ***Babiana namaquensis***.

on the lower tepals, but may occasionally be white or even greenish mauve.

Babiana torta appears to be related to a group of early winter-flowering, dwarf species of Namaqualand and the adjacent western Karoo, including *B. crispa, B. minuta, B. namaquensis*, and *B. tanquana*. These all have few-flowered spikes borne at ground level and variously undulate, twisted or crisped leaves. Among this group, *B. torta* may be most closely related to *B. minuta*, also a species of rock outcrops and shallow soils that occurs in the western Karoo and adjacent southern Namaqualand. *Babiana torta* may also be confused with *B. namaquensis* and their differences are discussed in detail under the latter species.

16. **Babiana namaquensis** *Baker*, Handbook of the Irideae 181 (1892); Lewis: 76 (1959); Goldblatt & Manning: 28 (2007). Type: South Africa, [Northern Cape], sandy plains near Port Nolloth, Aug. 1883, *H. Bolus 6579* (K, holo.; BOL, iso.).

Babiana buchubergensis Dinter: 254 (1931). Type: Namibia, Buchuberg, on micaceous schist in a water ravine, 2 Aug. 1929, *M.K. Dinter 6569* (B, holo.).

Plants up to 80 mm high. *Stem* reaching ground level, usually with well-developed collar of fibres around base. *Leaves* narrowly lanceolate to linear, twisted to loosely coiled above, 1.5–3.5(–8.0) mm wide, not evidently pleated, smooth or with short or long hairs, margins and central vein prominently thickened. *Spike* borne at ground level, 1- to 3-flowered; bracts smooth, green with dry brown tips, 17–27 mm long, inner forked apically. *Flowers* zygomorphic, pale mauve to creamy white, flushed purple outside, lower lateral tepals white to yellow with mauve tips, sweetly scented; perianth tube funnel-shaped, 25–28 mm long; tepals unequal, dorsal 30–40 mm long, lower 3 shorter, 25–35 mm long, joined basally for short distance. *Stamens* unilateral; filaments arched, ± 12 mm long; anthers 5–6 mm long. *Ovary* smooth; style dividing opposite anther apices, branches ± 4 mm long. *Flowering time*: mainly June, sometimes in early July.

Distribution and ecology: occurring in southwestern Namibia and adjacent South Africa in the Richtersveld, extending from Buchuberg in southwestern Namibia to Eksteenfontein in Northern Cape; stony coastal and near interior flats and low hills, usually on weathered dolomite but also on micaceous schist, the corms often wedged in rock crevices.

Diagnosis: although surprisingly common in the Richtersveld, *Babiana namaquensis* is seldom seen for it flowers early in the season, mostly in June or July, when little plant exploration is undertaken. Leaf morphology of *B. namaquensis* is unusually variable. Younger plants produce narrow leaves, twisted or coiled above, while mature plants have narrowly lanceolate leaves loosely twisted distally. The leaf morphology recalls that of *B. torta*, a similarly acaulescent species of central and southern Namaqualand that also has coiled to twisted leaves. In *B. torta* the leaves are usually densely hairy, while the slate-blue or rarely white flowers have a perianth tube 20–22 mm long, and the bracts are prominently veined and silky hairy or rarely sparsely velvety. In contrast, *B. namaquensis* has sparsely hairy to smooth leaves, consistently smooth bracts, and a pale mauve to white perianth with a tube 25–28 mm long. *Babiana torta* appears to be confined to granitic substrates, mostly growing in cracks in granite outcrops, and it flowers mainly in May or early June, whereas *B. namaquensis* favours limestone substrates and flowers somewhat later, in late June or July.

17. **Babiana longicollis** *Dinter* in Repertorium specierum novarum regni vegetabilis 29: 253 (1931); Lewis: 103 (1959). Type: Namibia, Klinghardt Mtns, 26 Sept. 1922, *M.K. Dinter 4007* (B, holo.).

Plants 100–150 mm high, including leaves. *Stem* reaching shortly above ground, sometimes branched, smooth.



Distribution of ***Babiana longicollis***.

Leaves sword-shaped to lanceolate, linear in juvenile plants, 60–100 × 4–10 mm, firm, lightly to strongly pleated, minutely hairy or almost hairless, loosely twisted in upper half and sometimes tip recurved, margins sparsely silky-hairy. *Spike* compact, decumbent, 3- to 5-flowered; bracts green with tips punctate and drying reddish brown, fairly prominently veined, smooth, 18–25 mm long, inner slightly longer than outer, forked apically, with dry attenuate tips. *Flowers* zygomorphic, purple to grey-mauve or greenish, lower tepals marked with white to pale yellow, scented of sweet pea; perianth tube (?32–)35–45 mm long; tepals unequal, dorsal 20–30 × (10–)15–20 mm, lower 3 tepals shortly united, 14–16 mm long. *Stamens* unilateral; filaments arched, ± 10 mm long; anthers 5–6 mm long. *Ovary* smooth; style dividing opposite anther bases, 3–4 mm long. *Flowering time*: mainly late June and July but sometimes in August.

Distribution and ecology: local in SW Namibia, from the Klinghardt Mtns to Rosh Pinah; in crevices in granite outcrops.

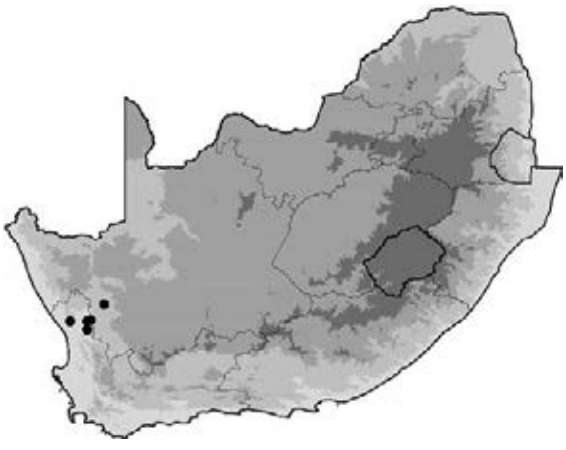
Diagnosis: known from a handful of collections from southern Namibia, *Babiana longicollis* has a stem produced shortly above the ground, relatively large flowers with a perianth tube 35–45 mm long and gradually widening in the upper half, and the dorsal tepal 20–30 mm long. Its relationships appear to lie with the northern Namaqualand species, *B. namaquensis*, which has identical leaves, ± 1.5–8.0 mm wide, loosely twisted in the upper half and weakly or not at all pleated, and pale mauve to whitish flowers with a substantially shorter perianth tube, mostly 25–28 mm long, compared to the longer tube of *B. longicollis*. The tepals of *B. longicollis* are smaller than to about the same size as those of *B. namaquensis*, the dorsal (15–)20–30 × (10–)15–20 mm. The style divides close to the bases of the anthers in *B. longicollis* but opposite the anther tips in *B. namaquensis*. Both species have hairless bracts.

18. **Babiana cinnamomea** *J.C.Manning & Goldblatt* in Strelitzia 18: 29 (2007). Type: South Africa, Western Cape, stony shale slope between Vanrhynsdorp and Grootdrif, foot of Vuurberg, rock crevices, 15 June 2002, *J.C. Manning 2744* (NBG, holo.).

Plants 40–60 mm high. *Stem* subterranean, unbranched, smooth. *Leaves* broadly ovate, held ± at right angles to sheaths, ± ovate, 30–40 × 20–25 mm, smooth, margins thickened, minutely papillate and crisped. *Spike* decumbent, short, 2- to 6-flowered; bracts green below, dry and translucent light brown toward tips, hairless, outer 17–19 mm long, inner 20–25 mm long, notched at apex. *Flowers* zygomorphic, pale yellow-green flushed with mauve, lower lateral tepals with white to cream-coloured median blotches, with sweet spicy scent; perianth tube funnel-shaped, narrow part hollow to base, 22–25 mm long; tepals unequal, dorsal ± 30 × 7–8 mm, upper lateral tepals joined to lower for ± 6 mm, forming a lip, lower tepals ± 20 mm long. *Stamens* unilateral; filaments ± 15 mm long; anthers 7–8 mm long. *Ovary* smooth; style dividing opposite anther tips, branches ± 3.5 mm long. *Flowering time*: early to midwinter, May and June.

Distribution and ecology: a fairly local endemic occurring along the base of the mountains stretching from east of Vanrhynsdorp to the Langberg west of Loeriesfontein in Western Cape, South Africa, and in the dry hills west of Nuwerus; on stony lower slopes usually in granite outcrops, also recorded on shale among quartzite pebbles.

Diagnosis: a dwarf species, *Babiana cinnamomea* has distinctive, broadly ovate leaves with undulate and crisped margins unique in the genus, and the floral bracts are unusual in being largely dry, thinly papery in texture, and pale straw in colour with minute light brown flecks over the surface. Even in full bloom *B. cinnamomea* is inconspicuous, for the pale bluish green to pale yellow flowers are borne close to the ground and are easily overlooked.



Distribution of ***Babiana cinnamomea***.

The flowers have a particularly strong, sweet, spicy scent, reminiscent of cinnamon and clove, produced during the day and at night, a feature more noticeable than the drab flower colour and suggesting moth pollination. Like many other species of *Babiana* with highly modified leaves, the juvenile foliage is very different. Seedlings and plants with immature corms have slender, linear leaves that bear a few long soft hairs.

19. **Babiana horizontalis** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 90 (1959); Goldblatt & Manning: 31 (2007). Type: South Africa, [Northern Cape], Anenous Pass, June 1900, *E.G. Alston in Herb. Marloth 4568* (PRE, holo.).

Plants up to 50 mm high, including leaves. *Stem* reaching up to 30 mm above ground, unbranched, smooth, enclosed below by thick fibrous collar. *Leaves* lanceolate, blades held at right angles to short pseudopetioles 20–30 mm long, almost horizontal, 30–40 × 13 mm, scarcely plicate, smooth or sparsely long-hairy on upper margins, prominently 3- or 4-ribbed. *Spike* horizontal, (1)2- to 5-flowered; bracts green, smooth, closely striate, 25–70 mm long, inner shorter than outer, forked apically, tips pale and dry. *Flowers* zygomorphic, outer tepals lilac, occasionally yellow, inner tepals pale yellow; perianth tube ± 25 mm long, funnel-shaped; tepals unequal, dorsal ± 27 mm long, lower 3 tepals 20–23 mm long. *Stamens* unilateral; filaments 16–17 mm long; anthers ± 6 mm long, said to be declinate. *Ovary* smooth; style dividing just beyond anther tips, branches 3–4 mm long, expanded at tips. *Flowering time*: June and July.

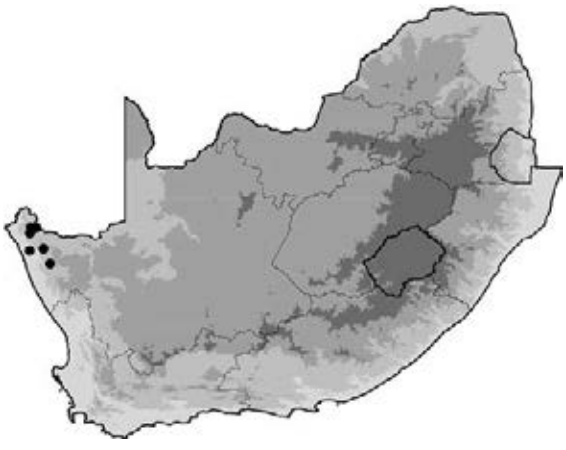
Distribution and ecology: relatively poorly known, restricted to the southern Richtersveld, in Northern Cape, South Africa; evidently on granite outcrops.

Diagnosis: the dwarf *Babiana horizontalis* is easily recognised by the unusual leaves, borne on pseudopetioles sometimes up to 30 mm long, with the expanded, lanceolate to oblong blades prominently 3- or 4-ribbed, scarcely pleated, and held horizontally at right angles to the sheaths. The flowers typically have lilac outer and yellow inner tepals but may also be entirely yellow. The immediate relationships of *B. horizontalis* are uncertain, but it seems to be allied to the several dwarf, acaulescent species of Namaqualand, all of which have a smooth ovary and similar inner bracts forked at the apex.

20. **Babiana gariepensis** *Goldblatt & J.C.Manning* in Strelitzia 18: 31 (2007). Type: South Africa, Northern Cape, Richtersveld National Park, Koeskop, steep, south-facing rocky slope, Sept. 1995, *G. & F. Williamson 5776* (NBG, holo.).

Plants 120–200(–280) mm high. *Stem* usually largely subterranean, with 1 or 2 branches produced close to ground level, smooth. *Leaves* ascending-horizontal, borne obliquely to sheath and stem, blade broadly lanceolate, (40–)70–110 × 18–25 mm, exceeding spike, scabrid to papillate on veins and margins, rough to touch, obscurely plicate but with 3 to 5 main veins. *Spike* decumbent, close to ground level, congested, 3- to 5-flowered; bracts lightly striate, green with brown apices, shortly hairy on veins, 23–35 mm long, inner slightly shorter to ± as long as outer, forked apically. *Flowers* zygomorphic, bilabiate, pale grey-green, upper tepals each with slate-blue median streak, red-lined in throat, lower 3 tepals with white spear-shaped markings outlined in dull reddish maroon, sweetly violet-scented; perianth tube 20–24 mm long, slender below, curving outward and wider in upper 7 mm; tepals unequal, dorsal 28–32 × ± 5 mm, arching over stamens, upper laterals ± 28 × 4 mm, joined to lower for ± 5 mm, lower tepals 18–24 mm long. *Stamens* unilateral; filaments arched, ± 16 mm long; anthers ± 5 mm long, lilac; pollen grey-white. *Ovary* smooth; style dividing opposite lower ⅓ of anthers, branches ± 2 mm long. *Flowering time*: June and July.

Distribution and ecology: restricted to southern Namibia and Northern Cape, South Africa, from the Namuskluft near Rosh Pinah to Koeskop and Grasvlakte in the Richtersveld; on rocky open slopes and south-facing cliffs.



Distribution of ***Babiana horizontalis***.



Distribution of ***Babiana gariepensis***.

Diagnosis: *Babiana gariepensis* remains poorly collected and somewhat puzzling. The large bracts, 23–35 mm long, with the inner forked near the apex place *B. gariepensis* in sect. *Teretifolieae*. The broad, sparsely hairy, lightly plicate leaf and moderately long perianth tube, 20–22 mm long, with a sharp curve below the throat suggest a possible relationship with the central Namaqualand *B. attenuata*. The flowers seem distinctive also in the relatively long, narrow tepals, the dorsal 28–32 × 5 mm. Additional material in flower is needed to better understand this apparently rare southern Namibia and Richtersveld endemic.

Ser. **Cuneifolieae** *Goldblatt & J.C.Manning*, new series. Type: *Babiana cuneata* J.C.Manning & Goldblatt

Leaves abruptly truncate; flowers zygomorphic; perianth tube ⅓ as long to much longer than dorsal tepal, obliquely funnel-shaped or straight, slender, not or only slightly expanded at apex.

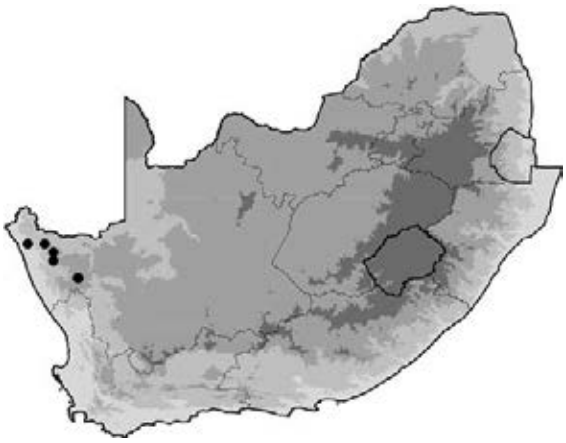
21. **Babiana flabellifolia** *Harv. ex Klatt* in Linnaea 35: 380 (1867); Goldblatt & Manning: 32 (2007). Type: South Africa, [Northern Cape], Namaqualand, without precise locality or date, probably near Modderfontein, west of Springbok, *H. Whitehead s.n.* (K, holo.).

Babiana cuneifolia Baker: 335 (1876). Type: South Africa, [Western Cape], Mierenkasteel, karroid slopes, Aug. 1830, *J.F. Drège 2627* (K, holo.; MO, P [2 sheets)], S, iso.).

Babiana truncata G.J.Lewis: 100 (1959). Type: South Africa, [Northern Cape], 2 miles E of Springbok, 26 July 1950, *G.J. Lewis 2203* (SAM, holo.; SAM, iso.).

Plants up to 80 mm high. *Stem* short or entirely underground. *Leaves* crowded basally, abruptly truncate and wedge-shaped, pleated, smooth or finely hairy with shortly velvety margins, or rarely coarsely hairy with white hairs up to 2.5 mm long; juvenile leaves filiform and long-hairy. *Spike* borne at ground level, compact, 2- to several-flowered; bracts 15–30 mm long, ± membranous or green, smooth or papillate to finely hairy, inner bract forked at tip, tapering into slender awns. *Flowers* zygomorphic, pale mauve to violet, tube white to pale yellow and lower lateral tepals with pale yellow to white median markings, sweetly scented of rose or carnation, open day and night; perianth tube 12–36 mm long, cylindric, straight, dorsal tepal suberect or arching forward, 27–35 mm long, lower tepals slightly shorter, 25–27 mm long. *Stamens* unilateral; filaments arcuate, 15–18 mm long; anthers 6–8 mm long. *Ovary* smooth; style dividing near anther apices, branches 4–5 mm long, expanded apically. *Flowering time*: mainly June and July sometimes in early August.

Distribution and ecology: restricted to northwestern South Africa, extending from the Anenous Mtns of northern Namaqualand in Northern Cape to Koekenaap in the south in Western Cape, and locally inland on the Bokkeveld Plateau near Calvinia; in clay and granitic soils, in renosterveld and succulent karroid scrub.



Distribution of ***Babiana flabellifolia***.

Diagnosis: among the five species of *Babiana* with truncate, ± cuneate leaves, *B. flabellifolia* is distinguished by the sweetly scented flowers with subequal tepals and a perianth tube of short to moderate length, 12–36 mm long. The tube is largely or entirely included in soft-textured bracts 15–30 mm long. The flowers remain open at night and are then strongly scented of carnation. The relatively short perianth tube has comparatively thick walls in the lower half when the tube exceeds 20 mm, so that nectar is forced into the upper part of the tube where it is accessible to long-tongued solitary bees and moths, the presumed pollinators. Plants are often hairless, or sparsely hairy on the leaf margins or bracts, but the feature is variable, and some collections from near Springbok have lightly hairy leaves. The type collection of *B. flabellifolia* is somewhat puzzling because the leaves and bracts are conspicuously hairy. The exact origin of the type is unknown but Reverend Whitehead, who collected it, was stationed at the Anglican Mission at Modderfontein, close to Springbok and the presumption is that the type of *B. flabellifolia* was collected there or nearby. The long-hairy leaves and bracts of the type are not matched in any other specimen with truncate leaves and it is possible that they represent a taxon separate from the hairless or sparsely hairy plants that occur widely in southern Namaqualand as well as north of Springbok. More information on the variation in the type population and those growing nearby would be helpful in dealing more critically with the question about the status of the type of *B. flabellifolia* relative to other collections assigned to the species.

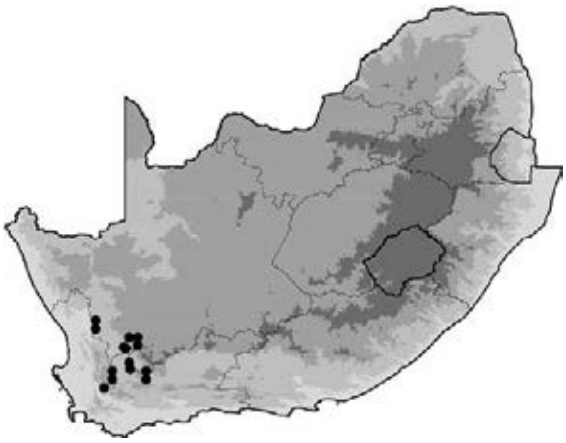
22. **Babiana cuneata** *J.C.Manning & Goldblatt* in Bothalia 34: 89 (2004); Goldblatt & Manning: 33 (2007). Type: South Africa, Western Cape, Cold Bokkeveld, Katbakkies Pass, 5 Sept. 2000, *P. Goldblatt & J.C. Manning 11457* (NBG, holo.; K, MO, PRE, iso.).

Plants 80–150 mm high, including leaves. *Stem* short, smooth. *Leaves* crowded basally, up to 6, oblong, (20–)30–100 × 8–18(–30) mm, leathery, pleated, abruptly truncate, smooth or finely velvety hairy. *Spike* compact, borne at ground level, 2- to 5(–7)-flowered; bracts green with brown attenuate tips, smooth or lightly hairy, 25–50 mm long, inner ± as long as outer, forked apically, basal margins sometimes fused around ovary for ± 2 mm. *Flowers* zygomorphic, pale blue to violet, lower lateral tepals with white median marks outlined dark violet to purple below, evidently odourless or sweetly scented; perianth tube 40–60 mm long, cylindric, straight, widening slightly in upper 8 mm; tepals spreading, subequal or upper three slightly larger, 26–32(–40) × 6–12 mm, upper laterals fused to lower for ± 2 mm. *Stamens* unilateral; filaments unilateral, 15–18 mm long, exserted 9–10 mm; anthers ± 6(–11) mm long, pale yellow to cream-coloured. *Ovary* smooth, lower flowers shortly stalked; style dividing opposite anther bases or opposite anther apices, branches ± 6 mm long, arching outward between or over anthers. *Flowering time*: August to mid-September.

Distribution and ecology: extending from the Bokkeveld Mtns and Klein Roggeveld in Northern Cape, South Africa, to the interior Cold Bokkeveld as far south as Karoopoort and the foot of the Witteberg between Matjiesfontein and Laingsburg in Western Cape; on dry rocky sandstone or dolerite slopes and flats in arid fynbos, renosterveld, or karroid bush.

Diagnosis: among the species with truncate foliage, *Babiana cuneata* is distinguished by the elongate perianth tube, 40–60 mm long, more-or-less equal, ascending tepals 26–30(–40) mm long, and a pale blue to violet, fragrant or apparently odourless flower. The stamens are openly displayed, with filaments 15–18 mm long and exserted 9–10 mm. The point of division of the style varies. In the type population the style branches opposite the base of the anthers but in plants to the south, below the Roggeveld Escarpment, it reaches the anther apices before branching. Flowering occurs from early August to late September. *Babiana flabellifolia* has, in contrast, strongly scented bilabiate flowers with an arched dorsal tepal more-or-less concealing the stamens, a perianth tube 18–36 mm long, and often dry, submembranous, or occasionally green, leafy bracts. In specimens where it is possible to see floral details, the style divides opposite the anther apices. Flowering in *B. flabellifolia* occurs from late June through July, rarely in early August in seasons when the rains are late or conditions are particularly cold. The flowers of *B. cuneata* closely resemble those of *B. sambucina*, which is widespread across the dry interior of the Cape Floral Region, but absent from the Roggeveld.

Plants at the southern end of the range, in the Klein Roggeveld south of Komsberg Pass, have unusually large flowers with the dorsal tepal ± 40 mm long, the anthers 9–11 mm long, and the style is also unusual in dividing opposite the anther apices rather than opposite their bases. Plants also seem unusual in the blue-grey colour of the leaves, often 20–30 mm wide, likewise exceptional for the species. At present, however, there appears no reason to recognise these as a separate taxon.



Distribution of ***Babiana cuneata***.

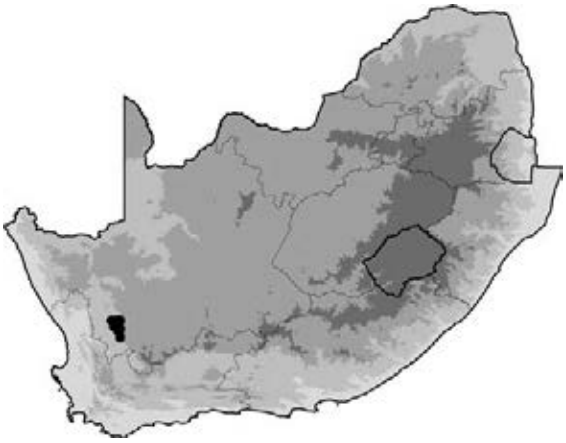
23. **Babiana praemorsa** *Goldblatt & J.C.Manning* in Bothalia 34: 90 (2004); Goldblatt & Manning: 35 (2007). Type: South Africa, [Northern Cape], Calvinia District, north of Bloukrans Pass, shale flats, 25 Aug. 1976, *P. Goldblatt 3935* (NBG, holo.; K, MO, iso.).

[*Babiana flabellifolia* sensu G.J.Lewis: 98 (1959), not of Harv. ex Klatt, misapplied name.]

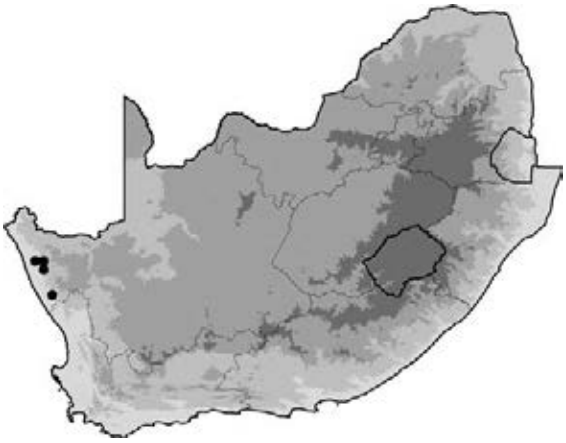
Plants 50–150 mm high. *Stem* short, suberect or decumbent, rarely reaching 20 mm above ground. *Leaves* several in a spreading fan, oblong-cuneate, abruptly truncate, pleated, minutely hairy, in a spreading fan; juvenile leaves linear, ± 1 mm wide, silky hairy. *Spike* congested, 5- to 6-flowered; bracts green, minutely hairy, outer 25–50 mm long, inner slightly shorter, forked apically, with acuminate tips. *Flowers* weakly zygomorphic, dark violet with white to cream-coloured spear-shaped marks often edged with red or dark blue on lower lateral tepals, unscented or rarely lightly sweet-scented; perianth tube 40–60 mm long, cylindric, straight; tepals subequal, spreading horizontally, mostly 18–22 × 3.5–5.0 mm. *Stamens* unilateral; filaments suberect, 8–9 mm long, exserted 4–5 mm; anthers 5–6 mm long, violet or yellow. *Ovary* smooth; style dividing opposite upper half of anthers or shortly beyond them, branches 2–3 mm long. *Flowering time*: August to mid-September.

Distribution and ecology: endemic to the Calvinia Distinct in Northern Cape, South Africa, and extending from the Hantamsberg and Bloukrans Pass westward to near Nieuwoudtville; in dolerite outcrops, often in rock crevices.

Diagnosis: one of five species of *Babiana* with abruptly truncate, wedge-shaped leaves, *B. praemorsa* is recognised by its flowers with a straight, cylindric perianth tube 40–60 mm long and firm, narrow, spreading tepals, 18–22 mm long. The perianth is deep violet rather than



Distribution of ***Babiana praemorsa***.



Distribution of ***Babiana pubescens***.

blue as in the apparently related long-tubed *B. pubescens* of the central Namaqualand. *Babiana praemorsa* can be distinguished from it and *B. cuneata*, the other long-tubed species with wedge-shaped leaves, by its short filaments, 8–9 mm long, exserted 4–5 mm from the perianth tube, tepals spreading at right angles from the nearly straight tube of uniform diameter, and short style branches ± 3 mm long.

24. **Babiana pubescens** *(Lam.) G.J.Lewis* in Annals of the South African Museum 40: 131 (1954); Lewis: 110 (1959), excl. syn. *B. cuneifolia* Baker; Goldblatt & Manning: 36 (2007). *Gladiolus pubescens* Lam.: 119 (1791). Type: South Africa, [Northern Cape], without precise locality or date, *F. le Vaillant s.n.* (P: Herb. Lamarck, holo.).

Plants 60–100 mm high. *Stem* short, decumbent, rarely extended above ground, simple or 1- or 2-branched. *Leaves* crowded basally, abruptly truncate and wedge-shaped, lightly pleated, usually finely hairy. *Spike* congested, 6- to 10-flowered; bracts ± smooth to velvety, 20–38 mm long, inner slightly shorter than outer, forked apically. *Flowers* zygomorphic, blue to violet with white median marks often edged red on lower lateral tepals; perianth tube elongate, sharply bent below apex, ± 50 mm long; tepals unequal, dorsal largest and held somewhat apart, ± 20 mm long, lower tepals joined to upper laterals for short distance and to one another for ± 2 mm, forming a lip, 15–17 mm long. *Stamens* unilateral; filaments ± 15 mm long, well exserted from tube; anthers 6–7 mm long. *Ovary* smooth; style dividing opposite lower half of anthers; style ± 4 mm long. *Flowering time*: late July to early September.

Distribution and ecology: occurring in central Namaqualand, Northern Cape, South Africa, extending from Komaggas in the north to Garies; on stony slopes in coarse granitic gravel.

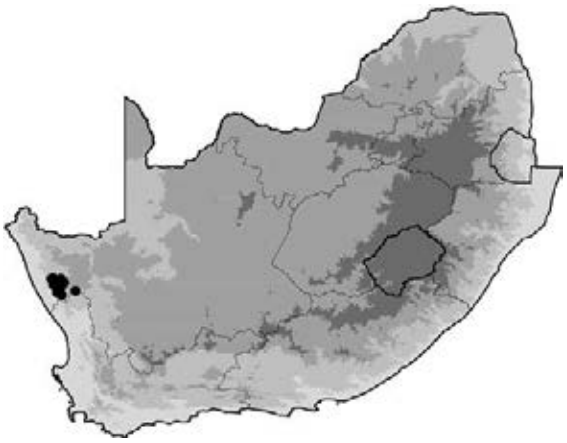
Diagnosis: *Babiana pubescens* is readily distinguished among the species with truncate leaves by the slender perianth tube, ± 50 mm long, sharply bent below the apex, and the relatively narrow tepals 15–20 mm long and 5–7 mm wide. Although said by Lewis (1959) to occur from Garies southward to Mierenkasteel (near Nuwerus) in southern Namaqualand, *B. pubescens* has only been reliably reported from Komaggas, southwest of Springbok, and in the vicinity of Garies. Despite being increasingly threatened by overgrazing and especially the heavy stocking of goats, *B. pubescens* remains relatively common locally. The attractive, blue to violet, long-tubed flowers are pollinated by the long proboscid fly, *Prosoeca peringueyi*, an important insect pollinator of species with long-tubed flowers in Namaqualand.

Ser. **Longitubae** *Goldblatt & J.C.Manning*, new series. Type: *Babiana sambucina* (Jacq.) Ker Gawl.

Flowers zygomorphic or actinomorphic (*Babiana symmetrantha*); perianth tube as long as or longer than dorsal tepal, slender, not or only slightly expanded at apex.

25. **Babiana attenuata** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 102 (1959); Goldblatt & Manning: 36 (2007). Type: South Africa, [Northern Cape], foot of the Kamiesberg near Kamieskroon, 29 July 1957, *G.J. Lewis 4414* (SAM, holo.; NBG, iso.).

Plants up to 80 mm high. *Stem* mostly or entirely underground, softly hairy. *Leaves* sword-shaped to lanceolate, rarely linear, plicate, softly hairy, often twisted and arching toward ground. *Spike* decumbent, 4- to 9-flowered; outer bract 20–30 mm long, velvety, inner ± as long, forked apically, attenuate. *Flowers* zygomorphic, bilabiate, blue to violet with white to yellow marks on lower lateral tepals, strongly scented of violets; perianth tube narrowly funnel-shaped, 25–35 mm long, bent near apex; tepals unequal, dorsal (20–)26–35 mm long, lower tepals slightly shorter. *Stamens* unilateral; filaments arching under dorsal tepal, ± 15 mm long; anthers 5–7 mm long. *Ovary* smooth; style arching over stamens, dividing opposite anther tips, branches ± 2.5 mm long. *Flowering time*: late July to early September.



Distribution of ***Babiana attenuata***.

Distribution and ecology: restricted to central Namaqualand, in the Kamiesberg and the highlands between Kamieskroon and Garies in Northern Cape, South Africa; on rocky and gravel slopes.

Diagnosis: *Babiana attenuata* has attractive blue-violet flowers borne on crowded horizontal spikes close to ground level. It is most easily recognised by the moderately long perianth tube, 25–35 mm long, about as long as or slightly longer than the bracts and tepals, and the strong sweet violet floral fragrance. It is easily confused with the vegetatively virtually identical *B. curviscapa*, which extends from Steinkopf in the north to Bitterfontein in the south, thus including the entire range of *B. attenuata*. They are separated primarily by the length of the perianth tube, substantially longer in *B. curviscapa* and usually 36–43 mm vs. 25–35 mm in *B. attenuata*. Flowers of *B. attenuata* are always strongly fragrant and have tepals usually 26–35 mm long, whereas the flowers of *B. curviscapa* are only faintly scented or lack a floral odour completely and the shorter tepals are 20–23 mm long. In the north of its range *B. curviscapa* has magenta to cherry-red flowers but elsewhere they are blue as in *B. attenuata*. Despite its relatively long perianth tube, *B. attenuata* is pollinated by anthophorine bees with mouthparts about 10 mm long.

Plants from the southern Kamiesberg with erect, linear leaves up to 150 mm long and conspicuously long-hairy, appear rather different to other populations of *B. attenuata* and may represent a local variant or possibly a separate species but the flowers match those of other populations of the species in critical details.

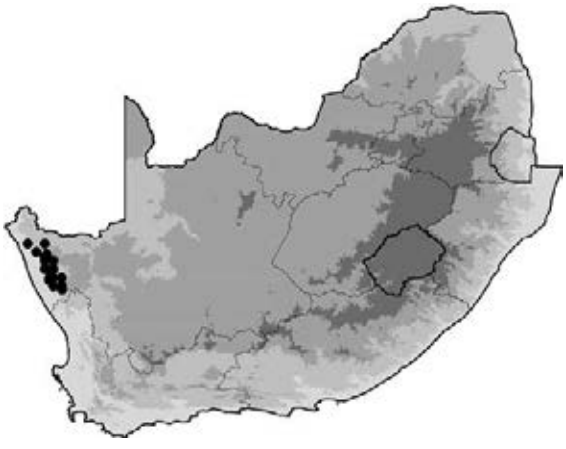
26. **Babiana curviscapa** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 107 (1959); Goldblatt & Manning: 37 (2007). Type: South Africa, [Northern Cape], Nababeep, 5 Sept. 1951, *W.F. Barker 7431* (NBG, holo.; K, iso.).

Babiana framesii var. *kamiesbergensis* G.J.Lewis: 98 (1959). Type: South Africa, [Northern Cape], Kamiesberg, ex hort. Kirstenbosch, 30 Sept. 1943, *C.L. Leipoldt s.n.* as *Natl. Bot. Gard. 981/39* (NBG, holo.).

Plants mostly acaulescent, 80–150 mm high, including leaves, often growing in tufts. *Stem* short, mostly underground, smooth or hispid to long-hairy, with up to 3 branches. *Leaves* several, lanceolate, pleated, velvety hairy, rarely long silky hairy, blades held apart, not forming a fan, loosely twisted, mostly 5–8 mm wide, rarely up to 15 mm. *Spike* horizontal, 5- to 12-flowered; bracts green with dry brown tips, velvety, 25–35 mm long, inner ± as long as outer, forked at apex. *Flowers* zygomorphic, deep red-purple or violet to deep blue, with white markings on lower lateral tepals, odourless or faintly violet-scented; perianth tube elongate-cylindric, 36–43 mm long, bent near apex; tepals unequal, dorsal 20–23 mm long, lower tepals 17–19 mm long. *Stamens* unilateral; filaments 12–14 mm long; anthers 4–6 mm long, white. *Ovary* smooth; style dividing opposite upper ⅓ of anthers, branches ± 4 mm long. *Flowering time*: late August to September.

Distribution and ecology: extending from the southern Richtersveld near Steinkopf to the Kamiesberg in Northern Cape, South Africa, and to Bitterfontein in Western Cape; on stony granitic flats and granite outcrops.

Diagnosis: the most common long-tubed species of *Babiana* in Namaqualand, *B. curviscapa* blooms from late August to the end of September, depending on elevation, plants on the Kamiesberg flowering the latest. It appears to be most closely allied to *B. attenuata*, which is vegetatively virtually indistinguishable in its short, somewhat twisted leaves but with strongly scented violet flowers with a shorter perianth tube, 25–35 mm long, and adapted for pollination by large-bodied long-tongued anthophorine bees, whereas the longer-tubed flowers of *B. curviscapa* are pollinated by long-proboscid flies. Although the two species flower at a slightly different time, *B. curviscapa* mainly in September and *B. attenuata* from late July to late August, flowering times may overlap at some sites, creating the possibility for hybridisation. Possible interspecific crossing between



Distribution of ***Babiana curviscapa***.

the two species is the reason they can sometimes be difficult to distinguish.

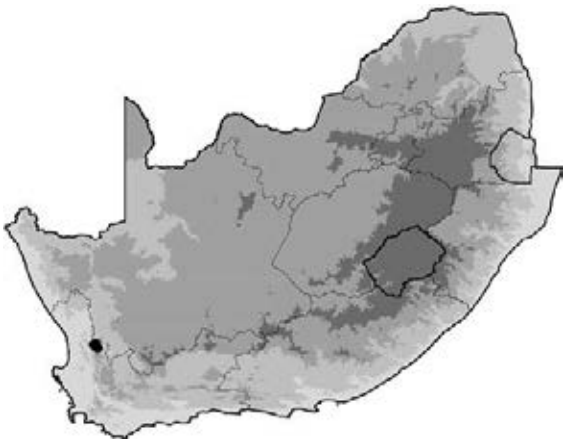
27. **Babiana geniculata** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 109 (1959); Goldblatt & Manning: 38 (2007). Type: South Africa, [Western Cape], Wuppertal, Boontjiesrivier, 25 Aug. 1896, *R. Schlechter 8666* (BOL, holo.; B, MO, S, iso.).

Babiana velutina var. *nana* Schltr.: 100 (1899). Type: South Africa, [Western Cape], Boontjiesrivier, 25 Aug. 1896, *R. Schlechter 8666* (B, BOL, MO, S, syn.).

Plants 20–60 mm high. *Stem* reaching just above ground, usually unbranched, velvety-hairy, enclosed below in thick collar of fibres. *Leaves* lanceolate, pleated, usually inclined toward ground, velvety-hairy. *Spike* compact, decumbent, 4- to 9-flowered; outer bract 25–35 mm long, green with dry acuminate apices, densely hairy, inner ½–⅔ as long, forked in upper ⅓. *Flowers* zygomorphic, violet, lower lateral tepals with white median streaks, unscented; perianth tube 35–45 mm long, cylindric, sharply bent near apex; tepals unequal, dorsal 23–29 mm long, lower tepals joined to upper laterals for ± 3 mm and to one another for 2–3 mm, forming a prominent lip, 15–22 mm long. *Stamens* unilateral; filaments arcuate, diverging distally, 13–15 mm long; anthers ± 7 mm long, held widely apart. *Ovary* hairy above base; style dividing opposite middle of filaments, branches slender 11–13 mm long. *Flowering time*: August.

Distribution and ecology: endemic to the northern Cederberg, Pakhuis and Biedouw Mtns in Western Cape, South Africa; on rocky sandstone slopes in dry fynbos.

Diagnosis: low-growing and virtually acaulescent, *Babiana geniculata* is distinctive in its flowers with a long slender perianth tube 35–45 mm long and bent at a sharp angle just below the apex, the ovary hairy above the base, and the divergent rather than parallel filaments with the anthers held well apart from one another. The style is also unusual in dividing opposite the middle of the filaments, thus below the bases of the anthers. The style branches, the longest in the genus, 11–13 mm long, are slender and barely expanded at the tips. The flowers are adapted for pollination by long-proboscid flies.



Distribution of ***Babiana geniculata***.

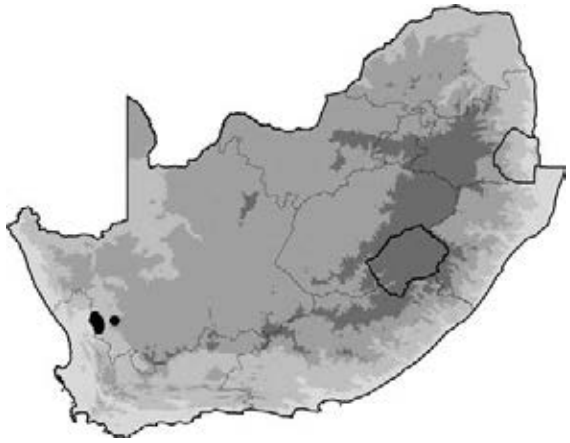
The inner bracts, forked in the upper third, are consistent with sect. *Teretifolieae* in which the inner bracts are usually forked only near the apex, whereas superficially similar *Babiana ecklonii* is a taller plant with the inner bracts divided to the base, a feature diagnostic for sect. *Babiana*. *Babiana curviscapa* from Namaqualand, also with short leaves and a decumbent spike of long-tubed flowers with the perianth tube sharply bent below the apex, has conventional arcuate and parallel stamens, a hairless ovary, and the style divides close to the anther apices into short branches, ± 4 mm long. The relationships and sectional position of *B. geniculata* remain uncertain.

28. **Babiana vanzijliae** *L.Bolus* in Annals of the Bolus Herbarium 4: 27 (1925); Lewis: 85 (1959) [as *B. vanzyliae*]; Goldblatt & Manning: 38 (2007). Type: South Africa, [Northern Cape], Nieuwoudtville District, without precise locality, flowered in Cape Town, Sept. 1924, *Van Zijl s.n.* (BOL 17698, holo.).

Plants 40–120 mm high. *Stem* reaching shortly above ground level, velvety, rarely with 1 or 2 branches borne at ground level, base enclosed by thick collar of fibres. *Leaves* sword-shaped to lanceolate, pleated, velvety-hairy. *Spike* compact, decumbent, 3- to 5-flowered; bracts green, becoming dry at tips, 25–40 mm long, inner slightly shorter than outer, forked at apex. *Flowers* zygomorphic, usually yellow, occasionally pale blue-mauve, lower lateral tepals with whitish median blotches, strongly scented; perianth tube narrowly funnel-shaped, (18–)25–50 mm long; tepals unequal, dorsal arching forward, 30–38 mm long, lower tepals joined to upper laterals for short distance forming oblique lip, 25–30 mm long. *Stamens* unilateral; filaments arcuate, 15–17 mm long; anthers 7–8 mm long. *Ovary* smooth or shortly hispid on ribs; style arching over stamens, dividing opposite anther tips, branches ± 4 mm long. *Flowering time*: early August to mid-September.

Distribution and ecology: a narrow endemic of the Bokkeveld Mtns in Northern Cape, South Africa, extending from the northern end of the range to Lokenberg south of Nieuwoudtville; on rocky sandstone- and tillite-derived soils in fynbos and renosterveld.

Diagnosis: one of just a handful of yellow-flowered species of *Babiana*, *B. vanzijliae* is recognised primarily by the yellow flowers with a long perianth tube mostly 25–50 mm long. In the south, at Papkuilsfontein and Lokenberg, the perianth may be a dull creamy yellow or flushed pale bluish mauve and the perianth tube is often shorter, 18–25 mm long. The shorter-tubed plants with



Distribution of ***Babiana vanzijliae***.

mauve flowers may be the result of introgression due to occasional crossing with short-tubed, violet-flowered *B. mucronata* because both species may be pollinated by bees and *Prosoeca* flies with mouthparts up to 12–14 mm long. In the north the longer tube may be the result of pollinator selection by flies with longer probosces.

29. **Babiana sambucina** *(Jacq.) Ker Gawl.* in König & Sims, Annals of Botany 1: 234 (1804); Lewis: 92 (1959); Goldblatt & Manning: 39 (2007). *Gladiolus sambucinus* Jacq.: 15 (1797). Type: South Africa, without precise locality, collector or date, illustration in Jacq.: t. 15 (1797).

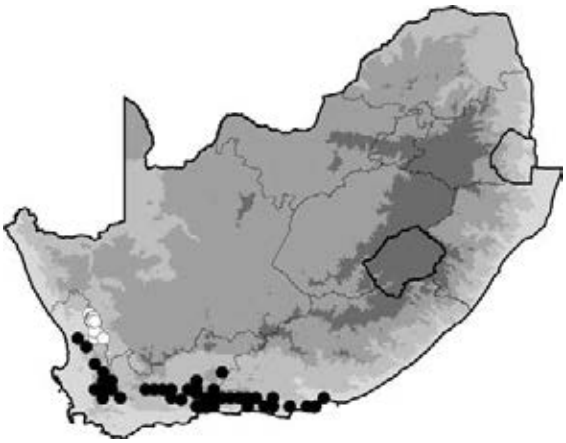
Plants 80–300 mm high, including leaves. *Stem* mostly underground, smooth, sometimes branched. *Leaves* lanceolate to linear, rarely subterete, strongly pleated to nearly flat, shortly hairy or hispid, occasionally ± smooth, or long-hairy and silky at base and upper part of sheath or throughout. *Spike* compact, several-flowered; bracts mostly 25–40 mm long, green with rust-coloured tips, variously scabrid to sparsely long-hairy, inner slightly shorter than outer, forked at apex, sometimes united basally around ovary; lowermost outer bract extended and leaf-like above, up to 60 mm long. *Flowers* zygomorphic, violet to blue, lower lateral tepals each with a white median mark edged below in dark blue to red, or sometimes with solid red centre, intensely fragrant or rarely evidently odourless; perianth tube 35–55(–65) mm long, straight, slightly flaring above, hollow throughout or with thick walls below tightly enclosing style; tepals subequal, (20–)30–35 × 5–12 mm, lower 3 tepals sometimes basally united for up to 2 mm. *Stamens* unilateral; filaments ± straight, 10–20 mm long; anthers 7–10 mm long, white. *Ovary* smooth, lowermost sometimes shortly stalked; style usually dividing between middle and apex of anthers, branches 3–4 mm long. *Flowering time*: mainly mid-August and September.

Distribution and ecology: a widespread species extending from the Bokkeveld Mtns in Northern Cape, South Africa, though interior Western Cape to Uitenhage and Addo in Eastern Cape; usually stony slopes and flats or rock outcrops, in dry fynbos and renosterveld, most often on sandstone-derived soils.

Diagnosis: *Babiana sambucina* is recognised by the smooth spike borne at ground level, a distinctive lowermost outer floral bract that is extended upward into a short blade, and flowers with a long, straight perianth tube and nearly equal tepals. The leaves and bracts are often almost hairless or at best velvety but are sometimes sparsely long-hairy, and with silky pubescence at the top of the leaf sheaths. The perianth is pale to deep blue or violet and the lower lateral tepals each have a prominent white mark edged in dark blue and sometimes red. The tepals are relatively large, usually 30–35 mm long, only slightly shorter than the tube, mainly 35–55 mm long, or sometimes equalling the tube. Flowers of most populations are strongly and sweetly scented of violets, a particularly characteristic feature of the species.

Despite the length of the tube, flowers of typical *B. sambucina* are pollinated by long-tongued bees, mostly large *Anthophora* species, with tongues no more than 10 mm long. Bees readily reach the nectar because it is held in the upper 10 mm of the tube, the lower portion being thick-walled and tightly enclosing the style. The elongate tube thus functions largely as a pseudopedicel, raising the flowers above the ground.

Of the three unusual sets of populations that Lewis (1959) formally recognised as varieties of *Babiana sambucina*, one of them, var. *undulato-venosa*, from the southeastern part of the range of the species, has short lanceolate leaves sometimes not overtopping the flowers, a perianth tube 55–60 mm long, and the lower bract has a weakly developed blade. It is no longer formally recognised taxonomically. More distinctive, var. *longibracteata* has long narrow leaves 2–6 mm wide, densely covered in long white silky hairs, and is currently treated as a separate subspecies. The third variety, var. *unguiculata*, is now considered a separate species, *B. rigidifolia*.



Distribution of ***Babiana sambucina*** subsp. ***sambucina***, ●; subsp. ***longibracteata***, ○.

Babiana sambucina can be confused with the widespread *B. bainesii* (long misidentified as *B. hypogaea*) of summer-rainfall southern Africa. The latter differs most significantly in the spike being borne just below the ground so that the flowers arise at about ground level, whereas in *B. sambucina* the spike is carried slightly above the ground. The leaves of *B. bainesii* are longer and normally narrower than in *B. sambucina*, usually 3–10 mm wide, and roughly hairy, but the degree and type of leaf pubescence is variable in both species. The perianth tube of *B. sambucina*, normally 35–55 mm long, is similar to that of *B. bainesii*, but the tepals, 20–60 × 6–12 mm, are proportionally narrower than in *B. sambucina* and do not overlap one another in the lower half as in *B. sambucina*. In addition, the perianth tube of *B. bainesii* has a wide throat and the lower tepals are joined to the upper laterals, forming a prominent lip not found in *B. sambucina*, which has the tube cylindric or gradually expanded from the base and the tepals arise at more-or-less the same level.

Among the species of the southern African winter-rainfall zone, *Babiana sambucina* may be most closely allied to *B. framesii* of the Bokkeveld Plateau and we find it difficult to separate the two when dry. *Babiana framesii* has, like *B. sambucina*, a long straight perianth tube, although somewhat curved below the throat, but the somewhat smaller tepals are proportionally narrower and spread almost at right angles to the tube, and the flowers are at most only lightly scented.

Key to subspecies

1a Leaves linear to sword-shaped, mostly 6–12 mm wide, occasionally subterete and ± 2.5 mm wide, variously velvety, pubescent, scabrid, or smooth; perianth tube 30–65 mm long, usually hollow only near apex; flowers usually strongly scented; usually growing in tufts in rocky ground . . . . . 29a. subsp. *sambucina*

1b Leaves linear, 2–6 mm wide, with long white-silky hairs; perianth tube 40–55 mm long, hollow to base; flowers lightly scented or unscented; usually growing singly in sandy ground . . . . . 29b. subsp. *longibracteata*

29a. subsp. **sambucina**

Babiana undulato-venoso Klatt: 350 (1882). *B. sambucina* var. *undulato-venoso* (Klatt) G.J.Lewis: 96 (1959). Type: South Africa, [Eastern Cape], Humansdorp, Company's Drift, Sept. 1922, *H.G. Fourcade 2311* (SAM, neo., designated by Lewis: 96 (1959); BOL, iso.).

Babiana mucronata var. *longicollis* Baker: 183 (1892). Type: South Africa, ex hort. Hibbert, England, without precise locality, illustration in Ker Gawl.: t. 638 (1803c).

Babiana stellata Schltr.: 99 (1899). Type: South Africa, [Western Cape], Cold Bokkeveld, *R. Schlechter 8856* (B, holo.).

Babiana gawleri N.E.Br.: t. 2710 (1905). Type: South Africa, [Western Cape], Olifants River, ex hort. Hibbert, England, without precise locality, illustration in Ker Gawl.: t. 638 (1803c).

Leaves lanceolate to linear or subterete, short or long-hairy or hispid, sometimes glabrescent. *Spike* with bracts mostly 25–40 mm long, green with rust-coloured tips, variously scabrid to long-hairy. *Flowers* with lateral tepals occasionally with red in throat, intensely to lightly fragrant, rarely evidently odourless; perianth tube 30–50(–60) mm long, gradually flaring, straight; tepals subequal, (20–)30–35 × 6–12 mm or dorsal slightly longer. *Filaments* 10–20 mm long.

Distribution and ecology: extending from the Cold Bokkeveld in Western Cape, South Africa, to Uitenhage and Addo in Eastern Cape; in rocky, usually sandstone-derived ground. Plants from the Great Escarpment east of Sutherland probably also belong here.

Diagnosis: always acaulescent, with spikes produced at ground level, subsp. *sambucina* varies considerably in leaf form and perianth tube length across its wide range. Particularly noteworthy is a narrow-leaved variant from the Anysberg and nearby ranges in the western Little Karoo. While the flowers are exactly like those of typical *B. sambucina* from the nearby Klein Swartberg and Groot Swartberg, the leaves have heavily thickened veins and nearly terete blades, and seem at first to be significantly different from subsp. *sambucina*, but these plants grow together with others with broader leaves that have identical flowers, suggesting that they do not merit taxonomic recognition.

A second variant includes plants from shale and limestone slopes in the Cango Valley of the Little Karoo. These resemble *Babiana sambucina* in vegetative form but have unscented or at best weakly scented flowers. The bases of all the tepals and the throat are dark red, while the perianth tube is uniformly wide and hollow throughout, and contains nectar in the base. The floral adaptations of this plant seem to us exactly those for long-proboscid fly pollination, although we have not seen insects visiting them. In addition, the pubescence of the leaves is very short, which contrasts with the dense, fairly long vestiture of most Little Karoo and Swartberg populations of *B. sambucina*. The degree of hairiness in *B. sambucina* does, however, vary across its range, and differences thus seem not particularly significant. Future study will show whether these populations merit taxonomic recognition, but for the present we regard them as a divergent race of *B. sambucina*.

29b. subsp. **longibracteata** *(G.J.Lewis) Goldblatt & J.C.Manning* in Strelitzia 18: 41 (2007). *B. longibracteata* G.J.Lewis: 243 (1932). *B. sambucina* var. *longibracteata* (G.J.Lewis) G.J.Lewis: 95 (1959). Type: South Africa, [Northern Cape], Grasberg Road, 10 miles [16 km] N of Nieuwoudtville, Sept. 1930, *L. Bolus s.n.* (BOL 19803, holo.; K, iso.).

Plants like subsp. *sambucina* but leaves mostly nearly flat, linear, 11–30 × 2–6 mm, with spreading or appressed long, silky hairs. *Spike* with bracts except for lowermost, 35–40 mm long, long silky hairy. *Flowers* with perianth tube 40–55 mm long, hollow throughout, with nectar at base, lightly scented or unscented. *Filaments* 15–20 mm long.

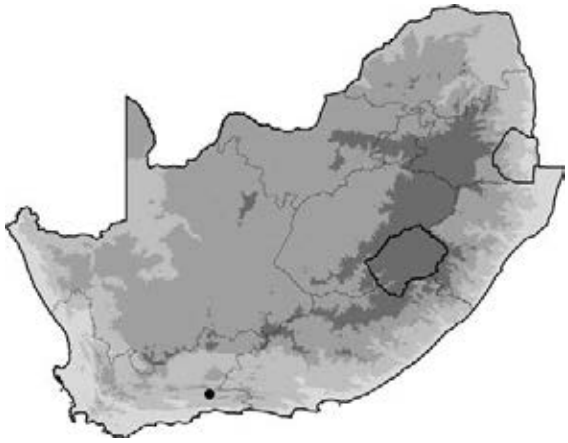
Distribution and ecology: restricted to the Bokkeveld Mtns in Northern Cape, South Africa; in rocky sandstone ground.

Diagnosis: subsp. *longibracteata* is distinguished by the long, silky hairs on the leaves and bracts, and flowers with a perianth tube hollow to the base and with a faint scent or lacking scent entirely, this in stark contrast to subsp. *sambucina*. The nearest populations of subsp. *sambucina* occur well to the south, in the Cold Bokkeveld. Subsp. *longibracteata* could equally be regarded as a separate species but the infraspecific rank recognises its close affinity with *B. sambucina*, of which it perhaps represents a series of populations in the process of evolving into a separate species evidently driven by a shift in pollination from large-bodied bees to long-proboscid flies.

30. **Babiana radiata** *Goldblatt & J.C.Manning* in Strelitzia 18: 41 (2007). Type: South Africa, Western Cape, Little Karoo, near De Rust, Farm Mons Ruber, sandy flats at foot of Enon Conglomerate ridge, 18 Sept. 2002, *P. Goldblatt & L.J. Porter 12187* (NBG, holo.; K, MO, PRE, WAG, iso.).

Plants 100–180 mm high, including leaves. *Stem* subterranean, mostly unbranched, sheathed by collar of coarse, brittle, fibres. *Leaves* in basal tuft, narrowly lanceolate to ± linear, up to 180 mm long and exceeding spike, 2–4(–7) mm wide, nearly plane, finely hairy. *Spike* inclined, 4- to 6-flowered; bracts pale green, dry and light brown at tips, shortly attenuate, finely hairy, 25–35 mm long, inner ± as long as outer, forked at apex. *Flowers* actinomorphic, salver-shaped, tepals forming shallow bowl, pink-purple with red centre and throat, sometimes with median white, linear to diamond-shaped median mark in red zone, sweetly scented during day; perianth tube 30–37 mm long, cylindric, straight or slightly curved, flared outward in upper 6 mm, with thick walls tightly enclosing style, upper quarter containing nectar; tepals lanceolate to spathulate, ascending below, spreading distally, subequal, 28–37 × 10–12 mm. *Stamens* symmetrically arranged, erect; filaments ± 9 mm long, purple; anthers 8–10 mm long, diverging, violet; pollen whitish. *Ovary* smooth; style erect, purple, dividing opposite lower ⅓ of anthers, branches 4–5 mm long. *Flowering time*: mid-August to mid-September.

Distribution and ecology: a very narrow endemic from near De Rust in the central Little Karoo in Western Cape, South Africa; on sandy flats in succulent karoo vegetation.

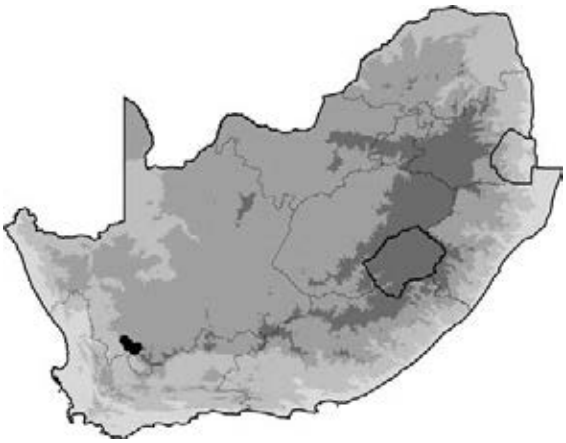


Distribution of ***Babiana radiata***.

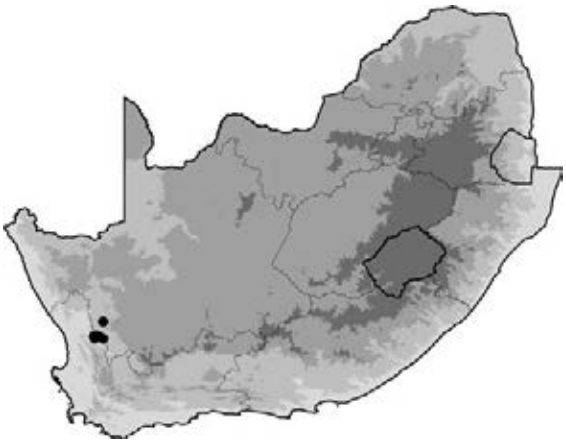
Diagnosis: *Babiana radiata* is recognised by the radially symmetric flower with a pink-purple perianth, the tepals forming a shallow bowl, and short style with the branches extending between the lower parts of the anthers. The stem is subterranean, only the spike is held above ground, and the linear leaves are 2–4(–7) mm wide, usually bearing fine long hairs. The large soft, pale green floral bracts, the inner of which is forked apically, and smooth ovary place the species in sect. *Teretifolieae*, where it may be most closely related to the widespread *B. sambucina*. That species has broader, noticeably pleated leaves, usually shortly hairy to scabrid leaves and zygomorphic flowers, usually blue to violet with the lower lateral tepals boldly marked in the centre with white blotches outlined in darker blue or rarely red-purple. The radially symmetric flower of *B. radiata* is an independent development in the section.

31. **Babiana virginea** *Goldblatt* in Journal of South African Botany 45: 82 (1979); Goldblatt & Manning: 42 (2007). Type: South Africa, [Northern Cape], Roggeveld Escarpment west of Middelpos, farm Rooiwal, Sept. 1974, *M. Thomas* sub *P. Goldblatt s.n.* (MO, holo.; K, NBG, PRE, S, iso.).

Plants 100–180 mm high, including leaves. *Stem* subterranean or barely raised above ground, usually unbranched. *Leaves* lanceolate, pleated, finely hairy, exceeding the flowers. *Spike* 2- to 4-flowered; bracts mostly 25–45 mm long, but lowermost up to 80 mm, densely hairy, green with brown, attenuate tips, inner forked at apex. *Flowers* zygomorphic, white or pale mauve with pale yellow or cream-coloured blotches on lower lateral tepals, intensely fragrant; perianth tube 45–65 mm long, gradually flaring from base, straight; tepals unequal, dorsal 35–40 mm long, lower directed forward, 30–35 mm long. *Stamens* unilateral; filaments arched, 15 mm long; anthers 9–11 mm long, pale yellow. *Ovary* smooth; style dividing opposite anther tips, branches spreading, ± 5 mm long, expanded at tips. *Flowering time*: mainly September.



Distribution of ***Babiana virginea***.



Distribution of ***Babiana rigidifolia***.

Distribution and ecology: centred on the Roggeveld Escarpment in Northern Cape, South Africa, extending from near Middelpos southward to Matjiesfontein in Western Cape; in stony ground, often in dolerite outcrops with the corms wedged in cracks.

Diagnosis: an acaulescent species, *Babiana virginea* has densely hairy, lanceolate leaves exceeding the typically white but sometimes pale mauve flowers. The flowers are large, with a tube up to 65 mm long and dorsal tepal 35–40 mm long, and have a strong, clove-like fragrance suggesting moth pollination. *Babiana virginea* is perhaps most closely related to the widespread, blue-flowered *B. sambucina*, also acaulescent, and can be distinguished from that species by the leaf vestiture, usually almost smooth or sparsely scabrid. The lowermost outer floral bract in *B. sambucina* is produced upward as a small leaf, a feature sometimes weakly developed in *B. virginea*.

32. **Babiana rigidifolia** *Goldblatt & J.C.Manning* in Strelitzia 18: 44 (2007), as new name for *B. sambucina* var. *unguiculata* G.J.Lewis: 95 (1959) [not *B. unguiculata* G.J.Lewis]. Type: South Africa [Western Cape], top of Botterkloof Pass, 20 Sept. 1952, *G.J. Lewis 2650* (SAM, holo.).

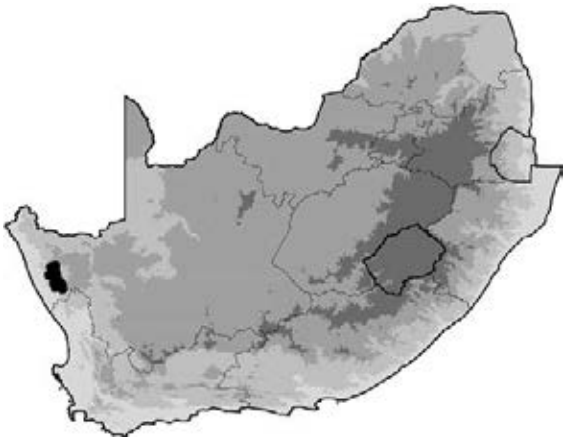
Plants 150–200 mm high, including leaves. *Stem* reaching up to 100 mm above ground level, ± erect, simple or 1- or 2-branched, smooth, sheathed below by dense collar of coarse fibres. *Leaves* sword-shaped to lanceolate, attenuate, usually exceeding spike, mostly 9–16 mm wide, pleated, softly hairy to glabrescent, apices firm and pungent, on drying veins and margins prominent and hyaline. *Spike* compact, several-flowered; bracts green, becoming brown at tips, minutely velvety, attenuate, outer 25–45 mm long (but lowermost often longer), lightly keeled, inner 2-keeled, slightly shorter than outer, forked apically. *Flowers* zygomorphic, violet, lower lateral tepals with narrow median white streak or blotch, unscented; perianth tube elongate, 45–55 mm long, slightly curved upward; tepals unequal, markedly narrowed in lower half, dorsal tepal 35–43 × 8–12 mm long, slightly longer than lower 3, lower tepals joined to upper laterals for 3–5 mm and to one another for ± 2 mm, forming a prominent lip, 27–40 × 6–10 mm. *Stamens* unilateral; filaments 18–20 mm long; anthers ± 8 mm long. *Ovary* smooth; style usually dividing opposite anther tips, branches ± 4 mm long. *Flowering time*: late August and September.

Distribution and ecology: restricted to the Bokkeveld–Stinkfontein Mtn complex between Nieuwoudtville and Botterkloof in Northern Cape, South Africa; in crevices in sandstone outcrops and rocky pavement.

Diagnosis: striking in its deep violet flowers, *Babiana rigidifolia* is recognised by the elongate perianth tube, 45–50 mm long, lower tepals joined to the upper laterals and forming a prominent lip 5–7 mm long, and rigid, velvety to almost smooth leaves with pungent tips. The leaves are fairly broad, up to 16 mm wide, strongly pleated and are held in a tight, erect fan. With their firm tips the leaves recall those of the Namaqualand *B. dregei*, but that species has smooth to glabrescent leaves with cartilaginous hyaline veins and margins and a particularly horny, pungent tip. The flowers are similar but somewhat smaller, with the dorsal tepal 18–28 × 8–10 mm, and the lower lateral tepals have prominent white median blotches. On drying, the major veins and margins of the leaves of *B. rigidifolia* appear prominent and hyaline, plants then even more closely resembling those of *B. dregei*.

33. **Babiana dregei** *Baker* in Journal of Botany, British and foreign 14: 336 (1876); Lewis: 106 (1959); Goldblatt & Manning: 44 (2007). Type: South Africa, [Northern Cape], Namaqualand, Uitkomst, Oct. 1830, *J.F. Drège 2628* (K, holo.; B, MO, P [3 sheets], iso.).

Plants ± 120–350 mm high, including leaves. *Stem* aerial, reaching shortly to well above ground, arching outward below spike, usually branched, sometimes repeatedly, angular, smooth (or minutely hairy on spike axis). *Leaves* sword-shaped to lanceolate in a tight fan, (5–)10–20(–



Distribution of ***Babiana dregei***.

25) mm wide, pleated, smooth, with prominently thickened veins and margins (these turning pale yellow on drying), apices hard and pungent. *Spike* compact, several-flowered; bracts green or with dry tips, minutely puberulous, or velvety, outer 35–60 mm long, keeled, inner 5–10 mm shorter, forked apically. *Flowers* zygomorphic, dark blue to violet or magenta purple with white splashes edged in darker colour on lower lateral tepals, unscented; perianth tube elongate, (45–)50–65(–70) mm long, straight or slightly curved near throat; tepals unequal, dorsal 18–28 mm long, lower three slightly shorter, joined to upper laterals for 2 mm in a lip. *Stamens* unilateral; filaments 11–15 mm long; anthers ± 8 mm long. *Ovary* smooth; style usually dividing between middle and shortly beyond anther tips, branches 3–4 mm long. *Flowering time*: mainly late August and September.

Distribution and ecology: centred in the Kamiesberg highlands of Namaqualand, Northern Cape, South Africa, extending from Mesklip, south of Springbok, to Garies; always in granite outcrops.

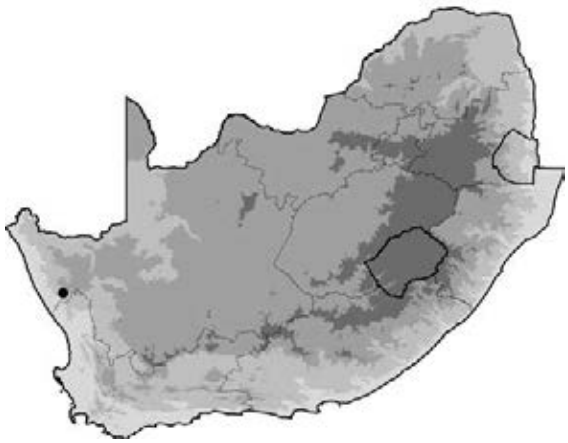
Diagnosis: the very distinctive *Babiana dregei* has striking, hard-textured, lanceolate leaves with a prominent, spiny, piercing apex and is a robust species, plants reaching up to 350 mm in height and producing numerous flowers on branched stems. The leaves have prominent, pale fibrous veins at the angles of the folds or pleats and are usually smooth but sometimes finely hairy. The flowers, with an elongate perianth tube, typically 50–65 mm long, are pollinated by the long-proboscid fly, *Prosoeca peringueyi*.

34. **Babiana rivulicola** *Goldblatt & J.C.Manning* in *Bothalia* 42: 137 (2012). Type: Northern Cape, southern Kamiesberg, Long Kloof, ± 20 km from Doringkraal turnoff from N7, Farm Nartjiesdam, in crevices in rocky bed of perennial stream, 22 Sept. 2010, *Goldblatt & Porter 13572* (NBG, holo.; K, MO, PRE, iso.).

Plants up to 300 mm high, excluding longer leaves, growing in dense clumps. *Stem* simple or 1- or 3-branched, slightly angled. *Leaves* mostly 6 or 7, linear, 250–450 × 5–10 mm, exceeding stem, firm but arching toward ground, shallowly pleated to almost flat, smooth. *Spike* flexed outward with flowers initially in two ranks, mostly 6- to 9-flowered; bracts green below, dry and light brown toward tips, outer mostly up to 35 mm long but lowermost much longer, attenuate, inner ± ⅔ as long as outer, 2-keeled, forked apically, tips attenuate. *Flowers* zygomorphic, pale blue to blue-mauve, paler in throat, lower 3 tepals with central, white, lanceolate blotch and darker violet marks near base, darkly lined on abaxial side of throat, lightly sweet-scented; perianth tube funnel-shaped, 42–44 mm long, lower part cylindric, upper ± 10 mm expanded into wide throat; tepals lanceolate, unequal, dorsal ± 30 × 8 mm, lower 3 tepals united with upper laterals for ± 3 mm, arching outward, 25 × 6 mm. *Stamens* unilateral; filaments straight, suberect, ± 15 mm long, included in floral cup; anthers ± 5 mm long, pale mauve; pollen white. *Ovary* smooth; style dividing opposite or slightly beyond anther tips, branches ± 5 mm long, recurved distally. *Flowering* mid- to late October.

Distribution and ecology: known only from the southern Kamiesberg in Northern Cape, South Africa; in cracks in granite bedrock in streams.

Diagnosis: *Babiana rivulicola* most closely resembles a second, more widespread Namaqualand endemic, *B. dregei*, both species having an aerial stem, smooth leaves, stem and bracts, and flowers with a long perianth tube. The leaves of *B. dregei* are broadly lanceolate and rigid with sharply pungent tips and the short stem is concealed among the leaves, whereas the stem reaches up to 300 mm high in *B. rivulicola* and the linear leaves are longer and relatively softly textured, with acute but not pungent tips. The flowers of the two species are broadly similar, ± funnel-shaped with the lower two thirds of the perianth tube cylindric, but *B. dregei* has a ± cylindric perianth tube (45–)50–65(–70) mm long, curved just below the apex, unlike the shorter, funnel-shaped perianth tube of *B. rivulicola*, 42–44 mm long. Additional floral differences include the longer anthers, ± 8 mm



Distribution of ***Babiana rivulicola***.

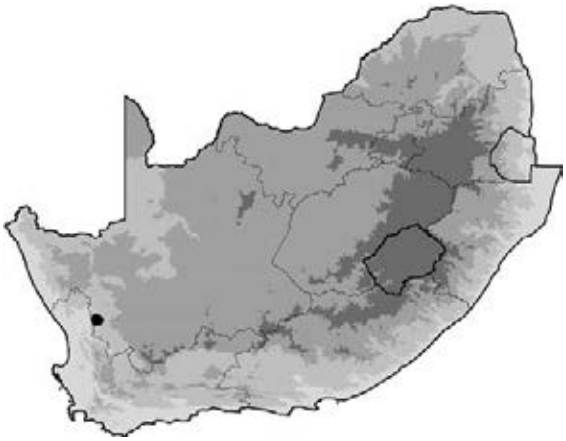
long and shorter style branches, 3–4 mm long in *B. dregei* vs. anthers ± 5 mm long and style branches ± 5 mm long in *B. rivulicola*. *Babiana dregei* occurs on dry, stony slopes close to sites where *B. rivulicola* grows but is in fruit when *B. rivulicola* comes into flower.

35. **Babiana framesii** *L.Bolus* in South African Gardening and Country Life 22: 276 (1932b); Lewis: 97 (1959); Goldblatt & Manning: 45 (2007). Type: South Africa, [Northern Cape], near Nieuwoudtville [as Klawer], cultivated at Kirstenbosch Gardens, September 1927, *P. Ross Frames s.n. as Natl. Bot. Gard. 1244/26* (BOL, holo.).

Plants 100–200 mm high. *Stem* short, reaching up to 20 mm above ground, simple or often with 1 or 2 short branches, sheathed below by thick collar of compact fibres. *Leaves* crowded basally, lanceolate, pleated, shortly hairy. *Spike* compact, suberect, 4- to 8-flowered; bracts green with dry tips turning brown with age, with short and long silky hairs, 40–50 mm long, inner ± as long as outer, forked apically. *Flowers* zygomorphic, dark blue-purple, lower lateral tepals with arrow-shaped white markings in midline, lightly sweet-scented; perianth tube 60–70 mm long, cylindric, slightly curved below throat; tepals subequal or dorsal up to 3 mm longer, 23–33 × 5–9 mm, spreading nearly horizontally. *Stamens* unilateral; filaments suberect, 10–12 mm long; anthers 7–9 mm long. *Ovary* smooth; style dividing opposite upper ⅓ of anthers, branches ± 4 mm long. *Flowering time*: August to mid-September.

Distribution and ecology: restricted to the Bokkeveld Plateau in the vicinity of Nieuwoudtville in the western Karoo, Northern Cape, South Africa; in dolerite rock outcrops in karroid scrub.

Diagnosis: *Babiana framesii* is most easily identified by its short stem, reaching no more than 20 mm above ground, tight fan of basal leaves, and ± erect spike with silky bracts 40–50 mm long. The flowers are deep violet-blue and have an elongate perianth tube 60–70 mm long, slightly curved at the throat. The lower tepals have bold white markings in the midline outlined in darker blue or red and the tepals are relatively narrow, 5–9 mm wide, and spread almost at right angles to the tube when the flowers are fully open. The stamens are held erect with the filaments exserted ± 10 mm from the tube and the anthers are 7–9 mm long. *Babiana framesii* is well known from the immediate vicinity of Nieuwoudtville, where it is often difficult to distinguish from the long-tubed *B. sambucina* subsp. *longibracteata*. The latter has a straight perianth tube, broader tepals mostly 8–12(–16) mm wide, and even when the flowers are fully open, the tepals may overlap one another and remain slightly ascending, unlike the outspread, widely separate tepals of *B. framesii*. The perianth tube of *B. sambucina* subsp. *longibracteata* is 30–55 mm long, shorter than that of *B. framesii*.



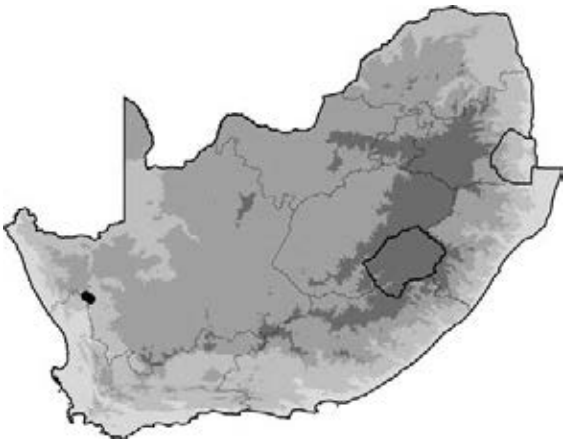
Distribution of ***Babiana framesii***.

Namaqualand plants treated by Lewis (1959) as *Babiana framesii* var. *kamiesbergensis* are now included in *B. curviscapa*, which also has the stem produced shortly above ground and, unless growing under shrubs, has the spike strongly arched toward the ground. The perianth tube is shorter than that of *B. framesii*, 36–43 mm long, and is sharply curved below the apex.

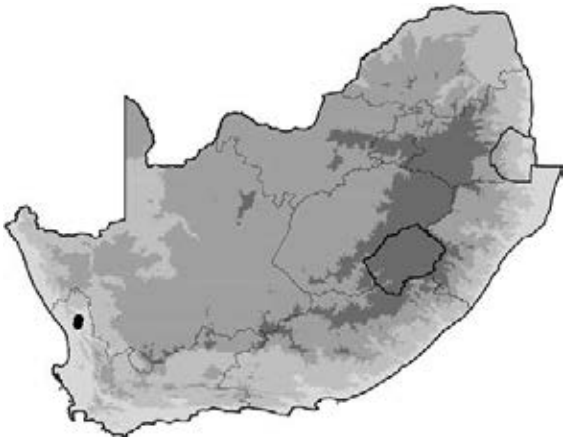
36. **Babiana symmetrantha** *Goldblatt & J.C.Manning* in Goldblatt *et al*., Bothalia 38: 49 (2008). Type: South Africa, Western Cape, Loeriesfontein, summit plateau of the Langberg among dolerite boulders, 5 Sept. 2006, *Goldblatt & Porter 12772* (NBG, holo.; K, MO, PRE, S, iso.).

Plants 100–200(–300) mm high, including leaves, often in small clumps. *Corm* with fibrous tunics. *Stem* subterranean or reaching above ground when growing through vegetation, producing slender cormlets in lower axils, simple or 1-branched, enclosed below by collar of brittle fibres. *Leaves* linear, exceeding flowers, up to 200 × 2–5(–8) mm, flat, sparsely pubescent. *Spike* 2- or 3-flowered; bracts green, becoming dry and brown at tips, 30–35 mm long, finely hairy, long-attenuate, inner slightly shorter than outer, 2-keeled, forked apically. *Flowers* actinomorphic, salver-shaped, tepals spreading when fully open, violet with darker violet marks near tepals bases, sometimes lower lateral tepals marked white outlined violet, sweetly scented of violets; perianth tube cylindric, 45–60(–75) mm long, straight, slightly expanded in upper 10 mm, hollow above but with thick walls tightly enclosing style in lower half; tepals subequal, lanceolate, (22–)28–35 × 5–7 mm, inner tepals narrower than outer. *Stamens* symmetrically arranged, erect; filaments ± 10 mm long, exserted ± 7 mm, purple; anthers ± 6 mm long, contiguous at tips, white; pollen white. *Ovary* smooth; style erect, purple, dividing below base of anthers, branches 4–5 mm long, expanded in upper ⅓, arching between anthers. *Flowering time*: mid-August to mid-September.

Distribution and ecology: a narrow endemic of the summit plateau of the isolated Langberg at ± 1 000 m



Distribution of ***Babiana symmetrantha***.



Distribution of ***Babiana carminea***.

elevation, west of Loeriesfontein in Northern Cape, South Africa; in heavy red clay among dolerite boulders.

Diagnosis: *Babiana symmetrantha* is recognised by the radially symmetric, violet flowers with spreading subequal tepals and an elongate perianth tube up to 75 mm long. Plants are ± acaulescent when growing in open ground and have a hairless ovary, and inner floral bracts forked at the apex. It is one of just three species of the section with a radially symmetric perianth, the others being *B. pygmaea* and *B. radiata* but *B. symmetrantha* appears only distantly related to these species and is more likely allied to the *B. framesii–B. sambucina* group, which also has an underground stem and elongate perianth tube, but a zygomorphic perianth. *Babiana symmetrantha* is also unusual in its linear, almost plane leaves that show little hint of the characteristic pleating of most *Babiana* species. The long-tubed flowers appear to be adapted for pollination by long-proboscid flies.

37. **Babiana carminea** *J.C.Manning & Goldblatt* in Strelitzia 18: 46 (2007). Type: South Africa, Western Cape, Vanrhynsdorp, Knersvlakte, Farm Quaggaskop, limestone ridge, 13 Aug. 1997, *P. Goldblatt & J.C. Manning 10662* (NBG, holo.; K, MO, PRE, iso.).

Plants ± acaulescent, 50–100 mm high, including leaves. *Stem* reaching shortly above ground level, unbranched, sheathed below by collar of coarse fibres. *Leaves* erect, narrowly lanceolate, up to 100 mm long, exceeding flowers, shallowly pleated, finely hairy. *Spike* decumbent, 2- to 5-flowered; bracts pale green with dry light brown tips, finely hairy, 40–50 mm long, inner slightly longer than outer, forked apically. *Flowers* zygomorphic, carmine red to red-purple, lower lateral tepals with broad, spear-shaped creamy yellow blotches, unscented; perianth tube slightly curved, 56–60 mm long, ± cylindric below, 36–40 mm long, widening abruptly and curving outward, upper 17–20 mm ± horizontal, cylindric, ± 6 mm diam.; tepals unequal, dorsal 40–48 × 9–13 mm, lower 3 tepals united basally for 2–4 mm, 35–40 × 10 mm. *Stamens* unilateral; filaments somewhat enlarged below, ± 40 mm long, exserted ± 20 mm from tube, dark pink; anthers ± 9 mm long. *Ovary* smooth; style usually dividing between base and middle of anthers, branches ± 6 mm long. *Capsules* ovoid, 10–14 mm long; mature seeds unknown. *Flowering time*: late July and August.

Distribution and ecology: a narrow endemic of the Knersvlakte in southern Namaqualand, in Western Cape, South Africa; confined to limestone outcrops, the corms tightly wedged in crevices in the rock.

Diagnosis: evidently most closely related to the other long-tubed *Babiana* species of sect. *Teretifolieae*, *B. carminea* has a spike borne at ground level, finely and shortly hairy leaves, floral bracts 40–50 mm long, and flowers with an elongate perianth tube, 56–60 mm long. The primary distinction between the long-tubed species of this alliance is in the flowers, which closely reflect their pollination ecology. *Babiana dregei* and *B. framesii* have dark blue to violet flowers with white markings, and a slender, straight or curved perianth tube of narrow diameter and both are pollinated by long-proboscid flies. In contrast, the flowers of *B. carminea* are red to reddish purple with a perianth tube that is slender below and wide and cylindric above, features typically associated with pollination by sunbirds, *Nectarinia* species. Pollination by sunbirds is an unusual strategy in the genus, shared only with the apparently distantly related *B. avicularis, B. ringens* and *B. hirsuta*. The presence of pale markings on the tepals such as found in *B. carminea* is unusual in bird-pollinated flowers, and may reflect a relatively recent shift from long-proboscid fly to avian pollination and the persistence of a feature no longer of adaptive value.

38. **Babiana tubulosa** *(Burm.f.) Ker Gawl.*, Genera iridearum 154 (1827); G.J.Lewis: 118 (1959), excluding var. *tubiflora*; Goldblatt & Manning: 47 (2007). *Ixia tubulosa* Burm.f.: 1 (1768). Type: South Africa, without precise locality or date, *N.L. Burman s.n.* (G: Herb. Burman, syn. [two sheets of four so-named]).

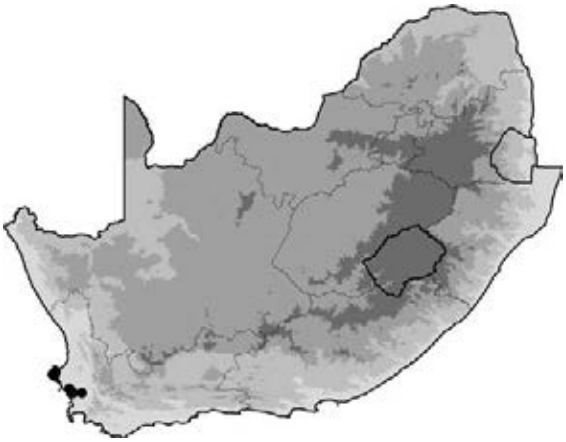
Gladiolus tubatus Jacq.: 6 (1795 [1788–1795]). *Babiana tubata* (Jacq.) Sweet: 396 (1826). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 264 (1793 [1788–1795]).

Gladiolus longiflorus Andrews: t. 5 (1797), illegitimate homonym, not *G. longiflorus* P.J.Berg. (1767). Type: South Africa, without precise locality, illustration in Andrews: t. 5. (1797).

Plants 70–150 mm high. *Stem* extending shortly to up to 100 mm above ground, then lightly hairy to velvety, with a poorly developed fibrous collar around base. *Leaves* narrowly sword-shaped, 8–12 mm wide, pleated, hairy. *Spike* inclined to ± horizontal, mostly 6- to 10-flowered; bracts green with dry, brown tips, velvety, 20–40 mm long, inner ± half as long as outer, forked apically. *Flowers* zygomorphic, creamy white, pink to red outside, with triangular to spear-shaped red markings on lower lateral tepals, tepal claws ascending with limbs spreading, odourless; perianth tube 65–105 mm long, cylindric below widening in upper 15–21 mm into a distinct gullet, tepals unequal, narrowed below and ± clawed, dorsal ± 30–34 mm long, lower 3 tepals 18–23 × 8 mm. *Stamens* unilateral; filaments 20–22 mm long; anthers 5–7 mm, purple; pollen white. *Ovary* smooth; style dividing opposite or shortly above anther tips, branches ± 6 mm long. *Flowering time*: mid-September to mid-October.

Distribution and ecology: a fairly narrow endemic of Western Cape, South Africa, extending from the Saldanha Peninsula to the hills between Mamre and Darling and inland on the Paardeberg south of Malmesbury; on well-drained granite-derived slopes, granite outcrops, occasionally on limestone, or on coastal dunes.

Diagnosis: *Babiana tubulosa* is recognised by the creamy white to creamy pink flowers, usually flushed pink to red outside, with prominent red markings on the lower tepals, and the elongate perianth tube 65–105 mm long, usually expanded in the upper 8–20 mm in a wide gullet. It is often confused with white (or creamy white to pink)-flowered *B. tubiflora*, a widespread coastal species that typically has narrow, ± linear, pilose leaves, a similarly elongate perianth tube, mostly 60–80 mm long but slender throughout or only slightly expanded in the upper 5–7 mm; in addition, it has shorter filaments 13–16 mm long, a short style usually dividing opposite the base to middle of the anthers (sometimes exceeding the anther tips), and style branches 3–4 mm long. The larger flowers of *B. tubulosa* have filaments 20–22 mm long and style branches ± 6 mm long prominently displayed above the anthers.



Distribution of ***Babiana tubulosa***.

The flowers have the typical adaptations for pollination by long-proboscid flies, but floral ecology of *B. tubulosa* has not been studied.

39. **Babiana tubiflora** *(L.f.) Ker Gawl.* in Curtis's Botanical Magazine 18: t. 680 (1803e); Goldblatt & Manning: 48 (2007). *Gladiolus tubiflorus* L.f.: 96 (1782). *G. elongatus* Salisb.: 40 (1796), illegitimate superfluous name for *G. tubiflorus* L.f. *Babiana tubulosa* var. *tubiflora* (L.f.) G.J.Lewis: 120 (1959). Type: South Africa, [Western Cape], without precise locality (as Swartland), *Thunberg s.n.* (UPS–THUNB 1085, holo.).

Plants 70–150 mm high, including leaves. *Stem* ± acaulescent or reaching up to 50 mm above ground, densely white-velvety, without collar of fibres around stem base, often producing slender stolons. *Leaves* linear to sword-shaped, 3–6 mm wide (subsp. *tubiflora*) OR lanceolate, 8–12 mm wide (subsp. *saxicola*); shallowly pleated, smooth to lightly to densely hairy. *Spike* inclined to decumbent, 6- to 16-flowered; bracts with dry brown tips, velvety, 35–60 mm long, inner mostly ¼ to ½ as long, forked apically. *Flowers* zygomorphic, white, with or without small pink or red median markings on lower lateral or all 3 lower tepals (subsp. *tubiflora*) OR creamy pink to creamy white, with small pink to red markings on lower tepal (subsp. *saxicola*), tepals ascending below or spreading from base, odourless; perianth tube (45–)60–80(–100) mm long, ± straight, cylindric throughout or slightly wider in upper 5–7 mm; tepals subequal, narrowed below and ± clawed, dorsal only slightly larger, 18–23 mm long, lower 3 tepals 3–4 mm wide. *Stamens* unilateral; filaments arched, 13–16 mm long; anthers 4–5 mm, usually white. *Ovary* smooth; style dividing between lower ⅓ to shortly above anther tips, branches 3–4 mm long. *Flowering time*: mostly August to mid-September, occasionally early October.

Distribution and ecology: largely a coastal species of Western Cape, South Africa, extending from Lambert's Bay in the north to Still Bay in the southeast; on sandy, mainly coastal flats and dunes, rarely a short distance inland.

Diagnosis: usually a small plant, typical *Babiana tubiflora* is recognised by the relatively small, white to creamy white flowers, often with small red or pink markings at

the base of the lower tepal limbs, an elongate perianth tube, and often narrow, linear leaves. The perianth tube is uniformly slender or very gradually expanded toward the apex and usually 60–80 mm long but sometimes shorter or longer. The filaments are 13–16 mm long and the style branches are 3–4 mm long and often not reaching the anther tips. *Babiana tubiflora* is closely related to a second long-tubed species, *B. tubulosa*, and often confused with it. This local endemic of the Atlantic Coast and near interior of Western Cape has creamy beige to pink flowers usually flushed pink outside, prominent red markings on the lower tepals limbs, and a perianth tube 65–105 mm long that is expanded distally into a wider gullet 5–12 mm long. The longer stamens have filaments 20–22 mm long with longer anthers, and the style divides opposite or slightly beyond the anther tips with the style branches ± 6 mm long. The flowers of both species are adapted for pollination by long-proboscid flies.

Typically a plant of sandy flats and dunes, *Babiana tubiflora* flowers mainly in August and early September, but populations from granite outcrops in the Saldanha District flower later, from mid-September to late October, and have broader leaves, often longer stems and sometimes pink flowers. Flowers of these plants are flushed reddish on the outside of the tepals and have the short style branches typical of *B. tubiflora* but the style is often longer, dividing up to 4 mm beyond the anther tips. The ascending tepals, ± 20 × 3–4 mm, have weakly defined claws and the dorsal is hardly if at all differentiated from the remaining tepals. The leaves in these plants are relatively broad, up to 12 mm wide and softly hairy. These populations differ significantly from the typical white-flowered populations and are recognised as a separate subspecies.

Key to subspecies

1a Plants acaulescent or stem up to 50 mm high; leaves linear to sword-shaped, 3–6 mm wide; style dividing between base and middle of anthers; anthers usually white to pale blue-mauve . . . . . 39a. subsp. *tubiflora*

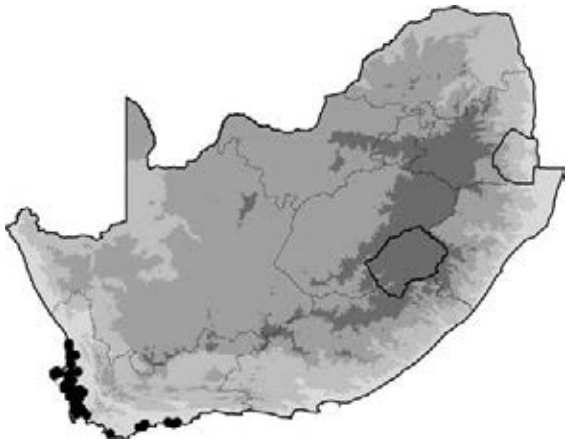
1b Plants with stems often 120–180 mm high; leaves lanceolate 8–12 mm wide; style usually dividing 2–4 mm above anther tips (or opposite lower half of anthers); anthers dark purple. . . . 39b. subsp. *saxicola*

39a. subsp. **tubiflora**

Gladiolus angustifolius Lam.: 119 (1791), as new name for *G. plicatus* Lam.: 119 (1791), illegitimate homonym, [not *G. plicatus* (L.) L. (1762)]. Type: South Africa, without precise locality or collector (P: herb. Lamarck, holo.).

Gladiolus inclinatus DC. in Redouté: t. 44 (1803), illegitimate superfluous name for *G. tubiflorus* L.f. Type: South Africa, without precise locality or collector, illustration in Redouté: t. 44 (1803).

Plants 70–150 mm high, with stem acaulescent or extending 50 mm above ground, densely pale velvety hairy. *Leaves* linear to sword-shaped, 3–6 mm wide; shallowly pleated, smooth to lightly hairy. *Spike* inclined to decumbent, mostly 6- to 12-flowered; bracts velvety, 35–60 mm long, inner ¼ to ± ½ as long as outer. *Flowers* white to creamy white, with small pink to red markings at base of lower tepal limbs; perianth tube (45–)60–80(–100) mm long, cylindric, slightly wider in upper 5–7 mm; tepals subequal, lanceolate, narrowed below and ± clawed, dorsal only slightly larger, 18–23 mm long, lower 3 tepals 3–4 mm wide. *Filaments* 13–16 mm long, exserted 7–10 mm from tube; anthers 4–5 mm long, usually white or pale blue-mauve). *Style* usually dividing opposite lower to middle ⅓ of anthers, branches 3–4 mm long. *Flowering time*: mostly August to mid-September.



Distribution of ***Babiana tubiflora*** subsp. ***tubiflora***, ●; subsp. ***saxicola***, ○.

Distribution and ecology: as for the species; always in deep sandy ground on flats and dunes.

Diagnosis: subsp. *tubiflora* is distinguished by the white to creamy white flowers, the lower tepals clawed and often with small pink to red marks at the bases of the limbs. The anthers are white to pale mauve and the style usually divides opposite the lower to middle third of the anthers. Sample populations of subsp. *tubiflora* have proved to be self-compatible and autogamous—almost all capsules produce full complements of seeds when isolated from potential pollinators.

A local small-flowered variant from Jacobsbaai on the Atlantic Coast north of Saldanha has an unusually short tube, 40–45 mm long, and short tepals, 12 × 6 mm, not narrowed below into claws. Associated with the short tepals, the filaments are ± 6 mm long. As in typical subsp. *tubiflora*, the style divides opposite the lower third of the anthers. Only two populations of this morph are known, both comprising less than 100 plants and growing in deep sand on the foredunes. These plants have not been recognised taxonomically and we provisionally regard them to be merely a local sport or mutant. The flower dimensions are not included in the description of the species.

39b. subsp. **saxicola** *Goldblatt & J.C.Manning*, new subspecies. Type: South Africa, Western Cape, nature reserve at Langebaan, hill top among granite rocks, 8 Oct. 2014, *Goldblatt & Porter 14077* (NBG, holo., MO, PRE, iso.).

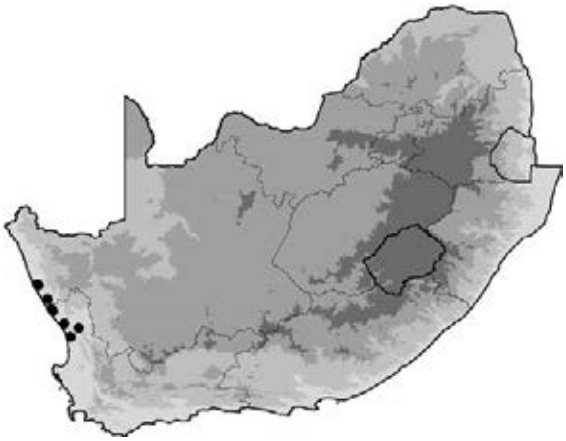
Plants 150–300 mm high, with stem extending shortly to up to 180 mm above ground, densely pale velvety hairy. *Leaves* mostly lanceolate, 8–12 mm wide, softly hairy. *Spike* inclined, mostly 10- to 16-flowered; bracts velvety, 20–45 mm long, inner ± half as long as outer, united basally around ovary. *Flowers* creamy pink to ± beige, pink to red outside, with triangular to spear-shaped red markings in middle of lower tepals and small red streaks at bases; perianth tube 65–75 mm long, cylindric slightly wider toward mouth, tepals subequal, lanceolate, dorsal and lower laterals slightly wider, obscurely narrowed below, ± 20 × 3–4 mm, lower median smallest. *Filaments* ± 12 mm long, exserted 5–6 mm from tube; anthers ± 4 mm long, dark purple; pollen pale purple. *Style* dividing 2–4 mm beyond anther tips (rarely opposite lower half of anthers), branches 2.5–3.5 mm long. *Flowering time*: mid-September to late October.

Distribution and ecology: local in the Saldanha District of Western Cape, South Africa, near Langebaan and in the West Coast National Park; on granite outcrops, corms wedged in rocks.

Diagnosis: subsp. *saxicola* is recognised in *B. tubiflora* by the stems usually extended well above ground, and by the lanceolate leaves up to 12 mm wide and softly hairy. The flowers are creamy pink to pale pink with tepals and tube flushed reddish outside, and have the short style branches typical of *B. tubiflora* but the style is often longer, dividing up to 4 mm beyond the anther tips. The tepals, ± 20 × 3–4 mm, are more-or-less straight and the dorsal is hardly if at all differentiated from the remaining tepals. The late flowering time and habitat in granite outcrops also differ from subsp. *tubiflora*, which grows on sandy ground.

40. **Babiana brachystachys** *(Baker) G.J.Lewis* in Flowering Plants of South Africa 14: 338 (1934a); Goldblatt & Manning: 48 (2007). *Acidanthera brachystachys* Baker: 338 (1876). Type: South Africa, [Western Cape], without precise locality [collected in 'Clanwilliam District'] or date, *P.A. Mader sub P. MacOwan 2183* (K, holo.).

Plants 200–300 mm high. *Stem* mostly underground or very short, often branched, sheathed by long-hairy to somewhat cobwebby cataphylls. *Leaves* leathery, linear to ± terete with longitudinal grooves, smooth, sheaths ciliate on margins, cobwebby below. *Spike* horizontal, 5- to 10-flowered; bracts green, drying brown at tips, smooth, 22–35 mm long, inner ± as long as outer, forked in upper ⅓. *Flowers* weakly zygomorphic, pale pink, lower tepals with red triangular marks on lower midline, darker pink outside, odourless; perianth



Distribution of ***Babiana brachystachys***.

tube cylindric, 70–75 mm long, slightly curved toward apex; tepals subequal, spreading at right angles to tube, 16–24 mm long. *Stamens* unilateral; filaments 4–5 mm long; anthers ± 5 mm long. *Ovary* smooth; style dividing opposite anther apices, branches ± 2.5 mm long. *Flowering time*: September and October.

Distribution and ecology: western South Africa, extending from Wallekraal in Namaqualand, Northern Cape, to near Lambert's Bay in Western Cape; on sandy slopes and dunes inland of the coast.

Diagnosis: unmistakable in the linear to nearly terete leaves with narrow longitudinal grooves, and the horizontal spikes bearing pale pink flowers with an elongate, slender perianth tube 70–75 mm long, *Babiana brachystachys* is a remarkable plant. The unusual flowers suggest pollination by long-proboscid flies, which pollinate flowers of several species with this shape and colour. Apart from the evident close relationship to *B. teretifolia*, its affinities are uncertain and we suggest that it may be allied to the large group of *Babiana* species with a similar largely underground stem, decumbent spike and inner bracts divided in the upper third. The cobwebby to woolly cataphylls of *B. brachystachys* are remarkable for the sect. *Teretifolieae* and recall the predominantly Namaqualand sect. *Antholyzoides*. Although known originally only from the sandveld east of Hondeklipbaai near Wallekraal, *B. brachystachys* has since been recorded at several localities to the south, including near the Groen River Mouth, Brand-se-Baai, Vredendal and Lambert's Bay.

41. **Babiana teretifolia** *Goldblatt & J.C.Manning* in Bothalia 40: 51 (2010). Type: Western Cape, Vanrhynsdorp, southern Namaqualand, Farm Kommandokraal, NW of Vredendal, 10 Sept. 2008, *Goldblatt & Porter 13101* (NBG, holo.; MO, iso.).

Plants acaulescent, up to 300 mm high, including leaves. *Stem* smooth or sparsely hairy, usually 1- or 2-branched, occasionally reaching shortly above ground, with cata-

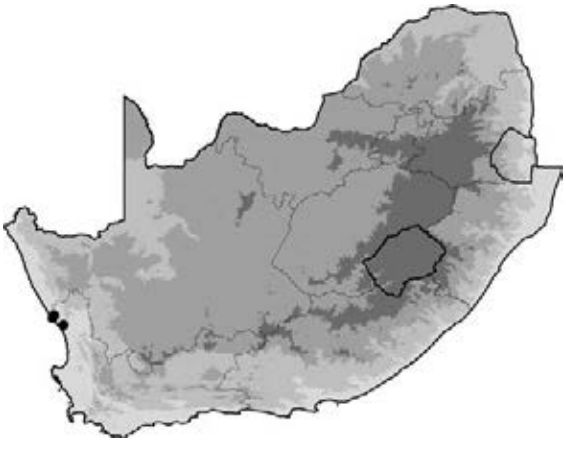
phylls and dry leaf sheaths forming a collar around base. *Leaves* ± 8, oval to round in section, ± 2 × 1.3–1.6 mm, narrowly 2-grooved on wider surfaces, 1-grooved on narrow surfaces, margins sparsely hairy below. *Spike* decumbent, crowded, secund in 2 ranks, up to 10-flowered; bracts green with rust-brown at tips, acute-attenuate, 18–25 mm long, inner ± as long as outer, forked apically for 3–4 mm. *Flowers* zygomorphic, predominantly pink, beige toward tepal bases, lower 3 tepals with narrow diamond-shaped markings in lower midline, red in throat, tepals ± uniformly pink outside; perianth tube cylindric, slender, 65–70 mm long, hollow, slightly curved; tepals narrowly linear and twisted, spreading with dorsal held slightly apart from upper laterals, ± 30 × 4 mm, upper lateral and lower tepals ± 26 × 2.5 mm. *Stamens* unilateral; filaments ± 12 mm long, inserted ± 2.5 mm below mouth of tube; anthers 5.5–6.0 mm long, white; pollen white. *Ovary* smooth; style arching over stamens, dividing at or shortly beyond anther tips, branches ± 5 mm long, notched apically. *Flowering time*: September.

Distribution and ecology: known from a single extended population on the Farms Kommandokraal and Skilpadvlei near Lutzville, Western Cape, South Africa; in deep sand in coastal sandveld.

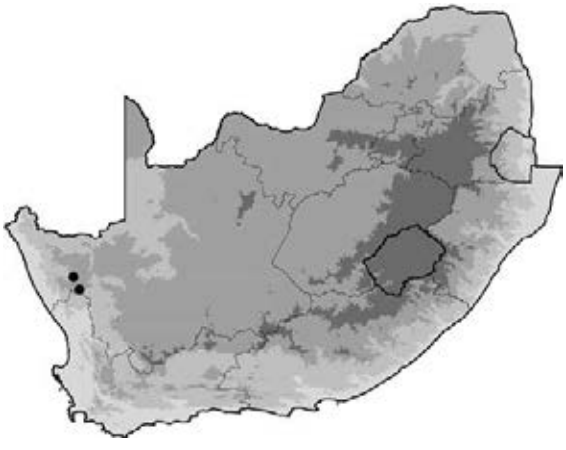
Diagnosis: in its subterete leaves and crowded, decumbent spikes of extremely long-tubed flowers, *Babiana teretifolia* superficially appears to be merely a variant of *B. brachystachys*, a species centred in coastal Namaqualand and extending south to near Lambert's Bay in Western Cape. The flowers, however, differ in several respects, especially in the remarkably narrow, channelled, spreading and twisted tepals, with the dorsal tepal hardly differentiated from the remaining five. The dorsal tepal is ± 30 × 4 mm and the remaining tepals ± 26 × 2.5 mm, whereas typical *B. brachystachys* has oblong-lanceolate, ± plane tepals, the dorsal tepal 20–24 × 6–8 mm and the lower three tepals 15–18 × 4–6 mm. These differences extend to the stamens: in *B. teretifolia* the filaments are ± 12 mm long and exserted ± 9.5 mm from the tube and the anthers are 5.5–6.0 mm long and white, as is the pollen, whereas *B. brachystachys* has filaments 4–5 mm long, exserted 1–3 mm, and anthers 4–5 mm long and usually pale violet to purple when fresh, as is the pollen, but occasionally white. In addition, the style of *B. teretifolia* divides opposite the anther tips so that the style branches, ± 5 mm long, arch above the anthers and can readily be seen to be notched at the tips. In *B. brachystachys* the style divides opposite the upper third of the anthers and the style branches are only ± 2.5 mm long. Added to the floral differences are the sparsely hairy leaf sheaths and flowers spaced ± 1.5 mm apart, in contrast with the woolly leaf sheaths and flowers set 3–6 mm apart in most populations of *B. brachystachys*. The extraordinarily long, linear and twisted tepals, compared to the more conventional oblong-lanceolate tepals of *B. brachystachys*, mark *B. teretifolia* as a specialised, geographic segregate of its already highly specialised sister species. The flowers of both species are adapted for pollination by long-proboscid flies.

42. **Babiana lapeirousioides** *Goldblatt & J.C.Manning* in Strelitzia 18: 49 (2007); Goldblatt & Manning: 143 (2012). Type: South Africa, [Northern Cape], without precise locality, as 'Gariep,' 30 Sept. 1943, *C.L. Leipoldt s.n.* (NBG, holo.).

Plants (50–)100–200 mm high, including leaves. *Stem* reaching up to 70 mm above ground, usually simple, rarely with 1 branch. *Leaves* narrowly sword-shaped, 50–150 × 5–9 mm, rigid, plicate, pungent, smooth, primary veins thickened, pale when dry. *Spike* compact, 2- to 4-flowered; bracts (17–)20–25(–35) mm long, smooth or minutely scabrid above, closely veined, dry and brown near apex, inner slightly shorter than outer, forked apically. *Flowers* zygomorphic, white, lower tepals with red or purple markings near base, unscented; perianth tube (25–)35–43(–52) mm long, cylindric, straight, flaring slightly toward mouth; tepals subequal or upper three slightly larger, spreading, narrowly oblanceolate, (10–)14–20 × 3–4 mm. *Stamens* unilateral; filaments erect, 7–8 mm long; anthers 4.5–5.5 mm, creamy white. *Ovary* smooth; style dividing from near base of anthers to shortly beyond anther tips, branches ± 2.5 mm long. *Flowering time*: late September to early October.



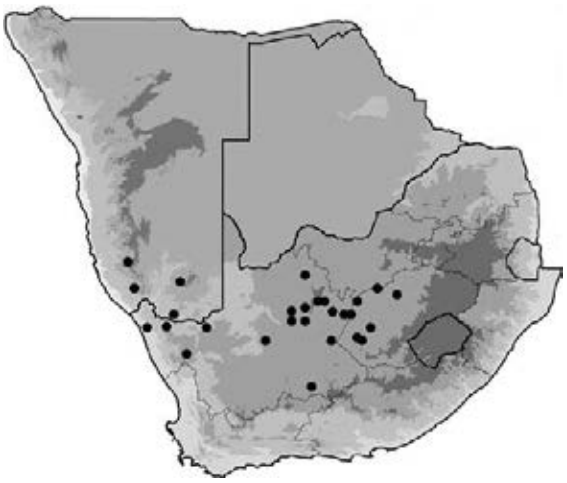
Distribution of ***Babiana teretifolia***.



Distribution of ***Babiana lapeirousioides***.

Distribution and ecology: restricted to the dry eastern foothills of the Kamiesberg in Namaqualand, Northern Cape, South Africa; in rock outcrops.

Diagnosis: *Babiana lapeirousioides* was described from fragmentary type material said to be from 'Garip', then thought to be the Garip Hills in the western Richtersveld, but has now been recollected at Vaalputs, in the eastern foothills of the Kamiesberg at the transition into Bushmanland. It is readily recognised by the white flowers with red V-shaped markings on the lower tepals, a straight, nearly cylindric perianth tube 22–40 mm long, and long, narrow leaves with sharp, pungent tips. The flowers are typical of those adapted for pollination by long-proboscid flies. When not in flower the stiff, sharply pungent leaves of *B. lapeirousioides* are easily confused with young plants of blue-flowered *B. dregei*, which grows in similar habitats in granite outcrops at higher elevations in the Kamiesberg.



Distribution of ***Babiana hypogaea***.

43. **Babiana hypogaea** *Burch.*, Travels in the interior of southern Africa 2: 589 [415 in reprinted edition] (1824); Goldblatt & Manning: 49 (2007). *Antholyza hypogaea* (Burch.) Klatt: 345 (Ergänzungen 11) (1882). Type: South Africa, [Northern Cape], Pellat Plains near Takun (or Litakun), 24 Aug. 1812, *W.J. Burchell 2241* (K, lecto., designated by Goldblatt & Manning: 92 (2004); B, P, isolecto.).

    Babiana falcata G.J.Lewis: 115 (1959). Type: South Africa, [Northern Cape], 20 miles E of Springbok, red sand flats, 8 Sept. 1950, *W.F. Barker 6671* (NBG, holo.).

    Babiana flavida G.J.Lewis: 117 (1959). Type: South Africa, [Northern Cape], Warrenton, Dec. 1922, *C.G. Adams 819* (BOL, holo.).

Plants acaulescent, 50–80 mm high, often growing in tufts with leaves up to 150 mm long. *Stem* subterranean or barely reaching above ground, simple or with short or vestigial lateral branches. *Leaves* linear to falcate or sword-shaped, often bent near base, sometimes inclined toward ground or evidently prostrate, lightly pleated, sparsely hairy to finely long-hairy, 25–150 × 1.5–3.0 mm, with firm tips. *Spike* usually arising below ground, 2- to 6-flowered; bracts 30–35 mm long, smooth, ± membranous below, green above ground level in upper ⅓, outer 25–50 mm long, inner as long or slightly longer, forked apically, attenuate. *Flowers* zygomorphic, greenish yellow to buff-coloured or ± white, flushed with light brown or blue-mauve outside, tepals darker in midline especially when dry, lower tepals marked with purple in lower half or reddish arrow-shaped marks near base and with dark reddish streaks in throat, strongly scented; perianth tube emerging from below ground level, cylindric, widening at throat, 30–40 mm long; tepals unequal, dorsal 35–42 mm long, lower tepals joined to upper laterals for up to 6 mm, forming a prominent lip, 30–35 mm long. *Stamens* unilateral; filaments 15–18 mm long; anthers 8–11 mm long. *Ovary* smooth, lower flowers of the spike shortly stalked; style dividing close to anther apices, branches ±3–4 mm long. *Flowering time*: mainly June to September, occasionally at other times depending on rainfall.

Distribution and ecology: relatively widespread, extending from southeastern Namibia to Northern Cape and Free State, South Africa, where it occurs in Bushmanland and the Upper Karoo; mostly in red sand plains.

Diagnosis: both *Babiana hypogaea* and *B. bainesii* are acaulescent plants with the long-tubed flowers arising below the ground, but those of *B. hypogaea* have a tube 30–40 mm long and shorter, often sparsely hairy to almost smooth leaves, sometimes with inclined to prostrate blades. The blades are often visibly constricted and apparently flexible at the base, which suggests an inclined to prostrate orientation even when they appear upright in pressed specimens. In contrast, *B. bainesii* has larger, blue-mauve to violet flowers with prominent white markings on the lower lateral tepals edged in darker blue, as well as nearly erect, usually densely hairy leaves, mostly 15–25 mm long. The flowers also have a tube (40–)50–60(–70) mm long, contrasting with the shorter tube of *B. hypogaea*. The shortly stipitate ovary of *B. hypogaea* and *B. bainesii* are typical of species of several genera of Iridaceae with an inflorescence borne at or below ground level and occur in other acaulescent species of *Babiana*, notably *B. sambucina*.

44. **Babiana bainesii** *Baker* in Journal of Botany, British and foreign 14: 335 (1876); Lewis: 115 (1959) [as *B. hypogea* (sic.)]; Goldblatt & Manning: 51 (2007). Type: South Africa, 'South African Goldfields', in 1870, *J.T. Baines s.n.* [K, lecto., designated by Goldblatt & Manning: 92 (2004)]. *Note:* The type was cited by Baker (1876) as having been collected in South Africa ('Transvaal') although the locality 'South

African Goldfields', given by the collector Thomas Baines, is not explicit.

Babiana bakeri Schinz: 712 (1906), as new name for *B. schlechteri* Baker: 1005 (1904), illegitimate homonym, not *B. schlechteri* Baker (1901). Type: South Africa, [Mpumalanga], near Middelburg, 22 Dec. 1893, *R. Schlechter 4055* (Z, ?holo.).

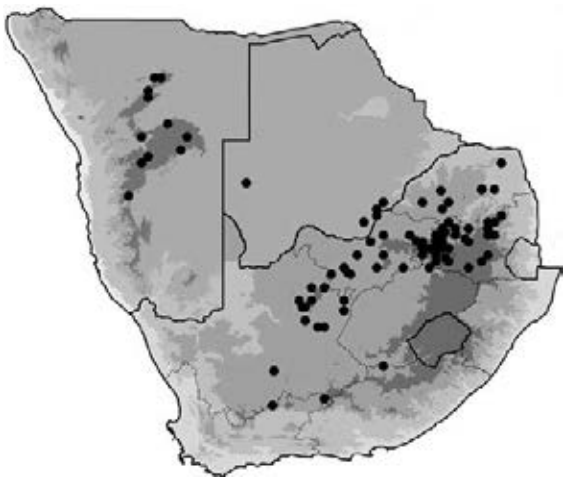
Babiana hypogea var. *ensifolia* G.J.Lewis: 114 (1959). Type: South Africa, [Eastern Cape], near Murraysburg, Aug. 1879, *W. Tyson 312* (SAM, holo.; K, SAM, iso.).

Babiana hypogea var. *longituba* G.J.Lewis: 115 (1959). Type: South Africa, [Limpopo], Mount Myorul, 29 Mar. 1894, *R. Schlechter 4729* (BOL, holo.; K, iso.).

Plants mostly 150–250 mm high (leaves only), sometimes growing in tufts. *Stem* underground, often branched. *Leaves* linear to sword-shaped, pleated, much exceeding flowers, 15–25 × 3–10 mm, densely hairy, scabrid, rarely ± smooth. *Spike* compact, at or shortly below ground level, with lower flowers shortly stalked, 2- to 8-flowered; bracts membranous to papery, with dry, rust-coloured tips or dry and rust-coloured throughout, lightly hairy, outer mostly 35–60 mm long, inner slightly shorter, forked at apex. *Flowers* zygomorphic, blue to violet or mauve, tepals paler (rarely white) toward edges, lower lateral tepals with white markings often edged in dark blue, usually sweetly scented; perianth tube mostly 40–60(–70) mm long, cylindric with expanded throat; tepals unequal, dorsal 40–50 mm long, upper laterals joined to lower tepals for ± 6 mm in a lip, lower tepals 25–40 mm long. *Stamens* unilateral; filaments 10–15 mm long; anthers 8–10(–12) mm long. *Ovary* smooth, lower flowers shortly stipitate; style usually dividing close to anther tips, branches ± 6 mm long. *Flowering time*: mainly in summer, February to April, occasionally in December or January; Upper Karoo populations in August or September.

Distribution and ecology: Botswana, Namibia, South Africa, Zimbabwe and Zambia, across summer-rainfall southern Africa from Murraysburg and Carnarvon in the Upper Karoo to southern Zambia in the northeast and northern Namibia in the northwest; on stony or sandy slopes and flats in dry grassland and bush.

Diagnosis: *Babiana bainesii* is recognised by the subterranean stem and inflorescence, the flowers thus arising shortly below ground level, and by its narrow, upright leaves, associated with blue-mauve to violet flowers with white markings on the lower lateral tepals edged in darker blue. The flowers have a perianth tube 40–55(–70) mm long and subequal tepals, the dorsal usually about as long as the tube, or slightly shorter when the tube exceeds 50 mm. The narrow leaves are linear to sword-shaped, erect and 15–25 mm long, thus much exceeding the flowers. Plants are often difficult to see among the grass where they grow, but when in bloom can often be located by their particularly strong sweet scent. Available evidence indicates that the flowers are pollinated by large-bodied bees.



Distribution of ***Babiana bainesii***.

A peculiar feature of this and the allied *Babiana hypogaea* is the underground inflorescence, a spike but with the lower flowers borne on short stalks, these sometimes resembling lateral branchlets, each bearing one or two flowers. As discussed under the preceding species, this feature is not particularly significant. Lewis (1959) treated *B. bainesii* as a synonym of the earlier *B. hypogaea*, misinterpreting the type of the latter, which flowered in winter and evidently had pale yellowish to buff-coloured flowers. That Burchell (1924) described the flower colour of *B. hypogaea* as blue was perhaps the result of basing the description on his pressed specimens in which the tepals have a dull mauve cast, as do all dry specimens of the species. This is the result of the mauve pigmentation on the outside of the tepals masking the dull yellow colouring of the inside of the tepals when dry.

Of the two varieties of the species, var. *longituba* from the mountains of Limpopo, South Africa, was distinguished largely by an elongate perianth tube up to 70 mm long and is now included in *B. bainesii.* The long tube in these plants likely represents the extreme of a range that includes many plants with a tube 55–65 mm long. The second variety, var. *ensifolia* has comparatively short, broad leaves 50–140 × 10–14 mm, unlike the narrow, sparsely to densely hairy, narrowly sword-shaped to linear leaves, mostly 15–25 × 3–10 mm, of typical var. *bainesii.* It broadly resembles the largely southern Cape species *B. sambucina* but has the entirely subterranean inflorescence, short lateral branchlets and rust-coloured bracts typical of *B. bainesii*. These plants flower in early spring, August and September. Var. *ensifolia* is poorly documented and requires additional study before its status can be established. It is provisionally included in *B. bainesii.*

Sect. 2. **Antholyzoides** *Benth. & J.D.Hook.*, Genera plantarum 3: 707 (1883); Goldblatt & Manning: 53 (2007). Type: *Babiana ringens* (L.) Ker Gawl., lecto., designated by Goldblatt & Manning: 53 (2007).

Babiana subg. *Antholyzoides* Baker: 166 (1877), Baker: 107 (1896). Type: *Babiana ringens* (L.) Ker Gawl., lecto., designated by Goldblatt & Manning: 53 (2007).

Babiana sect. *Exohebeoides* G.J.Lewis: 126 (1959). Type: *Babiana striata* (Jacq.) G.J.Lewis

Stem well-developed, smooth or velvety hairy (*B. spiralis, B. stenomera*), main axis erect with short, horizontal lateral branches, sterile in *B. avicularis* and *B. ringens*. *Leaves* usually smooth, sometimes scabrid or long-hairy on margins. *Spike* with bracts relatively short, usually hairless, dry in upper ⅓, apiculate-attenuate, inner forked to ± middle, 2-keeled. *Flowers* zygomorphic, dorsal tepal widely separated from others, curving back and erect when fully unfolded, distinctly clawed, lower tepals usually united for some distance in a lip, clawed, lower lateral tepals with limb abruptly expanded and usually bearing a lobe or auricle on either side of base. *Stamens* unilateral; filaments arcuate; anthers oblong-linear, fused together in *B. sinuata*. *Ovary* smooth.

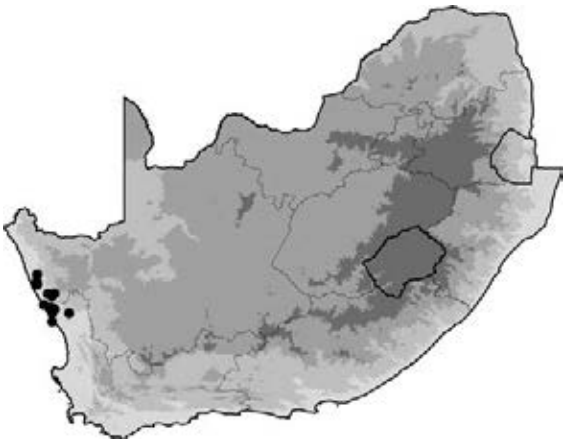
Species 12, mainly Namaqualand, with *B. sinuata* extending south into northern Western Cape.

Ser. **Exohebeoides** *(G.J.Lewis) Goldblatt & J.C.Manning*, name at new rank. *Babiana* sect. *Exohebeoides* G.J.Lewis: 126 (1959). Type: *B. striata* (Jacq.) G.J.Lewis

Flowers zygomorphic, shades of blue to violet or yellow, dorsal tepal longer than perianth tube and ultimately erect or recurved.

45. **Babiana spiralis** *Baker*, Handbook of the Irideae: 111 (1892); Lewis: 132 (1959); Goldblatt & Manning: 53 (2007). Type: South Africa, [Northern Cape], Namaqualand, without precise locality or date, collector uncertain, as Herb. Forsyth s.n. (K, syn. [2 sheets]).

Plants (150–)250–550 mm high. *Stem* erect, usually 2- to 6-branched, shortly velvety. *Leaves* narrowly lanceolate to linear, pleated, 1.5–2.5 mm wide, loosely to fairly tightly twisted above, often with pronounced pseudopetiole sometimes up to 40 mm long, sparsely scabrid on veins, sheath margins and upper edge of blade usually long-hairy, not cobwebby on sheaths. *Spike* 5- to 8-flowered; bracts green below, dry in upper ⅓, ± attenuate, obscurely hairy to hispid on lower midline, outer 8–10 mm long, inner slightly shorter, forked to ± middle. *Flowers* zygomorphic, blue-mauve to pink, lower tepals yellow with blue-mauve or pink tips, with strong freesia-like scent; perianth tube funnel-shaped, 8–10 mm long; tepals unequal, clawed, dorsal initially arched, later erect, 18–21 mm long, upper laterals joined to lower for ± 4 mm, lower 3 united for short distance, lower laterals abruptly expanded at top of claw, limb bases with prominent auriculate lobes. *Stamens* unilateral; filaments arched, ± 15 mm long; anthers 4 mm long. *Ovary* smooth; style dividing opposite middle of anthers, branches ± 3 mm long, spreading. *Flowering time*: August, September.



Distribution of ***Babiana spiralis***.

Distribution and ecology: extending from near Garies and Hondeklip Bay in Northern Cape, South Africa, south to Trawal and the Nardouw foothills in the Olifants River Valley, Western Cape; usually on sandy ground.

Diagnosis: *Babiana spiralis* is perhaps most closely related to *B. fimbriata* of central Namaqualand and it has often been confused with that species. The brightly coloured, attractive flowers, velvety hairy stem, and leaves twisted or coiled above and hairless except for a few long hairs on the margins distinguish it from *B. fimbriata*, which has dull coloured flowers, somewhat rigid, only weakly twisted leaves, a sparsely hairy or smooth stem, and upper lateral tepal limbs curving inward, very different from the ± patent tepals of *B. spiralis*. The lower lateral tepals of *B. fimbriata* also lack the auriculate lobes at the base of the limbs characteristic of most species of series *Exohebeoides*, including *B. spiralis*. Instead, the lower lateral tepals are obscurely lobed at best. The leaf sheaths and cataphylls of *B. spiralis* are not woolly or cobwebby as they are in *B. fimbriata*, and the leaf blades may have fairly well-developed terete pseudopetioles, sometimes up to 40 mm long with the broad part of the blade abruptly expanded. The ranges of the two species overlap in central Namaqualand, but *B. spiralis* has the wider distribution, extending westward to the sandy coast south of Hondeklipbaai and south to the Nardouw Mtns in Western Cape.

46. **Babiana stenomera** *Schltr.* in Botanische Jahrbücher für Systematik 27: 100 (1899); Lewis: 127 (1959); Goldblatt & Manning: 53 (2007). Type: South Africa, [Western Cape], Kareebergen, near Nuwerus, 1 200 ft [± 380 m], 17 July 1896, *R. Schlechter 8185* (B, BOL, K, MO, P, PRE, S, syn.).

Plants 80–120 mm high. *Stem* short, erect, densely hairy above, simple or with 1 or 2 short branches, sheathed below by a thick collar of fibres; cataphylls and bases of leaf sheaths evidently smooth. *Leaves* sword-shaped, reaching ± to top of spike, mostly 4.0–5.5 mm wide, scarcely plicate, hairless or sparsely hairy on veins and sheath margins. *Spike* erect, 5- to 8-flowered; bracts evidently green with brown tips, mostly 15–20 mm long, inner shortly hairy near base and on keels, divided near apex, sometimes for almost ⅓ their length. *Flowers* zygomorphic, blue-mauve with yellow markings on lower lateral tepals; perianth tube 12–14 mm long; tepals unequal, shortly clawed, dorsal tepal 22–24 mm long, lower tepals joined to upper laterals for ± 4 mm and to one another for ± 2 mm, ± 15 mm long. *Stamens* unilateral; filaments ± 15 mm long; anthers ± 6 mm long. *Ovary* smooth; style evidently dividing opposite middle of anthers, branches ± 4 mm long. *Flowering time*: July.

Distribution and ecology: a narrow endemic of the Kareeberge near Nuwerus in southern Namaqualand, Western Cape, South Africa; on granite hills at ± 380 m elevation.

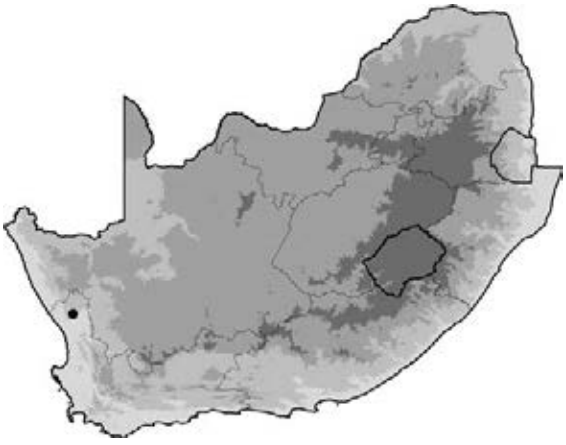
Diagnosis: *Babiana stenomera* is recognised by the floral bracts 15–20 mm long, the inner of which does not have rust-coloured, acuminate tips, and the ascending leaves are 4.0–5.5 mm wide. *Babiana stenomera* is evidently most closely related to a second Namaqualand species, *B. fimbriata*, but that species has narrower leaves, up to 3.5 mm wide, tapering and lightly twisted in the upper half, a smooth or at best sparsely hairy stem, and prominent long hairs on the edges of the leaf sheaths. The bracts of *B. stenomera* in particular, mostly 15–20 mm long, are beyond the expected range for *B. fimbriata* or for the related *B. spiralis* which has narrow, coiled leaves.

47. **Babiana lewisiana** *B.Nord.* in Botaniska Notiser 123: 436 (1970); Goldblatt & Manning: 55 (2007). Type: South Africa, [Western Cape], Vredendal, Hol River, on quartzite slope, 28 July 1962, *B. Nordenstam 787* (S, holo.; K, M, MO, NBG, iso.).

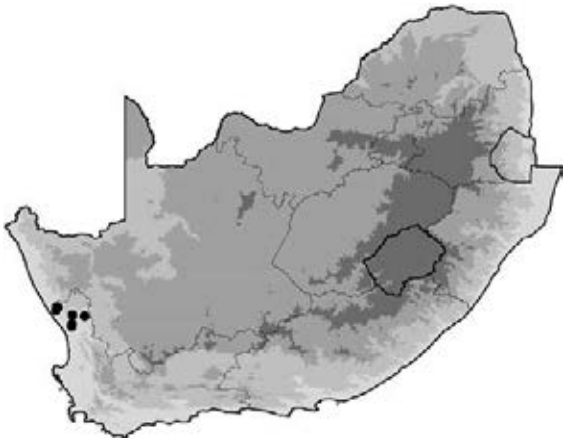
Plants 70–150 mm high. *Stem* simple or with one branch, softly hairy above, sheathed below by smooth cataphylls. *Leaves* with short pseudopetioles, blades oblong, held almost at right angles to sheaths, 10–15 mm wide, strongly ribbed but scarcely plicate, hairless or minutely hairy on margins. *Spike* 3- to 8-flowered; bracts sparsely hairy, green with attenuate, dry brown tips, often torn at apex, 15–20 mm long, inner slightly shorter than outer, forked to ± middle. *Flowers* zygomorphic, greenish yellow with purple tips; perianth tube funnel-shaped, ± 10 mm long; tepals unequal, dorsal oblong, ± 25 mm long, lower tepals joined to upper laterals for short distance, with short, well-developed claws, ± 20 mm long. *Stamens* unilateral; filaments arcuate, ± 15 mm long; anthers 5–6 mm long. *Ovary* smooth; style dividing opposite anther apices, branches ± 2.5 mm long. *Flowering time*: July and August.

Distribution and ecology: a rare endemic of the Knersvlakte in Western Cape, South Africa, near Vredendal; on stony quartzite ground near Hol River.

Diagnosis: distinctive in the short, oblong leaf blades held at right angles to the short, erect pseudopetioles, a softly hairy stem of short stature, up to 150 mm high, and relatively long, sparsely hairy floral bracts 15–20 mm long. The greenish yellow flowers have a short perianth tube, 10 mm long, a dorsal tepal ± 25 mm long, and lower tepals ± 20 mm long with short, well-developed claws. *Babiana salteri*, also with short spreading leaves, has hairy, soft-textured leaves, inner bracts divided to the base, and a densely hairy ovary. The similarity of the short leaf blades held nearly at right



Distribution of ***Babiana stenomera***.



Distribution of ***Babiana lewisiana***.

angles to the sheaths is best seen as convergent. *Babiana lewisiana* is most likely allied to the group of species in sect. *Antholyzoides* that have a pubescent stem and lack the cobwebby to woolly hairs on the cataphylls and lower leaf sheaths. These include *B. spiralis* and *B. stenomera* but it should not be confused with either of these species because of the plane leaves with broad, oblong blades extending almost horizontally, unlike the narrow, distally coiled leaves of the latter two species.

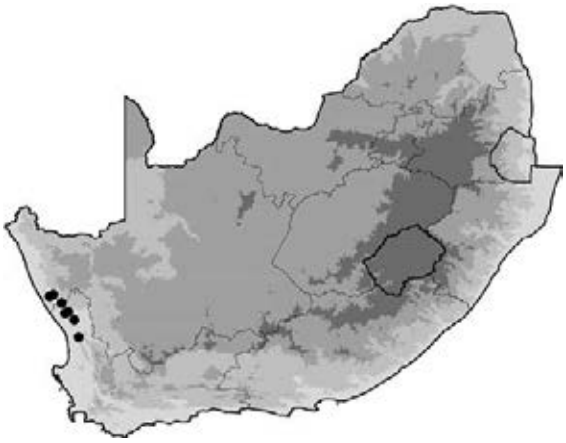
A collection, in fruit, from granite slopes S of Kotzesrus in Northern Cape may be this species and if so would represent a significant range extension. These plants conform with *Babiana lewisiana* in the virtually hairless leaves, hairless ovary, and absence of cobwebby hairs on the cataphylls.

48. **Babiana fimbriata** *(Klatt) Baker* in Journal of the Linnean Society, Botany 16: 166 (1877); Lewis: 132 (1959) [including *B. spiralis*]; Goldblatt & Manning: 55 (2007). *Antholyza fimbriata* Klatt: 299 (1867). Type: South Africa, [Northern Cape], southern Namaqualand, between the Swartdoorn and Groen River, Aug. 1830, *J.F. Drège 2619* (B, holo.; K, MO, P [3 sheets], S [2 sheets]; a second sheet of *Drège 2619* at K may be *B. planifolia*).

Plants 120–200 mm high. *Stem* erect, simple or with short lateral branches, smooth or sparsely hairy in lines below bracts, sheathed below by cobwebby to woolly cataphylls. *Leaves* linear, pleated, as long as or shortly exceeding spike, 3–4 mm wide, loosely twisted above, sparsely short- or long-hairy on lightly undulate margins. *Spike* short, erect, 5- to 7-flowered; bracts smooth, green, dry and brown toward apices, 12–14 mm long, inner forked in upper ⅓, membranous in lower midline. *Flowers* zygomorphic, dull reddish purple to red-brown, greenish outside, lower lateral tepals yellow-green with purple tips, sweetly scented of freesia and vanilla; perianth tube funnel-shaped, 10–12 mm long; tepals unequal, clawed, dorsal initially arched, becoming erect, (18–)21–25 mm long, upper lateral tepals directed forward and arching slightly inward, lower tepals joined to upper laterals for ± 5 mm and to one another for ± 2.5 mm, lower laterals with conspicuous auriculate lobes at limb bases, 10–12 mm long. *Stamens* unilateral; filaments arched, 13–15 mm long; anthers 5–6 mm long, usually lilac; pollen creamy white. *Ovary* smooth; style dividing between middle and upper ⅓ of anthers, branches ± 2.5 mm long. *Flowering time*: late July to mid-September.

Distribution and ecology: a Namaqualand endemic, extending from Garies in Northern Cape, South Africa, to Nuwerus and the Knersvlakte north of Vanrhynsdorp in Western Cape; occurring on stony granite or quartzitic slopes.

Diagnosis: distinguished by the hairless or nearly hairless stem and the woolly or cobwebby cataphylls and bases of the leaf sheaths, *Babiana fimbriata* has leaves



Distribution of ***Babiana fimbriata***.

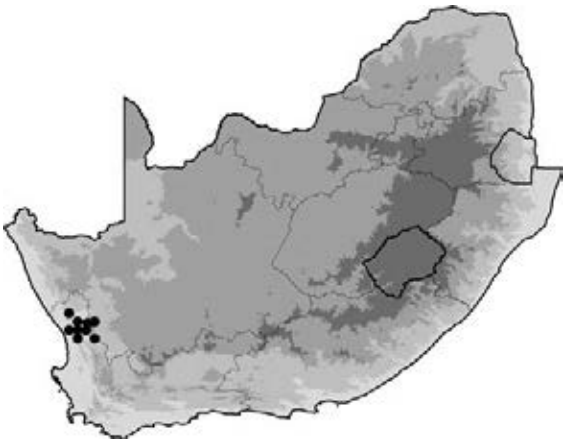
3–4 mm wide with the blades slightly twisted. The dark purple to almost brown flowers have greenish yellow lower lateral tepals with prominent auriculate lobes at the limb bases. The upper lateral tepals of *B. fimbriata* are directed forward or are slightly curved inward in the proximal half, a feature unique in the genus. *Babiana spiralis*, which has been confused with *B. fimbriata*, has smooth cataphylls and leaf sheaths, a velvety stem, and bright pink or blue flowers, also with auriculate lobes on the lower tepal limbs. The upper lateral tepals of *B. spiralis* curve outward shortly above the base in conventional subpatent orientation.

Babiana fimbriata is a fairly narrow endemic of central Namaqualand, whereas the relatively widespread *B. spiralis* favours deep sandy soils, and extends from Garies to Klawer in the south and west to the Atlantic Coast between Groen River Mouth and Kotzesrus.

49. **Babiana sinuata** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 128 (1959); Goldblatt & Manning: 56 (2007). Type: South Africa, [Western Cape], 10 miles [16 km] S of Klawer, 10 Sept. 1950, *W.F. Barker 6710* (NBG, holo.; BOL, K, SAM, iso.).

[*Babiana namaquana* Schltr. ms. Vuurfontein (?Zuurfontein), *Schlechter 10979* (B, K).]

Plants 120–250 mm high. *Stem* smooth, erect, mostly 2- to 6-branched, sheathed basally by woolly or cobwebby cataphylls. *Leaves* lanceolate, with sheaths often woolly or cobwebby, blades ± plane with few prominent veins, reaching to ± base of spike, loosely twisted, undulate and crisped, margins of sheath and upper margin of blade long-hairy, margins thickened, dark green. *Spike* inclined, lax, several-flowered; bracts smooth, green below, dry and brown in upper half, 8–10 mm long, inner as long as outer, forked to ± middle. *Flowers* zygomorphic, pale blue-mauve, lower tepals yellow with pale blue tips, lower laterals also with dark violet median mark, sweetly scented; perianth tube funnel-shaped, 8–9 mm long; tepals unequal, clawed, dorsal tepal held



Distribution of ***Babiana sinuata***.

apart from others, initially arcuate, later erect, ± 28 mm long, lower 3 shortly united, 12–14 × 3 mm. *Stamens* unilateral; filaments arcuate, 20 mm long; anthers connate, ± 7 mm long. *Ovary* smooth; style mostly dividing opposite upper half of anthers, sometimes beyond anther tips, branches ± 1.5 mm long. *Flowering time*: late August to mid-September.

Distribution and ecology: extending from southern Namaqualand to Bulshoek north of Clanwilliam and in the lower Doorn River Valley east of the Nardouw Mtns, Western Cape, South Africa; on stony shale slopes.

Diagnosis: one of the most distinctive species of the genus, *Babiana sinuata* can be recognised immediately by the twisted and broadly undulate leaves with thickened, crisped margins and woolly to cobwebby cataphylls and leaf sheaths; the upper (adaxial) margins also bear fine long hairs. The moderate-sized, pale blue-mauve flowers have the upper tepals at first arching over the stamens but later becoming erect and the lower median tepal has a prominent violet central mark on a pale yellow background. Most remarkable, however, are the long, arched stamens with anthers joined together, a feature unique in the genus. The woolly cataphylls and crisped, undulate, and twisted leaves suggest a close relationship with *B. striata*, with which it has been confused. Flowering earlier in the year, *B. striata* is easy to distinguish by the more compact inflorescence of smaller flowers with the anthers parallel but not joined together, and the corm tunics of particularly coarse fibres.

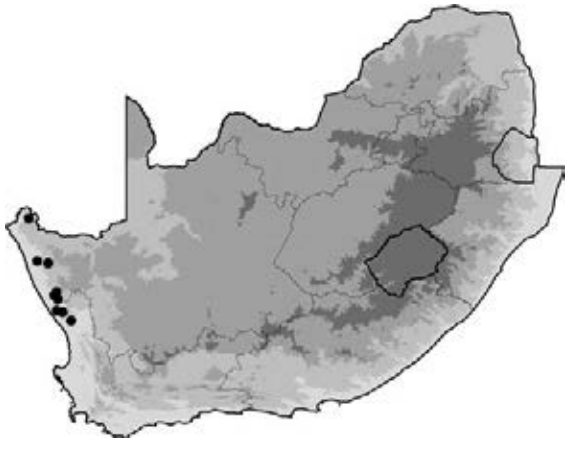
50. **Babiana striata** *(Jacq.) G.J.Lewis* in Journal of South African Botany, Suppl. 3: 129 (1959), excl. var. *planifolia*; Goldblatt & Manning: 56 (2007). *Gladiolus striatus* Jacq.: 5 (1795 [1788–1795]). *Waitzia striata* (Jacq.) Heynh.: 855 (1841), illegitimate name, genus invalid. *Montbretia striata* (Jacq.) Voigt: 610 (1845). *Antholyza striata* (Jacq.) Klatt: 346 (1882). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 260 (1793 [1788–1795]).

Gladiolus formosus Pers.: 44 (1805), illegitimate superfluous name for *G. striatus* Jacq. *Hebea formosa* Eckl.: 42 (1827) illegitimate name. Type: Unknown, probably illustration in Jacq.: t. 260 (1793 [1788–1795]).

Plants 80–150 mm high. *Corm* globose; tunics coarsely fibrous. *Stem* smooth, inclined, smooth, 1- or 2-branched, enclosed below ground by a thick collar of fibres and sheathed by cobwebby to woolly cataphylls. *Leaves* sword-shaped to lanceolate, margins broadly undulate and lightly crisped, twisted above, with prominent midrib, hairless or ciliate on margins, sometimes only near tips. *Spike* inclined to horizontal, 3- to 5-flowered in 2 ranks; bracts smooth, 8–15 mm long, inner forked in upper ⅓. *Flowers* zygomorphic, pale mauve or dull yellow, lower lateral tepals darker yellow-green in midline, lower median with spear-shaped, purple mark, evidently unscented; perianth tube ± 7 mm long; tepals unequal, abruptly narrowed below into claws, dorsal largest, widely arched, later curving back, 20–25 mm long, lower tepals joined to upper laterals for 3–4 mm and to one another for 3–6 mm, with prominent auriculate lobes above base of limbs, 12–14 mm long. *Stamens* unilateral; filaments ± 15 mm long; anthers 4.5–6.0 mm long. *Ovary* smooth; style dividing opposite anther bases, branches ± 2 mm long. *Flowering time*: June to late July.

Distribution and ecology: widespread in Namaqualand, Northern Cape, South Africa, extending from the southern Richtersveld to Nuwerus; on stony and gravel slopes at lower elevations, evidently uncommon.

Diagnosis: winter-flowering *Babiana striata* is recognised primarily by the unusual inclined leaves with undulate and tightly crisped margins, smooth or at most ciliate on the margins with the entire blade loosely twisted. The fairly small flowers are borne on an inclined to horizontal spike facing the spike axis, and the tepals are pale yellow, flushed light purple outside. Like most species of sect. *Antholyzoides*, the cataphylls and leaf bases are cobwebby. The species is most often confused



Distribution of ***Babiana striata***.

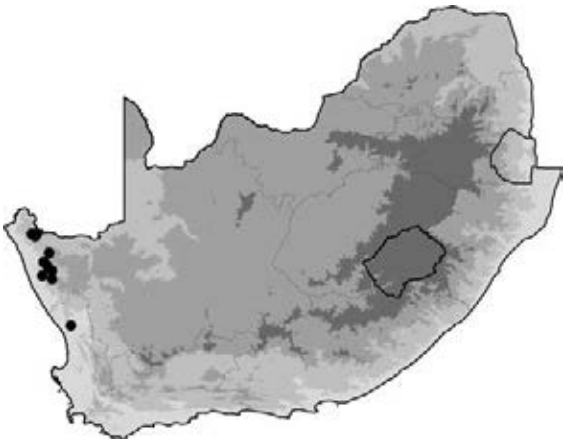
with blue-flowered *B. sinuata*, which also has similar undulate and twisted leaves but is otherwise very different. The leaves of *B. sinuata* differ in having long hairs on the margins of the sheath and upper margin of the blade, the flowers are larger, with the dorsal tepal ± 28 mm long (versus 20–25 mm in *B. striata*), and are pale blue with pale yellow lower tepals with pale blue tips, and the lower laterals have a conspicuous dark violet median mark. Even more distinctive are the stamens of *B. sinuata*, which have filaments ± 20 mm long and connate anthers, a feature that persists even in pressed specimens. The stamens of *B. striata* have filaments ± 15 mm long and the anthers free from one another. Surprisingly, given their dull colouration, the flowers of *B. striata* appear unscented, at least in the live plants examined from near Kotzesrus.

51. **Babiana planifolia** *(G.J.Lewis) Goldblatt & J.C.Manning* in Bothalia 35: 10 (2005), 57 (2007). *B. striata* var. *planifolia* G.J.Lewis: 130 (1959). Type: South Africa, [Northern Cape], 9 miles [14.5 km] W of Steinkopf, 30 June 1935, *T.M. Salter 5554* (BOL, holo.).

Plants 120–350 mm high. *Corm* globose; tunics finely fibrous. *Stem* erect, usually smooth, simple or with 1 or more short lateral branches, enclosed below ground by thick fibrous collar, cataphylls and base of leaf sheaths cobwebby to woolly. *Leaves* lanceolate to sword-shaped, plane or lightly undulate in proximal half, loosely twisted distally, blades (4–)8–16 mm long, sparsely short-hairy, often long-hairy on adaxial margins. *Spike* erect, sometimes sparsely hairy, with 3 to 8 flowers spirally arranged; bracts smooth or sparsely short-hairy, 12–24 mm long, inner forked to middle, tips attenuate. *Flowers* zygomorphic, mauve, lower lateral tepals yellow-green with mauve to purple tips; perianth tube 8–16 mm long, slender below, expanded toward apex; tepals unequal, clawed, dorsal arched, later recurving, 23–28 mm long, lower lateral tepals joined to upper laterals for 4–5 mm and to one another for ± 2 mm, 15–20 mm long. *Stamens* unilateral; filaments arched, ± 15 mm long; anthers ± 6 mm long. *Ovary* smooth; style dividing opposite middle to upper ⅓ of anthers, branches ± 3 mm long. *Flowering time*: May and June, occasionally in July.

Distribution and ecology: a Namaqualand endemic, *Babiana planifolia* extends from the southern Richtersveld to Garies and Soebatsfontein in Northern Cape, South Africa, to the northern Knersvlakte in Western Cape; on stony slopes, mainly on fine-grained soils.

Diagnosis: *Babiana planifolia* has nearly plane leaves, occasionally lightly undulate toward the base, and corm tunics of relatively fine texture. Plants have cobwebby to woolly cataphylls and lower leaf sheaths and the leaf blades are sparsely long-hairy on the veins or are virtually hairless. Like *B. striata* the stem and bracts are usually hairless and the lower lateral tepals appear to lack the prominent auriculate lobes typical of most other species of sect. *Antholyzoides*, including *B. striata*.

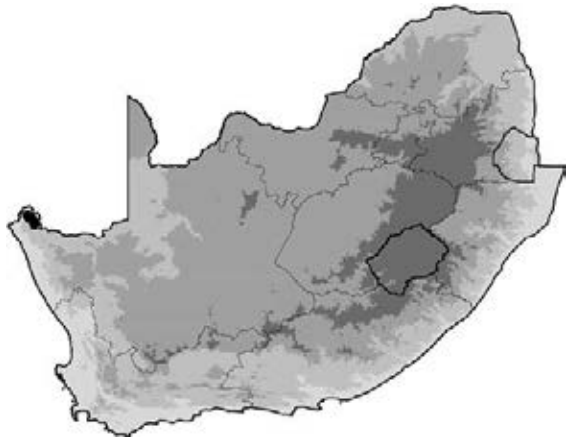


Distribution of ***Babiana planifolia***.

Plants from the Eksteenfontein area of the southern Richtersveld are included in *Babiana planifolia* although they have short, broad, lightly undulate leaves 35–50 × 15–20 mm, twisted in the upper half. These plants also seem to consistently differ in their short stature and long, soft, almost silky hairs on the leaf margins and upper sheaths, sometimes very conspicuous. Corms, cataphylls, and the lower leaf sheaths of the Richtersveld plants are not known and these plants are thus provisionally included in *B. planifolia*. When more specimens become available they may be found to constitute a separate taxon.

52. **Babiana lobata** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 135 (1959); Goldblatt & Manning: 58 (2007). Type: South Africa, [Northern Cape], as 'near Garies' [but certainly from the Richtersveld], 29 July 1937, *I.C. Verdoorn 1892* (PRE, holo.).

Plants 120–250 mm high, hairless throughout, with depressed globose corm up to 15 mm diam. *Stem* simple or few-branched, sometimes ± dichotomously with branches widely diverging, sheathed by smooth cataphylls, old dry leaves coiled around stem base. *Leaves* narrowly linear–sword-shaped, reaching or shortly exceeding spike, 2.5–4.0 mm wide, scarcely plicate, smooth, slightly twisted, veins thickened, prominent when dry. *Spike* inclined to ± horizontal, (4–)7- to 12-flowered; bracts subequal, smooth, dry and rust-coloured in upper ⅓, 5–8 mm long, inner ± as long or slightly longer than outer, forked apically or in upper ⅓. *Flowers* pale blue-mauve to violet, limbs of lower lateral tepals pale yellow or with mauve tips, with light acrid-metallic scent; perianth tube 7–9 mm long, funnel-shaped; tepals unequal, dorsal 18–23 × 4–5 mm, erect, later curving back in distal ⅓, lower lateral tepals joined to upper laterals for ± 5 mm and to one another for ± 3 mm, abruptly clawed at base, claws ± 2 mm long, limbs with conspicuous auriculate lobes at bases, margins lightly crisped. *Stamens* unilateral; filaments ± 15 mm long; anthers ± 4 mm long, purple; pollen cream-coloured. *Ovary* smooth; style dividing between base and middle of anthers, branches tangled



Distribution of ***Babiana lobata***.

in anthers. *Capsules* depressed-globose, ± 6 × 7–8 mm. *Flowering time*: July and August.

Distribution and ecology: endemic to the Richtersveld of Northern Cape, South Africa, extending from Armanshoek in the Richtersveld National Park to the foot of the Stinkfontein Mtns; on rocky lower slopes and flats.

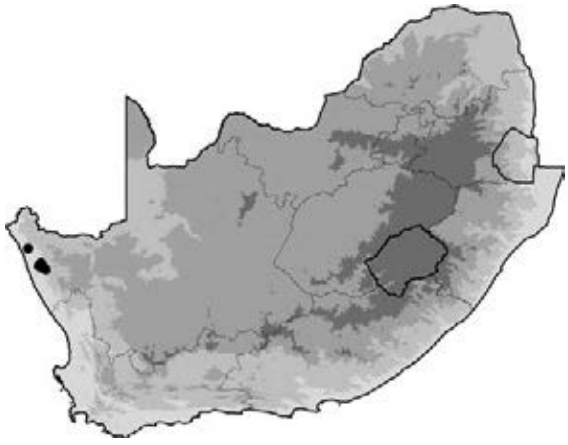
Diagnosis: with blue flowers with yellow markings on the lower tepals, *Babiana lobata* is recognised by the simple or dichotomously branched stem with flowers borne on the upper side of horizontal spikes, the lower tepals with auricular lobes at the bases of the limbs. The plants are hairless throughout and the floral bracts are short, 5–8 mm long, dry distally with the inner forked in the upper third. Somewhat unusual, the dry remains of past season's leaves are twisted around the base of the stem. *Babiana lobata* has been associated with two related species, *B. fimbriata* and *B. spiralis* from central Namaqualand, both also with auriculate lobes on the lower lateral tepal limbs. *Babiana fimbriata* has leaves twisted distally, woolly–cobwebby cataphylls, and lightly hairy bracts 12–14 mm long, much exceeding those of *B. lobata*. The related *B. spiralis* has velvety hairy stems but smooth cataphylls and leaf sheaths, and bracts 8–10 mm long. The hairless habit, short floral bracts, and more-or-less divaricate branching suggest that *B. tritonioides* is most closely related to *B. lobata*. Centred in the Komaggas area of northwestern Namaqualand, *B. tritonioides* has short, relatively broad leaves, the blades borne at right angles to the sheaths and twisted or folded back on themselves in concertina fashion and is typically a shorter plant, 100–150 mm high.

53. **Babiana tritonioides** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 134 (1959); Goldblatt & Manning: 59 (2007). Type: South Africa, Northern Cape, between Brakwater and Komaggas, 31 July 1953, *W.F. Barker 6699* (NBG, holo.).

Plants 100–150(–350 under bushes) mm high. *Stem* sharply inclined, simple or with 1 or 2 widely diverging branches, sheathed by smooth cataphylls, with collar of fibres around base. *Leaves* oblong to lanceolate, blades held ± at right angles to sheaths, 40–60 × 6–10(–18) mm, scarcely plicate, undulate in concertina fashion, twisted above and erect, smooth, veins lightly thickened. *Spike* horizontal, flexuose, 7- to 10-flowered; bracts smooth, 4.0–6.5 mm long, inner forked to ± middle. *Flowers* zygomorphic, blue-mauve, lower lateral tepals yellow, sweetly scented; perianth tube narrowly funnel-shaped, 6–8 mm long; tepals unequal, clawed, dorsal 23–27 mm long, lower tepals joined to upper laterals for 3–5 mm and to one another for ± 2 mm, 12–14 mm long, lower laterals with conspicuous auriculate lobes just above limb base. *Stamens* unilateral; filaments 15–17 mm long; anthers ± 5 mm long. *Ovary* smooth; style dividing opposite middle to upper ⅓ of anthers, branches 3–4 mm long. *Flowering time*: late July to early September.

Distribution and ecology: local in northern Namaqualand in Northern Cape, South Africa, from Komaggas to Kosies, but also recorded in the southern Richtersveld from the Oograbies (or Ugrabies) Hills northeast of Port Nolloth, although this record remains to be confirmed; on stony granitic slopes.

Diagnosis: the short floral bracts, 6–8 mm long, strongly inclined, secund spike and flowers with narrow tepals suggest that *Babiana tritonioides* is closely allied to the Richtersveld species, *B. lobata*, and the two seem somewhat isolated taxonomically within sect. *Antholyzoides*. The species is especially distinctive in the ± horizontal and distally twisted leaf blades, but the lower tepals have auriculate lobes above the base characteristic of the section. Based on morphology, *B. lobata* and *B. tritonioides* appear closely related and evidently represent a northern species pair of sect. *Antholyzoides*. The short leaves of *B. tritonioides* with relatively broad blades, mostly 40–60 × 6–10 mm, held nearly at right angles to the sheaths and twisted or folded back on themselves in concertina fashion, and short stature make the species easy to distinguish from the taller *B. lobata*, which has stems 120–250 mm high and erect, linear to



Distribution of ***Babiana tritonioides***.

narrowly sword-shaped leaves 2.5–4.0 mm wide, only lightly twisted in the upper half.

Ser. **Antholyzoides** *Goldblatt & J.C.Manning*, new series. Type: *Babiana ringens* (L.) Ker Gawl.

Flowers zygomorphic, predominantly red, lower tepals with yellow or green markings, dorsal tepal longer than perianth tube, erect and enclosing filaments.

54. **Babiana hirsuta** *(Lam.) Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 38: 53 (2008). *Antholyza hirsuta* Lam.: 201 (1783). *Gladiolus sulcatus* Lam.: 119 (1791), illegitimate superfluous name for *A. hirsuta* Lam. Type: without locality or collector, 'antholyza hirsuta. encycl.' as written on herbarium sheet, (P: Herb. Lamarck, holo.).

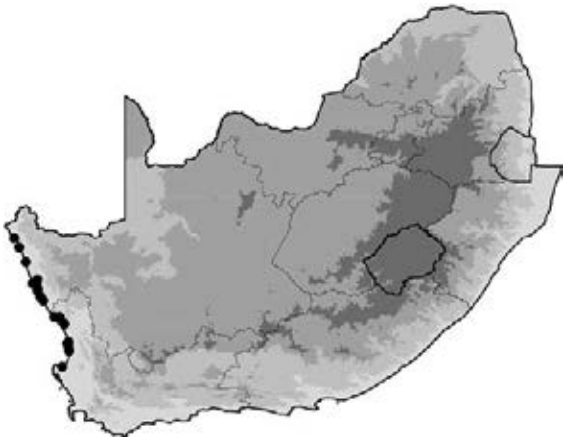
Babiana thunbergii Ker Gawl.: 233 (1804), as a new name for *Antholyza plicata* L.f.: 96 (1782) [not *B. plicata* Ker Gawl. 1802a]; Goldblatt & Manning: 60 (2007). *Anaclanthe plicata* (L.f.) N.E.Br.: 269 (1932a). *Gladiolus mollis* Vahl: 119 (1805), as a new name for *Antholyza plicata* L.f. [not *G. plicatus* L. (1762)]. Type: South Africa, [Western Cape], dunes near the coast below Verlorenvlei, Oct. 1774, *C.P. Thunberg s.n.* (UPS–THUNB 1104, holo.).

Anaclanthe namaquensis N.E.Br.: 269 (1932a). *Antholyza namaquensis* (N.E.Br.) Goldblatt: 444 (1971). Type: South Africa, [Northern Cape], dunes near Port Nolloth, Sept. 1883, *H. Bolus* sub *Herb. Norm. Austr. Afr. 669* (BOL, K, syn.).

[*Antholyza hirta* Pers.: 42 (1805), invalid name only in synonymy.]

Plants 400–700 mm high. *Stem* erect, densely hairy, with several, short, horizontal branches. *Leaves* lanceolate, firm, pleated, minutely hairy or scabrid. *Spikes* horizontal, crowded, many-flowered; bracts smooth or minutely hairy, green with dry brown tips, outer 18–30 mm long, inner slightly shorter, divided to ± middle, transparent in midline, prominently 2-veined. *Flowers* zygomorphic, facing spike apex, bright red, lower tepals yellow marked with green to black at base, unscented; perianth tube narrowly funnel-shaped, expanded in upper half, curving upward away from spike apex, 30–40 mm long; tepals unequal, ± clawed, dorsal 16–20 mm long, erect, margins curving inward enclosing filaments, lower tepals united with upper laterals for ± 6 mm in a prominent lip, lower and upper laterals ± 8 mm long. *Stamens* unilateral; filaments straight, erect, unilateral, 37–40 mm long, enclosed by upper tepal; anthers 5–7 mm long. *Ovary* smooth; style dividing between base and middle of anthers, branches ± 4 mm long. *Flowering time*: mainly July to October.

Distribution and ecology: common along the Atlantic Coast of Northern and Western Cape, South Africa, from the mouth of the Orange River southward to Britannia Bay near Saldanha but so far not recorded further north in adjacent southwestern Namibia; on sandy coastal flats and dunes, often common and making a striking display when in full bloom.



Distribution of ***Babiana hirsuta***.

Diagnosis: one of the most robust species of the genus, *Babiana hirsuta* is usually 0.35–0.50 m high but may reach 1 m when growing through low bush. The bright red flowers are distinctive in the large, erect dorsal tepal with the margins loosely curving together and enclosing the filaments and style. The anthers and style extend beyond the tepal apex, and the upper lateral and lower 3 tepals are partly united in an extended lower lip with the lower tepal lobes short and inconspicuous. The flowers broadly resemble those of *B. ringens* but are considerably smaller.

The flowers are clearly adapted for sunbird pollination and both dusky and malachite sunbirds are recorded visitors. The species is known locally as the *sandlelie* (sand lily).

55. **Babiana ringens** *(L.) Ker Gawl.* in König & Sims, Annals of Botany 1: 233 (1804); Baker: 114 (1896); Goldblatt & Manning: 61 (2007), 50 (2010). *Antholyza ringens* L.: 37 (1753). Type: South Africa, without precise locality or date, illustration in Commelin: 81, t. 41 (1697).

Plants 120–400 mm high. *Stem* with main axis sterile, velvety, with 1(2) horizontal branches borne shortly above ground. *Leaves* linear-lanceolate to almost terete, stiff, pungent, deeply pleated, usually smooth or minutely hairy. *Spike* decumbent, borne close to ground, 2- to 10-flowered; bracts green with dry rust-coloured tips, smooth or minutely hairy below, 20–50 mm long, inner forked in upper ⅓. *Flowers* zygomorphic, red with yellow throat, unscented; perianth tube narrowly funnel-shaped, expanded in upper ⅓, curving upward away from spike apex, 27–45 mm long; tepals unequal, dorsal longest, 18–50 mm long, channelled below with margins overlapping and enclosing filaments and style, lower tepals shortly united with upper laterals,

22–25 mm long. *Stamens* unilateral; filaments straight, erect, unilateral, 24–60 mm long; anthers 4.0–7.5 mm long, purple. *Ovary* smooth; style dividing opposite base of anthers (subsp. *australis*) or between middle of anthers or shortly beyond them, branches 2–5 mm long. *Flowering time*: late July to October.

Distribution and ecology: extending in South Africa from the Bokkeveld Mtns in Northern Cape south and east to Albertinia in Western Cape; on sandy flats and slopes in strandveld and fynbos, mainly along the coast up to 500 m elevation but also inland locally up to 600 m.

Diagnosis: the unusual flower of *Babiana ringens*, one of the most distinctive species in the genus, is adapted for sunbird pollination. Its specialisations include the red colour, stiff stamens and style, and elongate perianth tube with a wide throat.

Apart from the flower itself, the most striking adaptation of *Babiana ringens* is the sterile main stem, which acts as a perch for visiting sunbirds. Closely related, but smaller-flowered *B. avicularis*, shares this feature but differs from *B. ringens* in the falcate leaves elliptic in section and in the smaller flowers with a perianth tube 16–21 mm long, with the narrow basal part 4 mm long and kinked at the apex and dorsal tepal 15–18 mm long vs. tube 22–45 mm long and dorsal tepal 18–50 mm long but mostly 20–45 mm in *B. ringens*. The two species are allied to *B. hirsuta*, which has similar red flowers with a channelled dorsal tepal enclosing the filaments and style, but a multi-branched stem, the main axis of which bears a typical spike of several flowers. Variation across the range of *B. ringens* is considerable and populations from southern Western Cape with smaller flowers and a shorter style are segregated as subsp. *australis*.

Key to subspecies

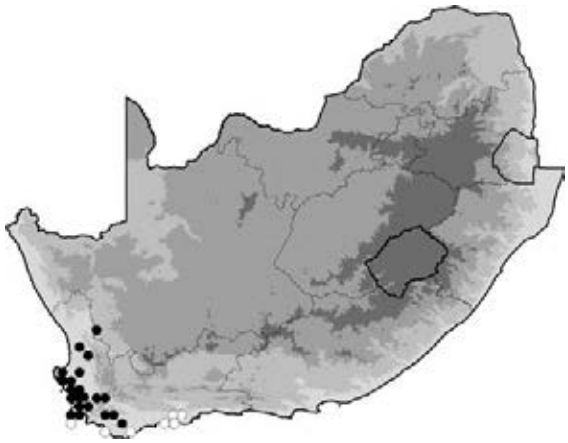
1a Style dividing opposite middle to tips of anthers or beyond them; dorsal tepal 25–50 mm long . . . . . 55a. subsp. *ringens*

1b Style dividing at or below base of anthers; dorsal tepal 18–30 mm long . . . . . 55b. subsp. *australis*

55a. subsp. **ringens**

Sterile stem 150–400 mm long. *Spike* mostly 4- to 10-flowered. *Flowers* with perianth tube 28–40 mm long, slender lower part 15–20 mm long and upper wider part 12–15 mm long; dorsal tepal 25–45(–50) mm long, upper lateral and lower median tepals narrowly lanceolate, 20–25 mm long, attenuate and mucronate, lower lateral tepals clawed with ovate blade. *Filaments* 37–70 mm long, exceeding apex of dorsal tepal; anthers 5.0–7.5 mm long. *Style* dividing opposite middle of anthers or shortly beyond them, branches 4–5 mm long. *Flowering time*: August to October.

Distribution: most common along the western coastal belt of Western Cape from Graafwater to the northern Cape Peninsula but extending inland in the Breede River Valley south of Worcester and on the Bokkeveld Escarpment at Botterkloof Pass; on deep sandy soils.



Distribution of ***Babiana ringens*** subsp. ***ringens***, ●; subsp. ***autralis***, ○.

55b. subsp. **australis** *Goldblatt & J.C.Manning* in Bothalia 40: 50 (2010). Type: Western Cape, Bredasdorp, Frikkiesbaai, 24 Aug. 1946, *Compton 18185* (NBG, holo.).

Sterile stem up to 120 mm long. *Spike* 2- to 4-flowered. *Flowers* with perianth tube 27–35 mm long, slender lower part 15–20 mm long and upper wider part 12–15 mm long; dorsal tepal 18–30 mm long, upper lateral and lower median tepals narrowly lanceolate, 20–25 mm long. *Filaments* 24–34 mm long, not reaching apex of dorsal tepal; anthers 4.0–5.5 mm long, reaching or sometimes exceeding apex of dorsal tepal. *Style* dividing at or 1–2 mm below base of anthers; branches 2–4 mm long. *Flowering time*: mainly mid-July to late August.

Distribution and ecology: extending along the southern coast of Western Cape, from Albertinia in the east to the Agulhas Peninsula, with outlying populations on the southern Cape Peninsula south of Red Hill; on sandy ground in coastal fynbos, flowering well after fire.

Diagnosis: subsp. *australis* stands out from typical *Babiana ringens* in its generally smaller size and 2- to 4-flowered spike of markedly smaller flowers, with tube 27–35 mm long, and smaller tepals, the dorsal 18–30 mm long. In comparison, subsp. *ringens* has spikes of (3–)6 to 10 flowers, a perianth tube 28–40 mm long, and a dorsal tepal 25–45(–50) mm long. In keeping with the longer perianth tube, the filaments are 37–70 mm long, and the anthers are 5.0–7.5 mm long vs. filaments 24–34 mm long and anthers 4.0–5.5 mm long in subsp. *australis*. The style of subsp. *australis* divides at or below the base of the anthers and the style branches are relatively short, 2–4 mm, compared with a style usually dividing beyond the anther tips (rarely opposite the middle of the anthers) in subsp. *ringens* and the style branches are 4–5 mm long. Both subspecies occur on

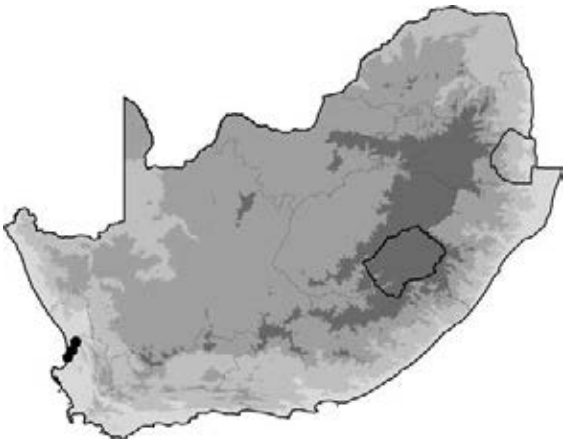
the Cape Peninsula, with subsp. *australis* recorded from the southern Peninsula and subsp. *ringens* in the north: their ranges do not overlap.

Two northern populations of subsp. *ringens* from the immediate vicinity of Graafwater have unusually small flowers for the subspecies, with a perianth tube 31–40 mm long and a dorsal tepal ± 25 mm long, but unlike subsp. *australis* they have anthers 5.0–5.5 mm long, a style dividing opposite the middle to upper third of the anthers, and style branches 4–5 mm long. These populations occur close to others with larger flowers, typical of subsp. *ringens*, and may represent a local race or possibly reflect poor growing conditions in a particular year.

56. **Babiana avicularis** *Goldblatt & J.C.Manning* in Bothalia 40: 47 (2010). Type: South Africa, Western Cape, coast south of Elands Bay, ± 30 km north of Rocher Pan, sandy flats, 11 Sept. 2008, *Goldblatt & Porter 13109* (NBG, holo.; K, MO, PRE, S, iso.).

Plants up to 120 mm high, excluding leaves. *Stem* with main axis suberect and sterile, usually with two decumbent branches borne close to ground, minutely velvety. *Leaves* 6 to 8, linear, up to 300 × 2–3 mm, firm, ± oval in cross section, closely pleated, usually with 2 or 3 folds on each surface, smooth. *Spike* horizontal, ± 2-ranked, mostly 8- to 12-flowered; bracts minutely scabrid, green with dry brown apices, outer 14–22 mm long, with prominent mucro, inner ± half as long, divided ± to base, joined by transparent tissue at ovary level. *Flowers* zygomorphic, facing spike apex, ± red, paler in throat, lower part of tube yellow, lower 5 tepals with pale green limbs sometimes fading to pink near tips, darker green in midline, unscented; perianth tube compressed-funnel-shaped, lower part ± 4 mm long, cylindric and kinked near apex, abruptly expanded into flared upper part 12–17 mm long; tepals unequal, outer whorl prominently mucronate, dorsal 15–18 × 2.5–3.5 mm, ascending, channelled below, margins curving inward enclosing filaments and style, expanded to 3 mm wide and recurved in upper 5 mm, lower 3 tepals united with upper laterals for ± 4 mm in prominent lip, directed forward, lower and upper laterals ± 8 × 1.5 mm, lower median 3–7 × 1–2 mm. *Stamens* unilateral; filaments suberect, 25–32 mm long, enclosed below by dorsal tepal, reaching apex of dorsal tepal; anthers 3.5–5.0 mm long, purple. *Ovary* smooth; style dividing shortly below base of anthers, branches 4–5 mm long, recurved. *Capsules* barrel-shaped, ± 11 × 8.5 mm, showing outline of seeds. *Flowering time*: mid-August to late September.

Distribution and ecology: restricted to the Atlantic Coast and near interior of Western Cape, South Africa, with just four populations known, two from sandy flats between Elands Bay and Rocher Pan, a short distance inland from coastal dunes adjacent to the beach; a third is from the Olifants River Valley north of Clanwilliam, also on sandy ground; and the fourth, the earliest record, is from coastal fynbos close to Leipoldtville; always in sandy ground.



Distribution of ***Babiana avicularis***.

Diagnosis: flowers of *Babiana avicularis* resemble those two other predominantly red-flowered species of the genus, *B. hirsuta* and *B. ringens*, except that they are almost half the size. Like *B. ringens*, the main axis is sterile and, as in *B. ringens* it serves as a perch for birds taking nectar from the flowers but their flowers differ in some important respects apart from their smaller size. Flowers of *B. ringens* subsp. *ringens* have a perianth tube 28–40 mm long, a dorsal tepal 25–45(–50) mm long, enlarged lower lateral tepals ± 20 mm long, and the upper tepals are recurved. In addition, the filaments are 37–70 mm long, the anthers 5.0–7.5 mm long, and the style divides opposite the upper half of the anthers or shortly beyond their tips. Subsp. *australis* has slightly smaller flowers with the dorsal tepal 18–30 mm long and filaments 24–34 mm long. In contrast, flowers of *B. avicularis* have a tube 16–21 mm long and distinctive in the lower cylindrical part of the tube 4 mm long and kinked below the apex. All three lower tepals are pale green and directed forward. In both species, as well as in *B. hirsuta*, the margins of the dorsal tepal curve inward and enclose the filaments and style with only the distal third or quarter expanded and slightly recurved. The filaments of *B. avicularis* are 25–32 mm long, the anthers 3.5–5.0 mm long and the style divides below the bases of the anthers. The leaves of *B. ringens* are lanceolate to sublinear but firm to rigid in texture with almost pungent tips, in contrast to the longer, linear, arching, softer leaves of *B. avicularis*. Like its two relatives, flowers of *B. avicularis* are adapted for pollination by sunbirds.

The floral bracts of *Babiana avicularis* are notable in two respects: they are rust-coloured at the tips and prominently mucronate, and the shorter inner bracts are divided for about ¾ of their length, with the two halves strongly divergent, whereas in both *B. hirsuta* and *B. ringens*, the inner bracts are divided in the upper third to half and do not notably diverge. The two coastal populations of *B. avicularis* are sympatric and co-blooming with *B. hirsuta*, but no hybrids have been recorded at either site.

Sect. 3. **Babiana**

Babiana sect. *Acastae* Salisb. ex Benth. & Hook.f.: 707 (1883). Subg. *Acaste* (Salisb. ex Benth.) Baker: 166 (1877) & 107 (1896). Type: *Babiana angustifolia* Sweet [lecto., designated by Goldblatt & Manning: 61 (2007)].

Plants with the aerial stem well developed or acaulescent, usually velvety hairy, sometimes smooth, main axis erect or decumbent, branched or not. *Leaves* usually velvety; bracts often relatively short, usually hairy, green with dry rust-coloured tips or entirely dry, inner divided to base (or almost so), each half with prominent central vein. *Flowers* zygomorphic or actinomorphic, dorsal tepal seldom widely separated from other tepals when flower zygomorphic, lower tepals usually united for some distance in a lower lip. *Stamens* symmetrically arranged or unilateral, sometimes dark blue to blackish; anthers oblong-linear or with connective expanded and then anthers arrow-shaped. *Ovary* densely hairy or sometimes smooth.

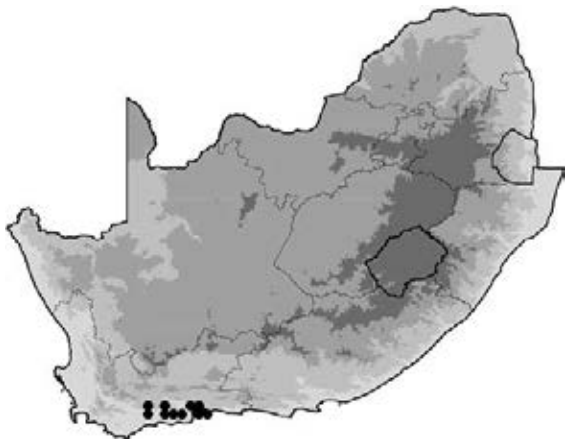
Species 37, mainly Western Cape but *B. patersoniae* extends into Eastern Cape and *B. mucronata* and *B. unguiculata* occur to the north in the Bokkeveld Mtns of Northern Cape.

Ser. **Patulae** *Goldblatt & J.C.Manning*, new series. Type: *Babiana patula* N.E.Br.

Flowers zygomorphic, with smooth or mostly smooth ovary.

57. **Babiana fourcadei** *G.J.Lewis* in Pillans in South African Gardening and Country Life 24: 268 (1934); Lewis: 92 (1959); Goldblatt & Manning: 62 (2007). Type: South Africa, [Western Cape], hills east of Great Brak River, Sept. 1932, *H.G. Fourcade 4765* (BOL, holo.; BOL, iso.).

Plants (70–)150–250 mm high. *Stem* erect, usually with 3 to 5(–7) short lateral branches, rarely unbranched, long-hairy, enclosed below by a tough fibrous collar (occasionally in overgrazed or poor conditions subacaulescent). *Leaves* usually ± falcate or lanceolate, (5–)9–20(–30) mm wide, lightly pleated, shortly hairy, usually crowded basally, reaching to base or middle of spike. *Spike* lax to ± compact, (4–)6- to 10-flowered; bracts green with dry rust-coloured tips, softly hairy, 12–20 mm long, inner shorter than outer, divided to base. *Flowers* zygomorphic, pale to deep blue to violet, lower lateral tepals white to pale yellow edged toward base with small violet marks, intensely sweet-spicy scented; perianth tube narrowly funnel-shaped, abruptly curved outward in upper 6 mm, 20–30 mm long; tepals unequal, dorsal 25–30 × ± 10 mm, flaring gradually from base, lower 3 tepals joined to upper laterals for 3–5 mm and to one another for ± 2 mm, lower tepals 18–24 mm long. *Stamens* unilateral; filaments arched, 15–18 mm long; anthers 5–8 mm long, pale mauve. *Ovary* smooth; style usually dividing opposite upper ⅓ of anthers, rarely slightly beyond tips; style 4–5 mm long, abruptly expanded apically. *Flowering time*: September to mid-October.



Distribution of ***Babiana fourcadei***.

Distribution and ecology: restricted to southern Western Cape, South Africa, extending from Swellendam to George, south of the Langberg–Outeniqua Mtn axis; occurring on lower mountain slopes and coastal hills.

Diagnosis: *Babiana fourcadei* is distinguished by the well-developed aerial stem, smooth ovary, and outer bracts dark rusty brown at the tips and rather irregularly lobed or torn. Among the species of series *Patulae*, *B. fourcadei* is recognised by the well-developed and usually repeatedly branched stem, and fairly large pale blue to violet flowers with a perianth tube, 20–30 mm long, dorsal tepal 25–30 mm long, and the completely smooth ovary. *Babiana patula*, often confused with *B. fourcadei*, always has a shorter, ± decumbent stem, and thus seldom exceeds 100 mm in height, and the ovary in most populations is minutely hairy on the ribs (plants with a completely hairless ovary are unusual but are reported in the literature). The perianth of *B. patula* ranges from either pale blue to mauve, purple, or pale yellow to white, typically with large yellow or cream-coloured markings on the lower lateral tepals. The flowers are slightly smaller, the tube 10–14 mm long, the dorsal tepal mostly 20–25 mm long, and the bracts acute and often only light brown.

58. **Babiana patula** *N.E.Br.* in The Gardener's Chronicle ser. 3, 92: 466 (1932b); Lewis: 62 (1959); Goldblatt & Manning: 62 (2007). Type: South Africa, [Western Cape], near Riversdale, 30 Aug. 1932, *J. Muir 4852* (K, holo.).

Plants mostly 60–100 mm high. *Stem* usually reaching shortly above ground level, sometimes up to 150 mm high, flexed outward above, velvety-hairy, simple with up to 4 short, ascending branches. *Leaves* lanceolate,

pleated, usually widely divergent, velvety to pilose. *Spike* decumbent, 3- to 9-flowered; bracts green with dry, rust-coloured apices, hairy, 10–15(–20) mm long, outer truncate to trifid, inner slightly shorter than outer, divided to base. *Flowers* zygomorphic, mauve to blue, occasionally purple, yellow or white, lower laterals and sometimes lower median yellow, tipped with mauve or entirely yellow, intensely fragrant often of rose or violet; perianth tube narrowly funnel-shaped, 10–14 mm long; tepals unequal, dorsal mostly 20–25 mm long, lower tepals joined to upper laterals for ± 2.5 mm and to one another for ± 2 mm, forming a lip, lower tepals 15–25 mm long. *Stamens* unilateral; filaments arched, 12–14 mm long; anthers ± 6 mm long. *Ovary* minutely hairy on ribs (or evidently smooth); style dividing between middle and apex of anthers, branches 3–4 mm long. *Flowering time*: August and September.

Distribution and ecology: extending from near Wolseley in the Breede River Valley to Albertinia in Western Cape, South Africa, also in the Little Karoo near Montagu; on clay or stony flats and lower slopes.

Diagnosis: distinctive in the relatively small, strongly fragrant flowers, *Babiana patula* is typically low growing and often has an unusually coloured perianth. While the flowers may be white to creamy yellow, they are more often violet or light mauve to purple with the lower lateral tepals deep yellow and tipped with purple or mauve. The affinities of *B. patula* seem to lie with the southern Cape *B. fourcadei*, a taller plant with blue to violet flowers marked with white, a longer perianth tube 20–30 mm long, often a quite different, spicy acrid fragrance, and a completely smooth ovary. The ovary of *B. patula*, unusual in sect. *Babiana* but typical of other members of series *Patulae,* is usually sparsely hairy on in the ribs. The character readily separates it from the superficially similar *B. odorata*, which also has strongly scented, cream-coloured and yellow flowers, sometimes flushed with mauve, but always has a densely hairy ovary.

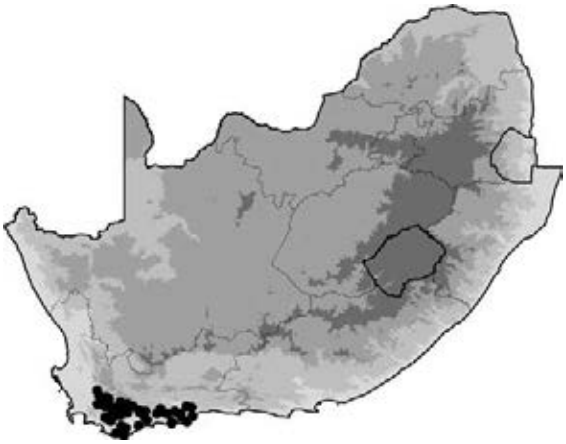
Babiana patula may also be confused with *Babiana ambigua*, a typically acaulescent or short plant of sandy habitats. Flowers of *B. ambigua* are dark blue, rarely mauve, and have white nectar guides. The ovary of *B. ambigua*, like that of *B. patula,* is smooth or sparsely hairy on the ribs, but the outstanding difference is that *B. ambigua* lacks a well-developed fibrous collar around the stem base present in *B. patula*.

59. **Babiana montana** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 63 (1959); Goldblatt & Manning: 64 (2007). Type: South Africa, [Western Cape], Kleinrivier Mtns, Aug., *C.L. Zeyher 4003* (BOL, holo.; K, P, SAM, S [2 sheets], Z, iso.).

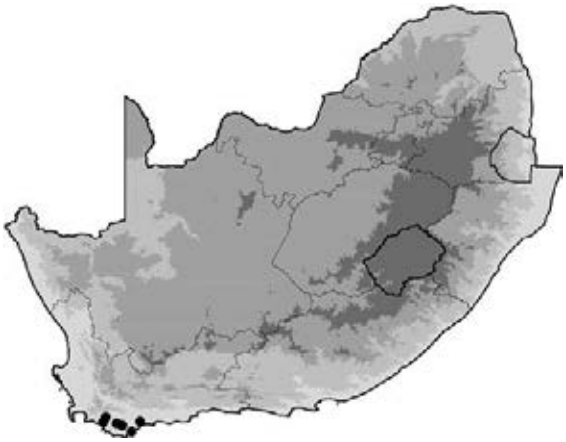
Plants 60–100 mm high, including leaves. *Corm* with tunics of coarse, matted fibres. *Stem* short, suberect, sometimes with short lateral branch, hairy, sheathed below by collar of tough fibres. *Leaves* lanceolate, pleated, hairy. *Spike* 4- to 5-flowered, crowded; bracts green with dry rust-coloured acute tips, densely hairy, 25–30(–38) mm long, inner ± 5 mm shorter than outer, divided to base. *Flowers* 2 to 5 in deflexed spike, zygomorphic, mauve, lower lateral tepals with yellow median blotch edged below in dark purple; perianth tube narrowly funnel-shaped, 17–20 mm long; tepals unequal, dorsal 25–35 mm long, lower tepals 22–30 mm long. *Stamens* unilateral; filaments unequal, median longer, 7–10 mm long; anthers 7 mm long. *Ovary* smooth; style dividing opposite upper half of anthers, branches ± 3 mm long, tips flattened and orbicular. *Flowering time*: June to August.

Distribution and ecology: extending from Caledon to Bredasdorp in Western Cape, South Africa; on sandstone and limestone slopes.

Diagnosis: readily recognised by the unusual, coarsely fibrous corm tunics that form a distinctive hard, cylindric collar around the stem base, *Babiana montana* has blue-mauve flowers with unequal filaments, the median one longer than the other two. In addition, the style branches have prominent orbicular tips, a character rare in the genus. The smooth ovary also stands out in



Distribution of ***Babiana patula***.



Distribution of ***Babiana montana***.

sect. *Babiana* but this feature is shared with a few other species, including *B. ambigua* and *B. fourcadei*. *Babiana montana* can also be distinguished from *B. ambigua* by the thick collar of fibres about the underground part of the stem, a feature lacking in the latter, as well as the unequal stamens. Plants from limestone habitats west of Bredasdorp have smaller bracts than is usual, 12–14 mm long, and smaller flowers about 40 mm long, but have the unequal stamens typical of the species.

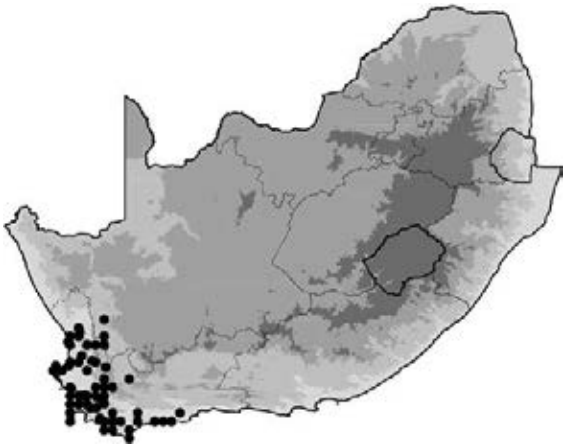
60. **Babiana ambigua** *(Roem. & Schult.) G.J.Lewis* in Journal of South African Botany, Suppl. 3: 64 (1959); Goldblatt & Manning: 64 (2007). *Gladiolus ambiguus* Roem. & Schult.: 446 (1817), as a new name for *G. mucronatus* Lam.: 119 (1791), illegitimate homonym, not *G. mucronatus* Jacq. (1791). Type: South Africa, [Western Cape], without precise locality or date, collector unknown (P: Herb. Lamarck, holo.).

Babiana obliqua E.Phillips in Flowering Plants of South Africa 9: t. 357 (1929); Lewis: 67 (1959). Type: South Africa, [Western Cape], Lambert's Bay, ± 20 yards [18 m] from high water mark, flowered at National Herbarium, Pretoria, July 1929, *J.J. van Nouhuys s.n.* (PRE 8180, holo.; K, iso.).

Plants 50–80(–160) mm high, including leaves. *Corm* with fibrous, netted tunics, with small cormlets at base; non-flowering plants with long, unbranched stolons with terminal corms or young plants. *Stem* underground or reaching shortly above ground level, without basal fibrous collar, suberect or inclined, lightly hairy, often with cormlets in underground axils. *Leaves* linear to lanceolate, exceeding stem, usually fairly narrow, 3–10(–15) mm wide, pleated, softly hairy. *Spike* crowded, decumbent, 2- to 4-flowered; bracts usually entirely green or with brown tips, finely to velvety hairy, 15–30(–40) mm long, inner ± as long as or slightly shorter than outer, divided to base. *Flowers* borne close to ground level, zygomorphic, blue to mauve, occasionally lilac, with white to cream-coloured markings on lower lateral tepals edged in darker blue to purple, sweetly or spicy fragrant; perianth tube obliquely funnel-shaped, 10–19 mm long; tepals unequal, dorsal 28–45 × 10–12 mm, lower tepals joined to upper laterals for 2–4 mm and to one another for 2–4 mm, 20–30 mm long. *Stamens* unilateral; filaments arcuate, 13–16 mm long; anthers linear, 6–8 mm long. *Ovary* smooth or sparsely hairy on ribs distally; style dividing opposite anther tips; style 4–6 mm long, expanded in upper ⅓. *Flowering time*: late July to September.

Distribution and ecology: fairly widespread in southwestern South Africa, extending from Botterkloof in Northern Cape and the Gifberg in Western Cape in the north to Riversdale in the south; mostly in deep coastal sands or stony or sandy mountain slopes and plateaus.

Diagnosis: *Babiana ambigua* is distinguished by the acaulescent habit, stem lacking a collar of fibres around the base, rather soft-textured fibrous corm tunics and



Distribution of ***Babiana ambigua***.

floral bracts divided to the base. The relatively large flowers are predominantly dark blue to violet with white to creamy white markings and have a sweet or spicy scent. It is often confused with a second coastal species, *B. nana*, and the two sometimes occur together, *B. nana* flowering somewhat later in the season than *B. ambigua*. Hybrids between the two species have been described by Lewis (1959) from the Cape Peninsula and on the Atlantic Coast to the north. Although similar in general appearance, *B. nana* usually has a short aerial stem and larger and more intensely fragrant flowers, the perianth often a deeper colour and, most importantly, the inner bracts are undivided. Lewis (1959) also reported hybrids between *B. ambigua* and the related and similar *B. scabrifolia* from the Olifants River Valley. *Babiana grandiflora* is also easily confused with *B. ambigua*, but this species from coastal Namaqualand has the inner floral bracts only notched apically, and considerably larger flowers with the dorsal tepal 45–55 mm long vs. 28–40 mm in *B. ambigua*.

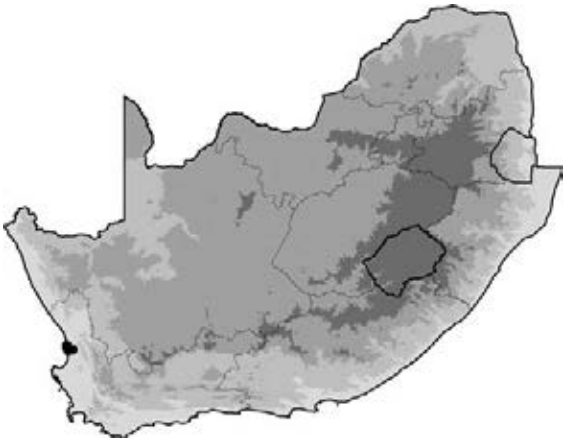
61. **Babiana petiolata** *Goldblatt & J.C.Manning* in Strelitzia 18: 65 (2007). Type: South Africa, Western Cape, south of Lambert's Bay, strandveld above the beach, flowered in Portland, Oregon, USA, May 2004, *Goldblatt & Porter 12301a* (NBG, holo.).

Plants acaulescent, up to 50 mm high, including leaves. *Corm* with fibrous, netted tunics. *Stem* reaching to ground level, smooth, simple or 1- or 2-branched, without collar of fibres around base, with small cormlets at first node above corm. *Leaves* lanceolate to sword-shaped, shallowly pleated, lightly papillate-scabrid to virtually smooth, usually with terete pseudopetiole 5–40 mm long, blades arching forward and concave with margins facing toward ground and often thickened. *Spike* decumbent, 4- to 6-flowered; bracts 15–20 mm long, keeled above and sparsely hairy on keel and margins, obtuse, with broad membranous margins, divided to base. *Flowers* zygomorphic, violet, lower tepals with pale yellow markings reddish proximally, with light iris-like scent; perianth tube obliquely funnel-shaped,

± 11 mm long, lower cylindric part ± 7 mm long; tepals unequal, dorsal held slightly apart, ± 30 × 8 mm, upper laterals smaller, lower 3 tepals joined to upper laterals for ± 5 mm and to one another for ± 3 mm, lower median narrowed below into channelled claw. *Stamens* unilateral; filaments arcuate, ± 12 mm long; anthers ± 6 mm long, light violet; pollen cream-coloured. *Ovary* smooth, ± 4 mm long; style arching over stamens, dividing opposite anther apices, branches ± 5 mm long, expanded at tips. *Flowering time*: late June and July.

Distribution and ecology: poorly documented but locally fairly common on the Atlantic Coast of Western Cape, South Africa, between Lambert's Bay and Velddrif; on flat sandy ground in strandveld not far inland of the coast.

Diagnosis: so named for the leaf blades narrowed below into a terete, petiole-like base above the sheaths, the remainder of the blades of *Babiana petiolata* are oblong to lanceolate. The distinctive leaves are inclined toward the ground and the blades are concave, especially when young or on immature plants, which have only one or two leaves versus three or four in mature individuals. The species is evidently most closely related to the widespread *B. ambigua* and is readily confused with this species. Both have the inner floral bracts divided to the base, and smooth ovary, and the underground part of the stem lacks a collar of fibres. It is distinguished from *B. ambigua* by the consistently pseudopetiolate leaves with smooth or sparsely papillate to scabrid blades, small flowers with a perianth tube ± 11 mm long, a pleasing *Iris*-like scent, and its early flowering time, mainly late June and July. Leaves of *B. ambigua* often appear petiolate but the apparently narrow base of the blade is actually the leaf sheath extending upward, and is normally clasping the leaf above; the blades are also obviously pleated and usually prominently hairy. The larger flowers have a tube 12–19 mm long and a spicy, acrid scent with undertones of violet. *Babiana ambigua* extends from Strandfontein north of Lambert's Bay to Riversdale in the southern Cape and co-occurs with *B. petiolata* near Lambert's Bay and then their differences become evident.



Distribution of ***Babiana petiolata***.

Ser. **Secundae** *Goldblatt & J.C.Manning*, new series. Type: *Babiana secunda* (Thunb.) Ker Gawl.

Spike with dry floral bracts; flowers inverted; perianth tube shorter than dorsal tepal; ovary smooth.

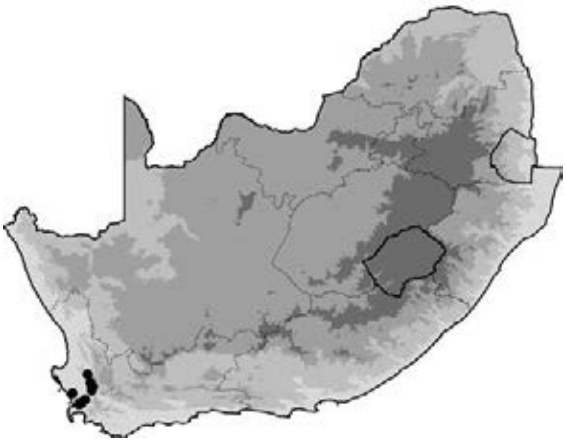
62. **Babiana secunda** *(Thunb.) Ker Gawl.*, Genera iridearum 154 (1827); Lewis: 57 (1959); Goldblatt & Manning: 66 (2007). *Gladiolus secundus* Thunb.:186 (1800). Type: South Africa, [Western Cape], without precise locality or date, *Thunberg s.n.* (UPS–THUNB, holo. [K, drawing]).

Babiana reflexa Eckl.: 33 (1827). *B. stricta* var. *reflexa* (Eckl.) Baker: 113 (1896). Type: South Africa, without precise locality, cult. Cape Town, *Ecklon s.n.* [S, lecto., designated by Nordenstam: 290 (1972)].

Plants 150–350 mm high. *Stem* flexed nearly horizontally, often with widely diverging branches, lightly velvety at least below. *Leaves* lanceolate, pleated, velvety. *Spike* inclined, secund, many-flowered; bracts initially green but usually completely dry and brown at flowering, smooth, 10–13 mm long, outer tricuspidate with long central awn, inner shorter than outer, divided to base. *Flowers* zygomorphic, inverted, with perianth tube recurved and facing spike apex, dorsal tepal horizontal, unilateral stamens curved back to lie above dorsal tepal and lower tepals suberect, blue with yellow or white markings on lower lateral tepals; perianth tube narrowly funnel-shaped, 6–8 mm long; tepals unequal, dorsal largest, 18–20 mm long, lower shortly joined below, 14–17 mm long. *Stamens* unilateral; filaments arching over dorsal tepal, 12–14 mm long; anthers facing spike apex, ± 6 mm long, yellow; pollen yellow. *Ovary* smooth; style dividing opposite anther tips, branches 3–4 mm long. *Flowering time*: mainly October to mid-November.

Distribution and ecology: extending from Hopefield and Porterville to Mamre and Paarl in Western Cape, South Africa; on clay and stony flats and lower slopes in renosterveld.

Diagnosis: *Babiana secunda* is one of a handful of species of *Babiana* with inverted flowers, that is, with the spike inclined and the flowers facing upward, with the dorsal tepal and the unilateral stamens facing the spike apex. It can be distinguished by the smooth, dry, often torn floral bracts, the outer tricuspidate with a long central awn and hairless ovary, the latter unusual for sect. *Babiana*. *Babiana secunda* blooms unusually late in the season, usually in October or November. In the other species with inverted flowers, *B. angustifolia, B. inclinata*, and *B. rubrocyanea*, the ovary is densely hairy, the bracts remain partly green at flowering, are usually velvety and lack a pronounced awn although they do tend to be tricuspidate. The anthers and pollen are pale to deep blue or violet (or sometimes white) in *B. angustifolia* and *B. inclinata*, whereas the anthers and pollen of *B. secunda* are yellow.



Distribution of ***Babiana secunda***.

The relationships of *Babiana secunda* remain uncertain hence its isolated position within sect. *Babiana* alone in series *Secundae*. DNA-based phylogenetic studies are not informative about the relationships of *B. secunda* although it is retrieved in an isolated position among species of sect. *Babiana*.

Ser. **Mucronatae** *Goldblatt & J.C.Manning*, new series. Type: *Babiana mucronata* (Jacq.) Ker Gawl.

Flowers zygomorphic; perianth tube shorter or longer than dorsal tepal; ovary variously hairy.

63. **Babiana mucronata** *(Jacq.) Ker Gawl.* in König & Sims, Annals of Botany 1: 234 (1804); Lewis: 58 (1959); Goldblatt & Manning: 67 (2007). *Gladiolus mucronatus* Jacq.: 162 (1791b). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 253 (1794 [1788–1795]).

Plants 50–180 mm high. *Stem* suberect or flexed outward, simple or with 2 or 3 branches, velvety-hairy, enclosed below by thick fibrous collar. *Leaves* sword-shaped to broadly lanceolate, 7–15(–20) mm wide, usually reaching ± middle or top of spike, exceeding stem in dwarf plants, pleated, shortly hairy with margins velvety and sometimes prominent. *Spike* suberect, compact, mostly 4- to 12-flowered; bracts green with dry and rust-coloured tips, outer obtuse to truncate or tridentate, (11–)15–25 mm long, inner ± half as long to only slightly shorter than outer, divided to base. *Flowers* zygomorphic, pale to dark blue-violet, lower lateral tepals with white to cream-coloured or pale yellow with violet edges, usually acrid-scented, occasionally evidently odourless; perianth tube narrowly funnel-shaped, (10–)12–18(–25) mm long; tepals unequal, dorsal 25–35 mm long, lower joined to upper laterals for 3–5 mm and to one another for ± 2.5 mm, forming a prominent lip, lower 15–18 mm long. *Stamens* unilateral; filaments arched, 13–16 mm long; anthers 5–7 mm long, violet or pale turquoise. *Ovary* densely hairy; style dividing between middle and apex of anthers, branches 3–4 mm long. *Flowering time*: late July to September.

Distribution and ecology: extending from the Bokkeveld Mtns in Northern Cape, South Africa, in the north to Tulbagh in Western Cape in the south; on rocky sandstone or stony clay slopes and flats and rock outcrops.

Diagnosis: one of the most common species of the interior valleys and lower mountain slopes of the western half of Western Cape, *Babiana mucronata* is recognised among species of sect. *Babiana* with a densely hairy ovary by the pale to deep violet flowers with white to pale yellow blotches on the lower lateral tepals. The anthers are pale yellow to lilac or sometimes turquoise and the flowers usually have an acrid to metallic odour or occasionally apparently odourless. Most other blue-flowered species of sect. *Babiana* from this area are more-or-less acaulescent, have leaves taller than the stem, and a smooth or sparsely hairy ovary, except for the relatively tall *B. lineolata*, which favours wet sandy ground and is easily separated by the rigid, narrow, deeply pleated leaves and short floral bracts, mostly 7–10 mm long.

Babiana mucronata is typically a fairly tall plant with a branched, aerial stem, and lightly pleated, softly hairy leaves. In the north of its range, on the Gifberg and Bokkeveld Escarpment, however, plants are consistently dwarfed, with a stem extending only a short distance above the ground, and flowers with a perianth tube about 12 mm long, whereas the taller southern populations have a tube 15–25 mm long. The northern plants are segregated as subsp. *minor*, being both geographically and morphologically distinct from subsp. *mucronata*. Plants from Elandskloof described by Lewis (1959) as var. *longituba* seem to represent no more than a slightly longer-tubed form of typical *B. mucronata* and are now included in subsp. *mucronata*. Longer-tubed populations of subsp. *mucronata* occur in a seemingly random pattern across the range of the taxon.

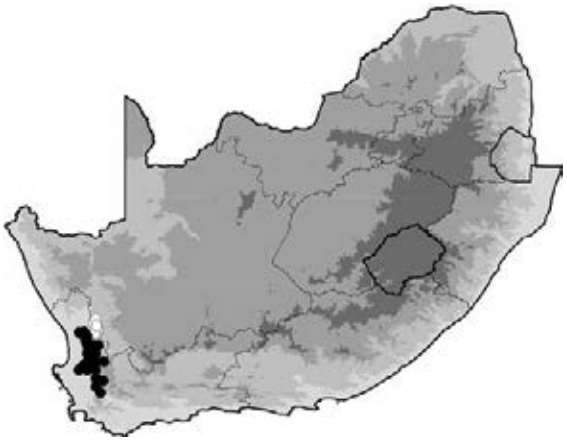
Key to subspecies:

1a Plants tall, usually 150–350 mm high, spike usually exceeding leaves; perianth tube 15–18(–25) mm long. . . . . 63a. subsp. *mucronata*
1b Plants dwarf, mostly 70–100 mm high, spike usually overtopped by leaves; perianth tube 10–14 mm long. . . . . 63b. subsp. *minor*

63a. subsp. **mucronata**

Babiana mucronata var. *longituba* G.J.Lewis: 60 (1959). Type: South Africa, [Western Cape], Elandskloof, 29 Sept 1944, *W.F. Barker 3090* (NBG, holo.).

Plants with well-developed aerial stem, mostly 150–350 mm high, suberect, usually branched. *Leaves* lanceolate, 7–15(–20) mm wide, usually reaching to ± middle or top of spike, margins not thickened. *Spike* 6- to 12-flowered; bracts 15–25 mm long. *Flowers* violet, lower



Distribution of ***Babiana mucronata*** subsp. ***mucronata***, ●; subsp. ***minor***, ○.

lateral tepals with white or pale yellow markings edged violet; perianth tube mostly 15–18(–25) mm long; dorsal tepal 25–35 mm long, lower tepals joined to upper laterals 3–5 mm and to one another for ± 2.5 mm, forming a lip, lower 15–18 mm long. *Filaments* 13–16 mm long; anthers 5–7 mm long. *Flowering time*: August and September.

Distribution and ecology: extending from the Olifants River Mtns and Pakhuis Pass to Tulbagh and Piketberg in Western Cape, South Africa; mostly on rocky sandstone slopes, occasionally on gravelly shale, conspicuous after fire.

Diagnosis: unless dwarfed by poor seasonal rains, subsp. *mucronata* is an erect plant with an aerial stem usually at least 150 mm high. It grows in a variety of habitats, and may be found on sandstone outcrops, stony clay slopes, and sometimes on the shale band of the Table Mountain series of the Cape System.

63b. subsp. **minor** *(G.J.Lewis) Goldblatt & J.C.Manning* in Strelitzia 18: 68 (2007). *Babiana mucronata* var. *minor* G.J.Lewis: 60 (1959). Type: South Africa, [Western Cape], Gifberg Plateau, 21 Sept. 1948, *J.H.P. Acocks 14905* (PRE, holo.; K, iso.).

Babiana klaverensis G.J.Lewis: 72 (1959). Type: South Africa, [Western Cape], Klawer, higher plateau in front of mountains, not rare, flowers mostly eaten or faded, corms often dug out by baboons, 250 m, 1 Aug. 1920, *H.K.C. Andreae 505* (PRE, holo.).

Plants mostly 70–100 mm high, including leaves. *Stem* reaching up to 40 mm above ground level, suberect or decumbent, simple or 1- or 2-branched, velvety. *Leaves* sword-shaped, firm, lightly to strongly pleated, finely hairy, margins occasionally thickened and prominent. *Spike* compact, 3- to 6-flowered; bracts 11–15 mm long. *Flowers* violet or blue-mauve; perianth tube 10–14 mm long; dorsal tepal 25–30 mm long, lower tepals joined to upper laterals for short distance and to one another for ± 1.5 mm, lower 20–25 mm long. *Filaments* ± 13 mm long; anthers ± 6 mm long. *Flowering time*: mid-July to mid-September.

Distribution and ecology: extending from the Bokkeveld Mtns in Northern Cape, South Africa, to the Gifberg in Western Cape; on rocky sandstone slopes and sandstone pavement.

Diagnosis: consistently short in stature, subsp. *minor* also has slightly smaller flowers than subsp. *mucronata*, with a slightly shorter perianth tube ± 12 mm long, dorsal tepal ± 25 mm long, and the lower and upper lateral tepals are joined for up to 2.5 mm into a lip. In contrast, subsp. *mucronata* has a perianth tube 15–25 mm long, dorsal tepal 25–35 mm long, and lower tepals joined for 5–7 mm long. Associated with the short perianth tube, subsp. *minor* has floral bracts 11–15 mm long.

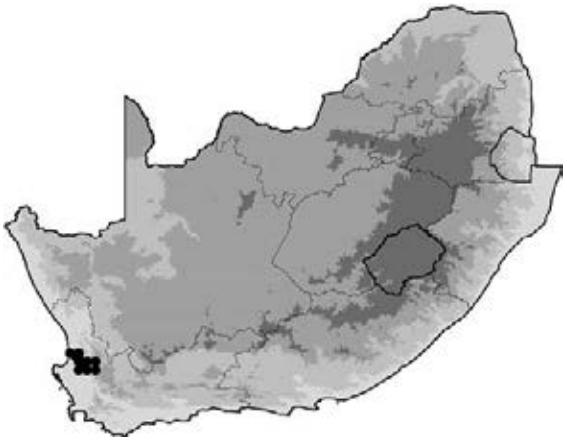
64. **Babiana lineolata** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 347 (Ergänzungen 13) (1882); Lewis: 51 (1959). Type: South Africa, [Western Cape], Olifants River Valley near Brakfontein, Sept., *C.F. Ecklon & C.L. Zeyher 76.9* (Irid. 132) (B, holo.; P [2 sheets], Z, iso.).

Babiana parviflora Brehm ex Klatt: 350 (1882). Type: South Africa, [Western Cape], without precise locality or date, *J.F. Drège 1825* (B "Herb. Lubeck", holo., not seen and evidently destroyed; P, S, iso.).

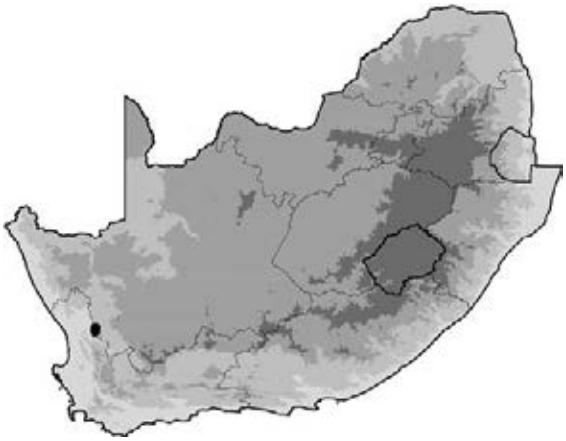
Gladiolus stenophyllus Schrank: 212 (1822), as a new name for *G. plicatus* var. *angustifolius* Jacq.: 4 (1791b). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 238 (1791 [1788–1795]).

Babiana stenophylla Baker: 866 (1901). Type: South Africa, [Western Cape], *Ecklon & Zeyher Irid. 132* (Z, holo.; B, P, iso.).

Plants 130–250 mm high. *Stem* erect, usually with several short lateral branches, velvety hairy. *Leaves* sword-shaped, 2–6(–10) mm wide, rigid, deeply pleated, finely hairy. *Spike* erect, secund, compact, 4- to 12-flowered; bracts green with rust-coloured attenuate tips, softly hairy, outer 7–14 mm long, inner ± ⅔ to nearly as long as outer, divided to base. *Flowers* zygomorphic, pale to deep blue, lower lateral tepals white to pale yellow, tipped with blue, evidently odourless; perianth tube narrowly funnel-shaped, 10–16 mm long; tepals unequal, tapering below, dorsal 18–24 mm long, lower tepals joined to upper laterals for 3–4 mm and to one another for ± 2 mm, 14–20 mm long. *Stamens* unilateral; filaments arched, 12–17 mm long; anthers 4.5–6.0 mm long. *Ovary* densely hairy; style dividing opposite middle of anthers, branches 3–4 mm long. *Flowering time*: September and early October.



Distribution of ***Babiana lineolata***.



Distribution of ***Babiana engysiphon***.

Distribution and ecology: extending from the Cold Bokkeveld and southern Olifants River Valley to the Piketberg in Western Cape, South Africa; mainly on seasonally wet sandy flats.

Diagnosis: *Babiana lineolata* can be recognised in sect. *Babiana* by the rigid, narrow, suberect, deeply plicate leaves, several-branched stem with short bracts, and zygomorphic, markedly bilabiate flower with the dorsal tepal erect and the lower tepals united below to form a prominent lip. Plants typically grow in dense colonies in damp sandy sites where the pale blue-mauve flowers make a display unusual for the genus. The fairly short-tubed flowers are adapted for pollination by anthophorine bees and *Apis mellifera* workers, which visit the flowers for their nectar.

Babiana lineolata is evidently most closely related to *B. mucronata* and it is easily confused with this species. The paler coloured flowers with a perianth tube 8–15 mm long and bracts 7–12 mm long, easily separate it from the taller subsp. *mucronata* which has a tube 15–25 mm long, bracts 15–25 mm long, and broader, more softly textured leaves 7–15(–20) mm wide. The shorter *B. mucronata* subsp. *minor* is not likely to be confused with *B. lineolata*.

65. **Babiana engysiphon** *J.C.Manning & Goldblatt* in Strelitzia 18: 69 (2007). Type: South Africa, Northern Cape, Calvinia, Moedverloor road, ± 28 km from Doornbos, 4 Sept. 2004, *P. Goldblatt & J.C. Manning 12388* (NBG, holo.; K, MO, PRE, iso.).

Plants 60–100 mm high, including leaves. *Stem* reaching shortly above ground level, flexed at ground level and inclined, simple or 1(2)-branched, velvety. *Leaves* mostly 5 to 7, ± linear to narrowly sword-shaped, 3–4 mm wide, widest in upper ⅓, shallowly pleated to almost flat, minutely velvety. *Spike* horizontal, compact, (2–)4- to 8-flowered; bracts green, with light brown attenuate tips, velvety to lightly hairy, outer 15–25 mm long, lightly keeled, inner ± ⅔ to ± as long as outer, margins membranous, divided to base or almost so, or joined in lower ⅓ by transparent membranous tissue. *Flowers* zygomorphic, dark violet, lower lateral tepals with broad white to pale yellow blotch near base, odourless; perianth tube elongate, (30–)35–40 mm long, gently upcurving, cylindric, slightly expanded at apex; tepals unequal, dorsal largest, 22–27 × 7–8 mm, recurved in upper half, lower 3 tepals joined to upper laterals for 4–5 mm and to one another for ± 2 mm in a prominent lip, 15–16 × 6 mm. *Stamens* unilateral; filaments 10–12 mm long, well exserted; anthers 5–6 mm long. *Ovary* softly hairy; style dividing opposite anther tips, branches ± 3 mm long, filiform throughout. *Flowering time*: late August and September.

Distribution and ecology: a narrow endemic of the Stinkfontein and southern Bokkeveld Mtns near Moedverloor in Northern Cape, South Africa; in sandy and stony sandstone ground in fynbos with restiads.

Diagnosis: a dwarf plant, seldom reaching more than 100 mm above the ground, *Babiana engysiphon* is recognised by its elongate perianth tube, mostly 35–40 mm long, violet perianth with large white markings on the lower lateral tepals and horizontal spike. The several leaves, narrow and almost linear to narrowly sword-shaped and usually lightly pleated or nearly plane and velvety, arch toward the ground and are often close to horizontal. Its immediate relationships are uncertain. The softly hairy ovary and bracts divided to the base or nearly so conform to ser. *Mucronatae* of sect. *Babiana*.

Plants co-occur in some places with *Babiana mucronata* subsp. *minor*, which has short-tubed, scented flowers adapted for pollination by anthophorine bees, whereas the odourless flowers of *B. engysiphon* are pollinated by long-proboscid flies. Despite the difference in pollination system, some hybridization between the two is evident. These plants have a tube of intermediate length and pale yellow rather than white markings on the lower tepals. *Babiana engysiphon* also co-occurs with *B. rigidifolia*, but this more robust, broad-leaved plant grows in a different habitat, with the corms wedged in

crevices in sandstone pavement. Although their flowering times overlap, no hybrids have been recorded between the two, despite both evidently being pollinated by long-proboscid flies.

66. **Babiana auriculata** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 88 (1959); Goldblatt & Manning: 71 (2007). Type: South Africa, [Western Cape], Pakhuis Pass, Sept. 1947, *G.J. Lewis 1878* (SAM, holo.).

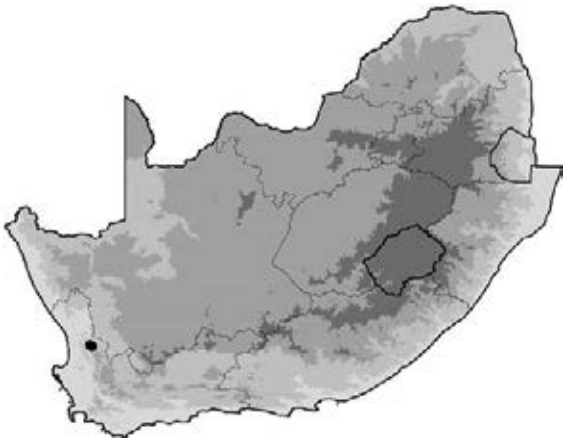
Plants 40–100 mm high. *Stem* short, often with 1 or 2 short branches, deflexed, lightly hairy. *Leaves* lanceolate, pleated, with short and long silky hairs, apex shortly cuspidate. *Spike* inclined to horizontal, secund, 3- to 8-flowered; outer bracts green, dry and rust-coloured in upper ⅓, softly hairy, 13–25 mm long, inner slightly shorter than outer, forked for ± ⅔ and membranous in lower midline, margins hyaline. *Flowers* 3 to 8 nodding, zygomorphic, dorsal tepal and stamens facing spike apex, blue-mauve, lower lateral tepals with pale yellow markings outlined in dark violet; perianth tube funnel-shaped, 15–20 mm long; tepals unequal, dorsal 20–28 mm long, lower tepals joined to upper laterals for short distance, forming a lip, lower narrowed into claws ± 5 mm long, limbs 10–15 mm long, lower laterals with auriculate lobes at base. *Stamens* unilateral; filaments arched, 15–18 mm long; anthers 4–6 mm long. *Ovary* hairy on ribs; style dividing opposite upper half of anthers, branches ± 3 mm long. *Flowering time*: September.

Distribution and ecology: known only from the Pakhuis Mtns in Western Cape, South Africa; in crevices in sandstone outcrops.

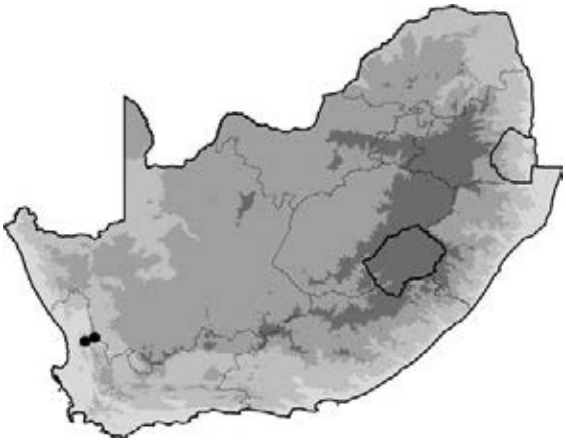
Diagnosis: *Babiana auriculata* is distinguished by the strongly deflexed stem and blue-mauve flowers with yellow markings on the lower tepals and auricular lobes at the base of the lower lateral tepal limbs. Although included in sect. *Babiana* because of the ovary hairy on the ribs, the inner bracts are not divided to the base but are joined in the lower third by membranous tissue. At first *B. auriculata* appears to be a smaller form of *B. mucronata*, but that species has the inner bracts clearly divided to the base, a densely hairy ovary, and the lower tepals lack auricular lobes. The auricular lobes of the lower tepals recall sect. *Antholyzoides* but the partly hairy ovary is inconsistent with that section, as are the membranous inner bract margins and midline. Apart from their incomplete separation, the inner bracts are otherwise typical of sect. *Babiana* in their membranous margins and rust-coloured tips. The narrow claws of the lower tepals suggest that *B. auriculata* is most closely allied to *B. unguiculata*, which also has narrowly clawed lower tepals. The nearly horizontal spike axis with the flowers facing the stem apex is another striking feature of *Babiana auriculata*, and one shared with a few other species of section *Babiana*.

67. **Babiana unguiculata** *G.J.Lewis* Journal of South African Botany, Suppl. 3: 131 (1959); Goldblatt & Manning: 71 (2007). Type: South Africa, [Western Cape], Nardouw Pass, Sept. 1941, *T.P. Stokoe 8482* (SAM, holo.; BOL, iso.).

Plants 100–200 mm high. *Stem* erect, sometimes with 1 or 2 short branches in upper ⅓, velvety, enclosed below by thick collar of fibres. *Leaves* sublinear to sword-shaped, reaching to ± middle of spike, 4–7 mm wide, sometimes lightly twisted, strongly pleated, usually shortly hairy (in cultivation smooth except for a line of long hairs on adaxial margins). *Spike* suberect, 4- to 12-flowered; bracts green, dark brown at tips, softly hairy, 7–15 mm long, inner slightly shorter or longer than outer, forked mostly to base (rarely for half their length with membranous midline). *Flowers* zygomorphic, pale creamy yellow, lower lateral tepals deep yellow; perianth tube 10–12 mm long; tepals unequal, dorsal ± 25 mm long, arching over stamens, later erect, lower tepals joined to upper laterals for ± 5 mm and to one another for 3–4 mm in a prominent lip, lower laterals with narrow claws ± 2 mm long, abruptly widening into broad limbs ± 15 × 7 mm. *Stamens* unilateral; filaments arched, 12–15 mm long; anthers 5–6 mm long, yellow; pollen white. *Ovary* lightly hairy, mostly



Distribution of ***Babiana auriculata***.



Distribution of ***Babiana unguiculata***.

on ribs; style dividing between middle and apex of anthers, branches 3–4 mm long. *Flowering time*: August to mid-September.

Distribution and ecology: extending from the Bokkeveld–Stinkfontein Mtn complex south of Nieuwoudtville in Northern Cape south to the Nardouw Mtns in Western Cape, South Africa (but poorly documented and known from just two sites); in seeps and locally wet sandstone pavement.

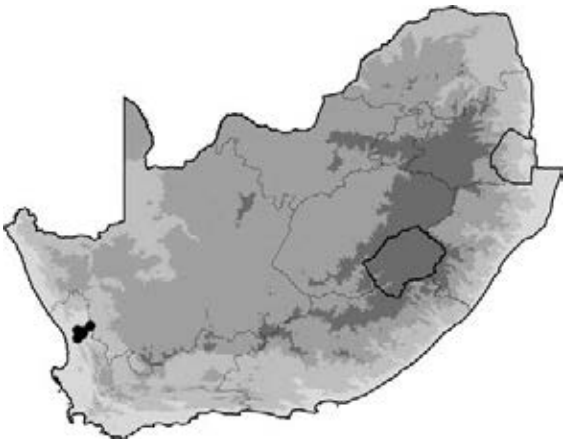
Diagnosis: the fairly small, yellow flowers, hairy ovary, and inner bracts divided almost to the base of *Babiana unguiculata* are consistent with sect. *Babiana*. In the type collection the narrow leaf blades are tightly pleated, appearing to be ribbed, but other collections have softer-textured leaves, only moderately pleated, densely short-hairy but long-hairy along the adaxial margins. The general appearance of the flowers and the short floral bracts recall *B. auriculata* and *B. lineolata* in particular but both have blue rather than pale yellow flowers. Flowers of *B. unguiculata* lack the auriculate lobes on the lower tepal limbs so characteristic of *B. auriculata*.

68. **Babiana toximontana** *J.C.Manning & Goldblatt* in Strelitzia 18: 73 (2007). Type: South Africa, Western Cape, flats below Matsikamma along road near foot of Gifberg Pass, 18 July 2005, *J.C. Manning* et al. *2979* (NBG, holo.; K, MO, iso.).

Plants 80–150 mm high. *Stem* reaching shortly above ground, velvety, strongly inflexed and horizontal, few-branched. *Leaves* 5 or 6, lanceolate, lightly coiled distally, held at ± 45° to sheaths, 50–100 × 7–18 mm, velvety, lightly pleated. *Spike* horizontal, secund, mostly 5- to 10-flowered; bracts green with brown tips, velvety, truncate, outer 14–20(–30) mm long, inner 11–15(–20) mm long, divided to base. *Flowers* zygomorphic, pale to deep blue, lower lateral tepals with white median blotches and wine-red streaks, with sweet spicy scent; perianth tube funnel-shaped, 12–14 mm long; tepals unequal, dorsal 28–32 × 6–8 mm, upper lateral tepals joined to lower for ± 5 mm, forming a lip, lower tepals ± 20 mm long. *Stamens* unilateral; filaments ± 15 mm long; anthers 7 mm long, lilac. *Ovary* densely hairy; style dividing opposite anther tips, branches ± 4 mm long. *Flowering time*: June to mid-July.

Distribution and ecology: a local endemic of the foothills of the Matsikamma and Gifberg Mtns between Vanrhynsdorp and Klawer, in Western Cape, South Africa; on sandy flats and stony lower slopes in arid fynbos.

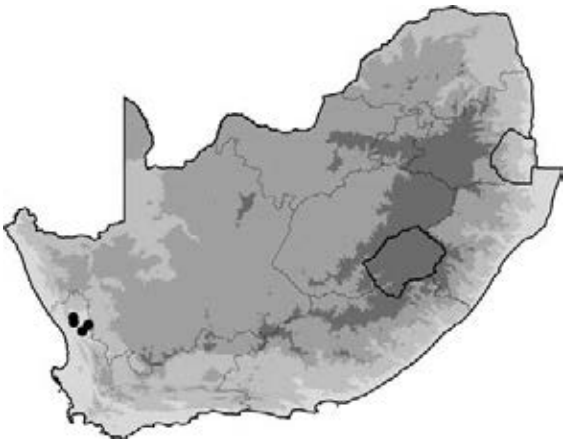
Diagnosis: distinctive in the spreading, velvety leaves, lightly coiled at the tips, *Babiana toximontana* typically has short, branched stems with horizontally arching, secund spikes, and fairly truncate bracts, the inner divided to the base. The flowers are moderately sized and pale to deep blue marked with white blotches and red streaks on the lower tepals. It is evidently closely allied to *B. salteri*, which also has oblique, rather spreading leaves and dense, horizontal spikes and also flowers early in the season, in late June and July. *Babiana salteri* has broader, more widely spreading leaves that are firm-textured and never twisted or coiled at the tips, and smaller flowers (tube ± 9 mm vs. 12–14 mm long and dorsal tepal 23 mm vs. 28–30 mm long) with the lower lateral tepals mostly or entirely yellow and the upper lateral tepals narrower and recurved. The two species favour different habitats, with *B. salteri* restricted to quartz patches on clay soils in succulent karoo scrub, and *B. toximontana* favouring sandstone-derived soils in arid fynbos. *Babiana salteri* is known for certain only NE of Vanrhynsdorp, whereas *B. toximontana* occurs in several populations in the foothills and lower slopes of Gifberg and Matsikamma.



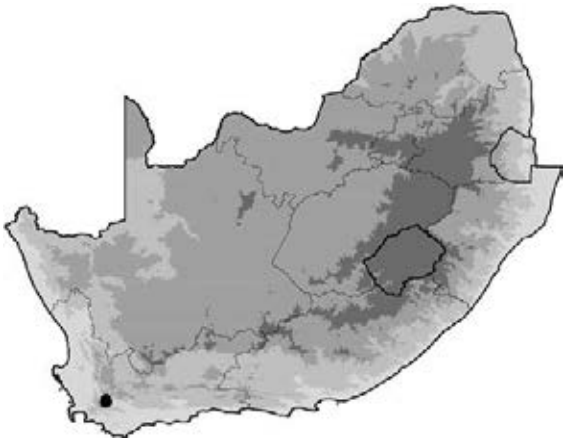
Distribution of ***Babiana toximontana***.

69. **Babiana salteri** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 73 (1959); Goldblatt & Manning: 73 (2007). Type: South Africa, [Western Cape], 16 miles [± 24 km] NE of Vanrhynsdorp on road to Calvinia, 14 June 1938, *T.M. Salter 7318* (SAM, holo.).

Plants 70–100 mm high. *Stem* reaching shortly above ground, usually with 1 to 3 short branches, shortly hairy above, base enclosed by thick fibrous collar. *Leaves* lanceolate-oblong with blades held ± at right angles to sheaths and stem, pleated, minutely hairy, mostly 20–40 mm long. *Spike* compact, 2-ranked, 5- to 10-flowered; bracts green with dry tips, lightly hairy, 10–13 mm long, inner ± as long as outer, divided to base. *Flowers* zygomorphic, pale blue-mauve with white to yellow markings on lower lateral tepals; perianth tube funnel-shaped, ± 9 mm long; tepals unequal, tapering toward base, dorsal ± 23 mm long, lower 3 tepals joined to upper laterals for short distance and to one another for ± 2 mm, 13–15 mm long. *Stamens* unilateral; filaments ± 1.3 mm long; anthers ± 7 mm long. *Ovary* densely hairy; style dividing opposite middle of anthers, branches ± 3 mm long. *Flowering time*: June to late July.



Distribution of ***Babiana salteri***.



Distribution of ***Babiana arenicola***.

Distribution and ecology: extending from the southern Knersvlakte and lower slopes of the Bokkeveld and Koebee Mtns in Western Cape, South Africa; on dry stony flats and lower mountain slopes.

Diagnosis: the dwarf *Babiana salteri* is recognised by the low stature, up to 100 mm high, and leaves with broadly lanceolate to ovate blades held almost at right angles to the sheaths enclosing the erect stem. The relatively small, pale blue-mauve flowers have a short perianth tube ± 9 mm long, dorsal tepal ± 23 mm long and lower tepals 13–15 mm long tapering toward the base, although not distinctly clawed. The short, horizontally oriented leaves recall those of the Richtersveld endemics, *B. gariepensis* and *B. horizontalis*, as well as those of the southern Namaqualand *B. lewisiana* but none of these species has bracts divided to the base.

70. **Babiana arenicola** *Goldblatt & J.C.Manning* in Strelitzia 18: 74 (2007). Type: South Africa, [Western Cape], Brandvlei, south of Worcester, half a mile before the hot spring, 18 Sept. 1974, *A.A. Mauve & I. Oliver 757* (PRE, holo.; MO, NBG, iso.).

Plants 60–140 mm high, including leaves. *Stem* reaching 20–40 mm above ground level, lightly hairy, enclosed below by collar of dark brown fibres. *Leaves* narrowly sword-shaped to linear, shortly exceeding stem, mostly 3–6 mm wide, firm to rigid, deeply pleated and veins thickened, sparsely short-hairy, mainly on veins. *Spike* erect, 2- to 6-flowered; bracts green with dry rust-brown tips, ± smooth above, shortly to silky hairy below, outer 22–30(–45) mm long, inner ± ⅔ as long, shortly attenuate, divided to base. *Flowers* zygomorphic, blue with white markings on lower lateral tepals edged toward throat in dark blue or red, sweetly scented; perianth tube straight, cylindric below, widening gradually in upper ⅓, ± 30 mm long; tepals subequal, dorsal ± 32 × 12 mm, upper laterals ± 32 × 10 mm, lower tepals 28–30 × 10 mm. *Stamens* unilateral; filaments suberect, unilateral, ± 15 mm long, exserted ± 8 mm from mouth of tube; anthers linear, 6–7 mm long, yellow; pollen white. *Ovary* sparsely to densely shortly hairy; style dividing ± 2 mm below base of anthers, branches 5–6 mm long, slender, hardly expanded at tips. *Flowering time*: mid-August to late September.

Distribution and ecology: local in the vicinity of Brandvlei, between Worcester and Villiersdorp in Western Cape, South Africa; in sand among sandstone rocks.

Diagnosis: a puzzling species of sect. *Babiana*, plants are nearly acaulescent and have blue flowers borne close to ground level, thus broadly resembling *B. ambigua*, from which *B. arenicola* differs markedly in having a fairly prominent hairy ovary, narrow, deeply pleated, stiff leaves 3–6 mm wide, and straight perianth tube, ± 30 mm long. The style is also unusual in dividing below or shortly above the base of the anthers into slender branches 5–6 mm long. By contrast, *B. ambigua* has firm, but less rigid leaves, 3–10 mm wide, a curved perianth tube, 10–19 mm long, wider in the throat, arched filaments, and the style dividing opposite the anther tips. *Babiana arenicola* is included in ser. *Mucronatae* because of the shortly hairy, almost bristly ovary, and linear, yellow anthers and pollen.

71. **Babiana scabrifolia** *Brehm ex Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 349 (Ergänzungen 15) (1882); Lewis: 68 (1959); Goldblatt & Manning: 75 (2007). Type: South Africa, [Western Cape], Clanwilliam District, Langevallei, July 1830, *J.F. Drège 2623* (K, lecto., designated by Lewis: 68 (1959); P, iso. [two sheets]).

Babiana occidentalis Baker: 183 (1892). Type: South Africa, [Western Cape], Clanwilliam, without precise locality, *Mader in Herb. Macowan 2169* (K, holo.).

Babiana subglabra G.J.Lewis: t. 545 (1934b). Type: South Africa, [Western Cape], Olifants River Valley near Clanwilliam, ex hort. Kirstenbosch, *G.J. Lewis s.n. as Natl. Bot. Gard. 1812/32* (BOL, holo.).

Babiana adpressa G.J.Lewis: 1 (1938). Type: South Africa, [Western Cape], Nardouw Pass, ex hort. Kirstenbosch, *T.M. Salter s.n. as Natl. Bot. Gard. 1159/33* (BOL, holo.).

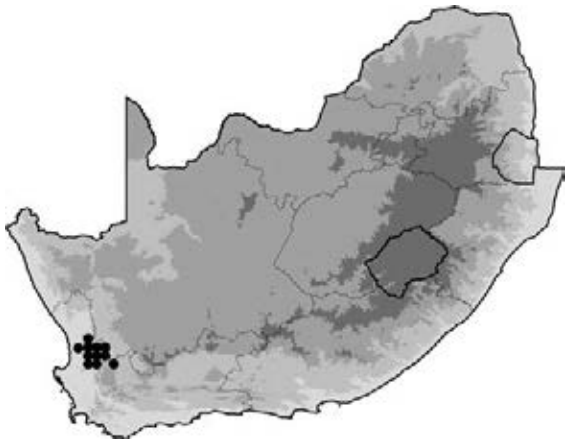
Babiana scabrifolia var. *acuminata* G.J.Lewis: 70 (1959). Type: South Africa, [Western Cape], Olifants River Valley at Bulshoek Barrage, 2 Aug. 1950, *G.J. Lewis 2192* (SAM, holo.; SAM, iso.).

Babiana scabrifolia var. *declinata* G.J.Lewis: 71 (1959). Type: South Africa, [Western Cape], between Brandewyn River and Doorn River, in sand, 25 Aug. 1950, *G.J. Lewis 2207* (SAM, holo.).

Plants 50–150 mm high, including leaves. *Stem* ± underground, with thick collar of fibres around base, often forming tufts, simple or branched at ground level, hairy above ground. *Leaves* lanceolate to oblong, exceeding stem, 6–20 mm wide, usually inclined toward ground, soft-textured and lightly pleated, shortly hairy or nearly smooth, narrow and twisted in young plants. *Spike* congested, ± horizontal, 4- to 8-flowered; bracts green, sparsely hairy, 20–32 mm long, inner slightly shorter than outer, divided to base (rarely shortly above base), with wide transparent margins. *Flowers* zygomorphic, mostly pale blue to pale lilac, lower lateral tepals with broad white to cream-coloured splashes in upper half outlined in dark blue to violet, sweetly scented, often of narcissus; perianth tube narrowly funnel-shaped, 12–18 mm long; tepals unequal, dorsal 30–45 × 7–10 mm, lower tepals joined to upper laterals for up to 4 mm and to one another for ± 4 mm, forming a prominent lip, 20–30 mm long, margins of lower laterals undulate, lightly crisped in lower half. *Stamens* unilateral; filaments arched, 13–18 mm long; anthers 6–8 mm long; pollen white. *Ovary* thinly hairy above or on ribs, rarely smooth; style dividing between middle and apex of the anthers, branches 4–5 mm long, expanded at tips. *Flowering time*: June to August.

Distribution and ecology: centred in the Olifants River Valley in Western Cape, South Africa and on lower slopes of the surrounding mountains; on stony soils in dry fynbos or karroid scrub.

Diagnosis: *Babiana scabrifolia* is most easily recognised by the underground stem, often branched at ground level, and usually forming small tufts, and the fairly large, pale blue to blue-mauve flowers, which have a pleasing sweet scent and contrast both in the scent and large size with those of *B. mucronata*, which is also common in the Olifants River Valley. That species typically has an erect, usually well-developed aerial stem, while the flowers have a densely hairy ovary and produce a rather harsh acrid-spicy odour. Young plants do not have the narrow, twisted to coiled immature leaves of *B. scabrifolia* that surround the parent plants. It reproduces amply by cormlets and it is common to see mature flowering plants with their broad, soft-textured leaves surrounded by the linear, twisted to coiled leaves produced by immature plants.



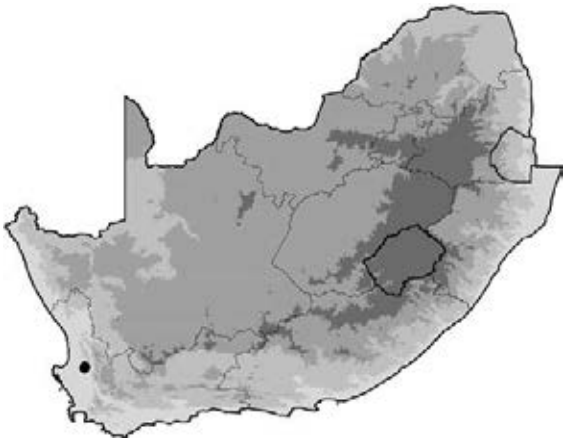
Distribution of ***Babiana scabrifolia***.

Babiana scabrifolia is unusually variable in leaf shape, size and pubescence, and what are now thought to be ecological variants were described in the past as the separate species *B. subglabra* and *B. adpressa*. The variants are often simply individuals growing in more shaded, or wetter, or more exposed sites. Hybrids between *B. scabrifolia* and *B. mucronata* occur locally where they are sympatric, and have overlapping flowering times and share the same pollinators, anthophorine bees and honey bees.

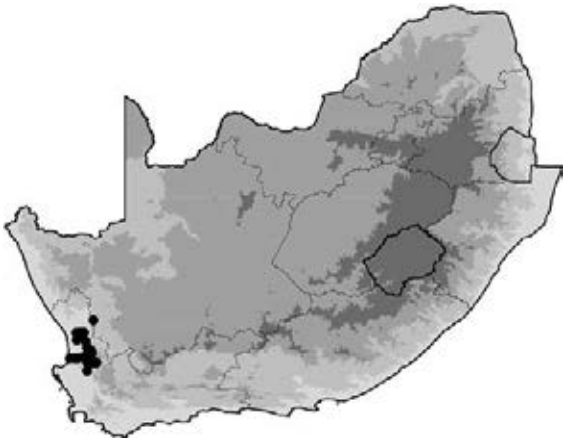
Babiana scabrifolia is broadly similar in habit to *B. ambigua* and the two occasionally grow fairly close to one another. The latter is most easily distinguished by the absence of a collar of fibres around the underground part of the stem and by the tepals with more-or-less straight margins that contrast with the undulate to crisped tepal margins of *B. scabrifolia*. While *B. scabrifolia* has a sparsely thinly ovary, sometimes only on the ribs, *B. ambigua* typically has a smooth ovary, occasionally sparsely hairy on ribs.

72. **Babiana latifolia** *L.Bolus* in South African Gardening and Country Life 17: 377 (1927); Goldblatt & Manning: 76 (2007). *B. ecklonii* var. *latifolia* (L.Bolus) G.J.Lewis: 105 (1959). Type: South Africa, [Western Cape], foot of the Piketberg, flowered at Kirstenbosch Gardens, 16 Sept. 1927, *D. van Zijl s.n. as Natl. Bot. Gard. 625/1927* (BOL, holo.).

Plants 100–250 mm high. *Stem* inclined, usually 2- to 4-branched, densely hairy. *Leaves* lanceolate, to 20 mm wide, soft and lightly pleated, softly hairy. *Spike* several-flowered; bracts green with brown tips, densely long-hairy, 15–25 mm long, outer obtuse-acuminate, inner slightly shorter than outer, divided to base. *Flowers* zygomorphic, violet with whitish or pale violet median streaks on lower lateral tepals; perianth tube cylindric, curved near apex, 30–40 mm long; tepals unequal, dorsal suberect, 22–26 mm long, lower tepals obtuse to obtuse apiculate, 17–21 mm long, joined to upper laterals for ± 4 mm, forming a fairly prominent lower lip. *Stamens* unilateral; filaments arcuate, ± 12 mm long;



Distribution of ***Babiana latifolia***.



Distribution of ***Babiana ecklonii***.

anthers ± 6 mm long, dark blue black. *Ovary* densely hairy; style dividing opposite upper thirds of anthers, branches ± 4 mm long, tips unusually large and undulate, overtopping anthers. *Flowering time*: August to early September.

Distribution and ecology: known only from the eastern base and lower slopes of the Piketberg in Western Cape, South Africa; on loamy sandstone-derived soils.

Diagnosis: *Babiana latifolia* differs from *B. ecklonii* in its unusual style branches conspicuously enlarged at the tips, purple flower colour with narrow white nectar guides on the lower lateral tepals, blue-black anthers, and obtuse apiculate tepal tips. Flowers of *B. ecklonii* are violet with broad white to pale yellow nectar guides, the anthers are pale violet, and the tepals are narrow and acute. The style divides opposite the anther apices in *B. latifolia* and the style branches are ± 4 mm long with the tips unusually broad and undulate. In *B. ecklonii* the point of division of the style and length of style branches is variable, in different individuals, dividing variously below the anthers and ± 2 mm long, or opposite the middle or close to the anther apices and up to 4 mm long, but in both cases the style branches are slender, widening gradually toward the tips. Vegetatively the two also differ: in *B. latifolia* the leaf and stem pubescence is velvety but in *B. ecklonii* the pubescence is longer and sparser, and the erect stem is largely sheathed by the leaf bases, whereas the stem of *B. latifolia* arches outward and is free of the leaf bases for at least half its length. As expected from its long perianth tube, flowers of *B. latifolia* are pollinated by the long-proboscid flies.

73. **Babiana ecklonii** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 348 (Ergänzungen 14) (1882); Lewis: 104 (1959); Goldblatt & Manning: 76 (2007). Type: South Africa, [Western Cape], without precise locality or date, *Ecklon & Zeyher 133* [G, lecto., designated by Lewis: 105 (1959)].

Babiana velutina Schltr.: 100 (1899). Type: South Africa, [Western Cape], Gifberg, near Windhoek, 1 Aug. 1897, *R. Schlechter 8364* (BM, K, MO, P, PRE, Z, syn.).

Babiana fastigiata L.Bolus: 377 (1927). Type: South Africa, [Western Cape], said to be from George, cultivated at Piketberg, Aug., *D. van Zyl s.n.* (BOL 17823, holo.).

Plants 100–300 mm high. *Stem* ± erect, often weakly flexed below spike, usually 2- to 4-branched, softly hairy, mostly sheathed by leaves. *Leaves* lanceolate to sword-shaped, in a tight fan, usually relatively soft-textured and lightly pleated, somewhat silky hairy. *Spike* 2-ranked, closely 4- to many-flowered; bracts green with dry, brown, attenuate tips, densely hairy, outer 14–25 mm long, inner ± ⅔ as long as outer, divided to base or almost so. *Flowers* zygomorphic, violet with large cream-coloured to pale yellow marks on lower lateral tepals, unscented; perianth tube cylindric, usually sharply curved below apex, 35–47 mm long, widening and arching outward in upper 6–8 mm; tepals unequal, dorsal suberect, 23–27 mm long, lower 3 tepals joined to upper laterals for 5–7 mm and often to one another for a short distance, forming a pronounced lower lip, lower 3 tepals 12–17 mm long, extending horizontally below, arching outward and downward above. *Stamens* unilateral; filaments arcuate, 14–16 mm long, diverging after anther dehiscence; anthers 5–7 mm long, pale blue or violet. *Ovary* hairy above or throughout, rarely hairy only on ribs; style usually dividing opposite middle of anthers, occasionally below anther bases or opposite anther tips, branches ± 4 mm long (or when style short, branches ± 2 mm long), stigmatic lobes barely expanded. *Flowering time*: August and September.

Distribution and ecology: South Africa, Western Cape, from the Gifberg and Heerenlogement Mtn in the north to Elandskloof and Piekenierskloof in the south; on mountain slopes up to 500 m elevation and flats in stony, sandstone-derived soils, often in rock crevices.

Diagnosis: although typical of sect. *Babiana* in its branched, aerial stem and inner bracts divided to the

base, *B. ecklonii* is remarkable for its tall stature when well grown, the stem largely sheathed by the bases of the erect leaves, and for its elongate perianth tube, 35–47 mm long. The blue-violet flowers have large white markings on the lower lateral tepals and unusual stamens, which are initially parallel, but after dehiscence the filaments diverge, leaving the anthers widely separated from one another.

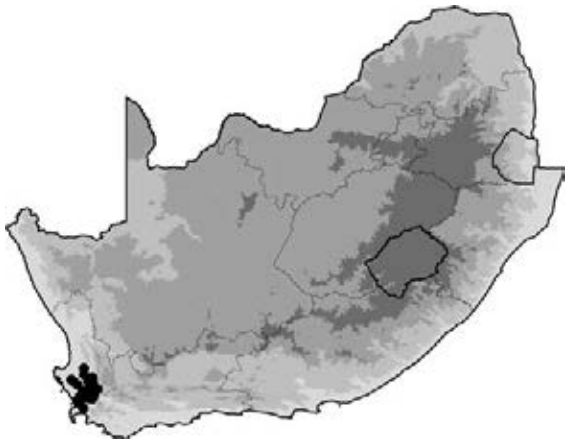
Variation across the range of *Babiana ecklonii* is puzzling. It is fairly uniform in the Olifants River Mtns, where it has blue-violet flowers with very discrete and prominent white to pale yellow nectar guides on the lower lateral tepals, an erect stem, fairly attenuate floral bracts, and style branches terminating in small stigmatic lobes. At the northern edge of its range, at Klawer and on the Gifberg, plants have narrower, more densely pilose leaves and also have flexed and inclined stems. While the type form of *B. ecklonii* has the ovary densely hairy above the base, plants from sites west of the Olifants River Mtns may have the ovary hairy only on the ribs.

A feature of *Babiana ecklonii*, evidently unique in the genus, is variation in style and style branch length within populations. At sites in the Olifants River Valley and near Algeria in the Cederberg, the style in some plants is short, dividing below the anther bases and with style branches ± 2 mm long, but in others the style divides opposite the middle or upper third of the anthers and the branches are ± 4 mm long. The flowers are pollinated by long-proboscid flies.

74. **Babiana odorata** *L.Bolus* in South African Gardening and Country Life 22: 243 (1932a); Lewis: 60 (1959); Goldblatt & Manning: 77 (2007). Type: South Africa, [Western Cape], near Porterville, 4 August 1897, *R. Schlechter 10725* (BOL, lecto., designated by Lewis: 61 (1959); K, S, isolecto.).

Plants 50–150 mm high, ± acaulescent. *Stem* inclined, usually with short lateral branches, velvety. *Leaves* lanceolate, pleated, softly hairy. *Spike* inclined, 3- to 8-flowered; bracts green with dry rust-coloured tips, softly hairy, 15–25 mm long, inner slightly shorter than outer, divided to base. *Flowers* zygomorphic, usually creamy yellow with deep yellow blotches on lower tepals, sometimes upper tepals flushed pale mauve, spicy violet-scented; perianth tube narrowly funnel-shaped, 10–14 mm long; tepals unequal, dorsal largest, 26–34 mm long, lower joined to upper laterals for ± 3 mm and to each another for 2–3 mm, forming a prominent lip, 20–22 mm long. *Stamens* unilateral; filaments arched under dorsal tepal, 14–17 mm long; anthers 5–6 mm long, blue or turquoise. *Ovary* densely hairy; style usually dividing opposite anther apices, branches 4–5 mm long, expanded apically. *Flowering time*: late July to early September.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, extending from Porterville and Piketberg to the Tygerberg near Cape Town; mainly on gravelly granite-derived soils, occasionally on sandstone, at low elevations in renosterveld.

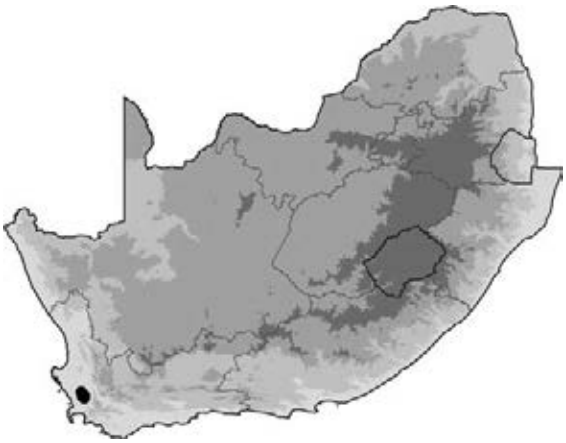


Distribution of ***Babiana odorata***.

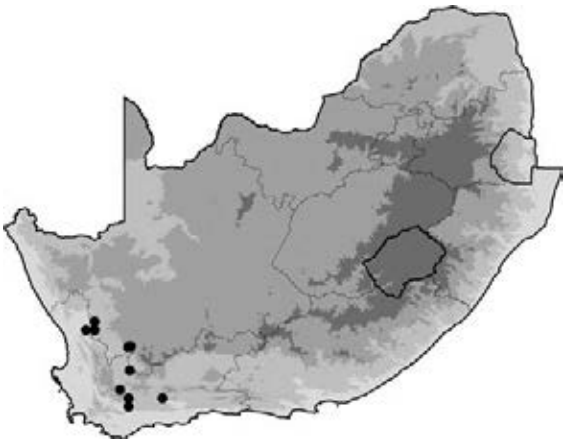
Diagnosis: the attractive *Babiana odorata* is a common species of the loamy clay or granitic soils of the Swartland north of Cape Town and is a pleasant sight in lightly disturbed renosterveld in early spring around Malmesbury and Moorreesburg. Plants have short, velvety stems or are almost stemless, the flowers then borne close to ground level. The flowers may be pale creamy yellow with bright yellow lower tepals or rarely flushed pale mauve, but are always intensely fragrant, with a spicy to pleasant violet odour, the scent varying with ambient temperature and age of the flowers, which each last three days. *Babiana odorata* is most easily confused with the vegetatively similar *B. patula*, which occurs in similar habitats to the east, in the Breede River Valley and across the low hills of the southern Cape. Most readily distinguished by the ovary smooth or lightly hairy on the ribs vs. densely hairy in *B. fragrans*, *B. patula* has dull yellowish or white or more often pale mauve to blue or dull purple flowers with yellow markings and a particularly strong fragrance, often of violet or freesia.

75. **Babiana noctiflora** *J.C.Manning & Goldblatt* in Strelitzia 18: 78 (2007). Type: South Africa, Western Cape, Slent Farm, SE end of Paardeberg, granite outcrops, 28 Sept. 1999, *P. Goldblatt 11172* (NBG, holo.; K, MO, NBG, PRE, iso.).

Plants 180–300 mm high. *Stem* usually with 2 to 4 branches, flexed outward above, velvety to silky hairy. *Leaves* lanceolate, pleated, softly hairy, reaching to ± middle of spike. *Spike* inclined, 4- to 8-flowered; bracts green with dry rust-coloured tips, silky hairy, 12–15 mm long, inner slightly shorter than outer, divided to base. *Flowers* zygomorphic, creamy yellow, lower lateral tepals deep yellow, violet-scented; perianth tube 35–50 mm long, slender and cylindric below, with long wide throat, 15–25 mm long; tepals unequal, dorsal 27–32 mm long, inclined toward ground, lower tepals joined to upper laterals for ± 5 mm, lower three



Distribution of ***Babiana noctiflora***.



Distribution of ***Babiana scariosa***.

22–25 mm long. *Stamens* unilateral; filaments arched, 28–30 mm long; anthers 6–7 mm long. *Ovary* densely hairy; style dividing below or opposite base of anthers, branches ± 4.5 mm long, expanded at apex. *Flowering time*: late September to mid-October.

Distribution and ecology: a narrow endemic of the Paardeberg between Malmesbury and Agter-Paarl, in Western Cape, South Africa; on granite outcrops in fynbos.

Diagnosis: resembling *Babiana odorata* in the relatively broad leaves and pale yellow flowers, *B. noctiflora* has a taller but inclined stem, up to 300 mm long, and inclined spike. The flowers stand out in having an elongate perianth tube 33–50 mm long, compared with 10–14 mm in *B. odorata*. It is also late flowering, from mid-September until mid-October, which contrasts with the early spring flowering of *B. odorata* in July and August. The flowers have the typical features of ser. *Mucronatae*, having inner bracts divided to the base, a densely hairy ovary and linear anthers. The flowers are adapted for pollination by night-flying moths and they remain open and scented all night.

Ser. **Scariosae** *(G.J.Lewis) Goldblatt & J.C.Manning*, name at new rank. *Babiana* sect. *Scariosae G.J.Lewis* in Journal of South African Botany, Suppl. 3: 122 (1959). Type: *B. spathacea* (L.f.) Ker Gawl.

Floral bracts dry and membranous; flowers zygomorphic or actinomorphic, dorsal tepal shorter or longer than perianth tube; ovary smooth.

76. **Babiana scariosa** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 122 (1959); Goldblatt & Manning: 80 (2007). Type: South Africa, [Northern Cape], between Oorlogskloof and Papkuilsfontein, Sept. 1939, *C.L. Leipoldt 3043* (BOL, K, syn.).

Plants mostly 300–600 mm high, occasionally up to 800 mm. *Stem* erect, smooth, usually with several short branches held close to axis. *Leaves* linear-lanceolate, pleated, shortly velvety. *Spike* erect, congested, many-flowered; bracts dry-papery, smooth, brown or ± translucent with brown flecks, attenuate, 20–24 mm long, inner bract divided for ± ⅔ its length. *Flowers* zygomorphic, blue to mauve with white to pale yellow markings on lower tepals; perianth tube narrowly funnel-shaped, 11–20 mm long; tepals unequal, dorsal largest, 23–27 × 6–11 mm, lower tepals joined to upper laterals for ± 5 mm, shortly clawed, 17–20 × 6–8 mm. *Stamens* unilateral; filaments arched, 12–14 mm long; anthers 5–7 mm long, yellow. *Ovary* smooth; style dividing opposite middle of anthers, branches 3–4 mm long. *Flowering time*: August to mid-October.

Distribution and ecology: extending from the Bokkeveld Mtns and Roggeveld Escarpment in Northern Cape, South Africa, to the Hex River Mtns and western Little Karoo near Montagu and the Touwsberg in Western Cape; on dry sandstone or clay slopes, in arid fynbos or karroid scrub.

Diagnosis: *Babiana scariosa* is readily recognised by the blue flowers with white to yellow markings, a perianth tube of intermediate length, mostly 12–15 mm (but up to 20 mm in the type) combined with distinctive dry, brown to translucent floral bracts. Plants can be relatively tall for the genus, up to 500 or even 800 mm but plants from the Bokkeveld Plateau are consistently shorter, mostly ± 300 mm tall. *Babiana scariosa* is most closely allied to acaulescent *B. papyracea*, which has a radially symmetrical, short-tubed flower, but similar dry, membranous floral bracts. It may also be related to *B. spathacea* of the western Karoo, which also has similar floral bracts, but the flowers of this species are creamy beige with red markings on the lower tepals and have an elongate perianth tube. Hybrids between this species and *B. scariosa* may be found where the two co-occur on the Bokkeveld Plateau south of Nieuwoudtville.

77. **Babiana spathacea** *(L.f.) Ker Gawl.* in Curtis's Botanical Magazine 17: t. 638 (1803c), name misapplied to *B. sambucina*; Lewis 3: 124 (1959); Goldblatt & Manning: 80 (2007).

Gladiolus spathaceus L.f.: 96 (1782). Type: South Africa, [Northern Cape], without precise locality, as Bokkeveld "Bockland" and Hantam, Nov. 1774, *Thunberg s.n.* (UPS–THUNB 1070, holo.).

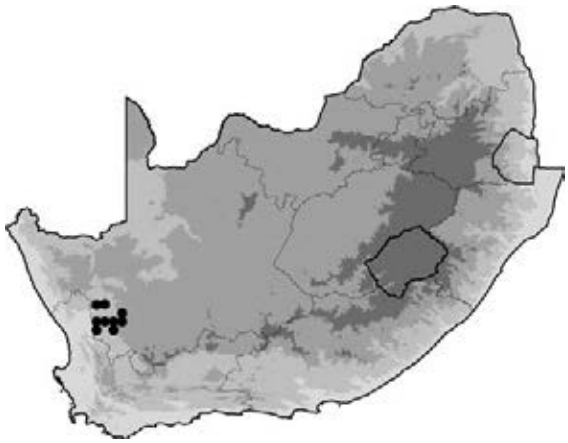
Gladiolus paleaceus Vahl: 118 (1805). Type: South Africa, without precise locality, collector unknown (C: ex Herb. Royen, presumed holo.).

Babiana densiflora Klatt: 348 (1882). Type: South Africa, [Northern Cape], Hantam Mtns, *Meyer 1869* (B, holo.).

Plants mostly 250–400 mm high. *Stem* erect, smooth, usually with several short branches held close to main stem, smooth. *Leaves* linear-lanceolate, pleated, shortly hairy. *Spike* congested, erect, many-flowered; bracts dry-membranous, pale brown or ± transparent with brown flecks, attenuate, 25–50 mm long, inner slightly shorter than outer, divided for ⅔ its length, rarely completely, but often torn at anthesis and appearing divided to base. *Flowers* zygomorphic, creamy beige to white, sometimes pale lilac outside, or bluish white to lilac, lower tepals and lower half of throat with small red or purple markings, odourless; perianth tube cylindric, sharply curved above, (30–)35–45 mm long; tepals unequal, dorsal 20–23 × 6 mm, ovate-spathulate, upper laterals curved backward, lower 3 joined together for a short distance, directed forward, ± 15 mm long. *Stamens* unilateral; filaments weakly arched, ± 10 mm long; anthers 4–6(–7) mm long, usually violet or purple. *Ovary* smooth; style dividing opposite anther tips, branches usually short, 1.8–2.5(–4.0) mm long. *Flowering time*: mostly from mid-September to early November.

Distribution and ecology: restricted to the western Karoo of Northern Cape, South Africa, extending from Loeriesfontein in the north to Calvinia and near Nieuwoudtville in the south; stony clay soils, often in dolerite outcrops, in karroid scrub and renosterveld.

Diagnosis: *Babiana spathacea* is immediately recognised by the long-tubed, usually creamy beige to ± white flowers with dark red to purple markings near the bases of the lower three tepals, a perianth tube 35–45 mm long and dorsal tepal ± 25 mm long. The dry, membranous, long-cuspidate floral bracts, which prompted the name *spathacea*, are distinctive only in combination with the perianth characters. Two other species also have similar floral bracts, *B. scariosa*, which has bilabiate, blue flowers with a relatively short perianth tube, 12–20 mm long, and the acaulescent *B. papyracea*, which has large, radially symmetric flowers. South of Nieuwoudtville plants included in *B. spathacea* are unusually variable, some having pale lilac-blue flowers with purple markings, a somewhat smaller perianth with the tube 30–36 mm long and the dorsal tepal 13–23 mm long. These plants also sometimes have longer style branches, up to 4 mm long, unusual for the species, in which 1.8–2.0 mm long is typical.

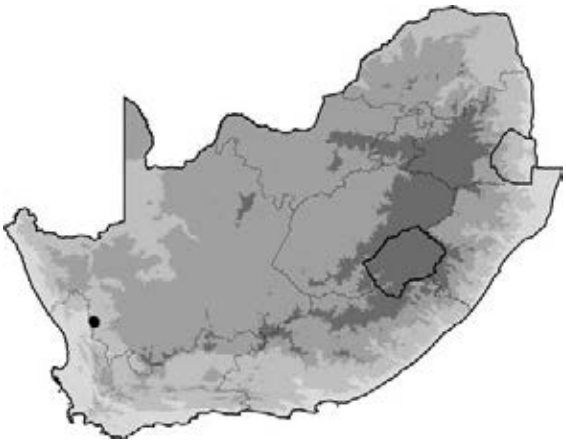


Distribution of ***Babiana spathacea***.

It seems likely that hybridisation with *Babiana scariosa*, which also grows there and in the same habitat, is the source of the bluish colouring, shorter perianth tube, and longer style branches. Closer to Nieuwoudtville plants have white flowers with red markings, flushed lilac on the tube and reverse of the tepals, and the anthers and pollen are dark purple. Flowers are smaller and have a tube ± 30 mm long and a dorsal tepal ± 15 mm long, but the style branches in these plants are 2.0–2.5 mm long, which is typical of *B. spathacea*. The shift in flower colouring and perianth size is puzzling but so striking that this distinctive race of *B. spathacea* probably deserves taxonomic recognition. The pattern of variation needs additional study before an informed decision can be reached.

78. **Babiana papyracea** *Goldblatt & J.C.Manning* in Strelitzia 18: 81 (2007). Type: South Africa, Northern Cape, Glenlyon farm, S of Nieuwoudtville, tillite flats, 4 Oct. 2000, *P. Goldblatt 11611* (NBG, holo.; K, MO, PRE, iso.).

Plants up to 150 mm high, including leaves. *Stem* short or subterranean, closely 2- to 4-branched, usually forming small tufts. *Leaves* several in basal tuft, linear, pleated, shortly velvety, 2–4 mm wide. *Spike* congested, 3- to 8-flowered; bracts dry, membranous, pale with brown flecks, 30–35 mm long, tapering to attenuate, awn-like tips, with brown central vein, inner ± as long as outer, usually divided for ± ⅔ its length. *Flowers* actinomorphic, pale or deep blue-purple (rarely white), tepals often darker toward base and with white markings, throat usually white, unscented; perianth tube filiform, straight, 35–45 mm long, thick walled and tightly enclosing style; tepals subequal, narrowly lanceolate, 26–32 × 5–6 mm, spreading at ± 70° from vertical when fully open. *Stamens* symmetrically arranged; filaments erect, surrounding style, ± 7 mm long; anthers ± 8 mm long, straight, weakly diverging, later arching inward, light mauve; pollen cream-coloured. *Ovary* smooth; style dividing opposite lower half of anthers, branches slender, ± 2.5 mm long. *Flowering time*: late September and October.



Distribution of ***Babiana papyracea***.

Distribution and ecology: a narrow endemic of the Bokkeveld Plateau in Northern Cape, South Africa, only known from near Nieuwoudtville and a short distance to the south of the town; on stony clay ground in renosterveld.

Diagnosis: *Babiana papyracea* is recognised by the ± acaulescent habit, and radially symmetric, blue-mauve flowers with dry, membranous floral bracts with attenuate awn-like tips. It is most closely related to the taller, short-tubed *B. scariosa*, which has bilabiate flowers but similar dry floral bracts, also shared with long-tubed *B. spathacea*, both of which also occur in the immediate vicinity of Nieuwoudtville. The radially symmetric flower of *B. papyracea* is a striking contrast to the zygomorphic flowers of its two relatives. The flowers of *B. papyracea* appear to be adapted for pollination by hopliine beetles.

Ser. **Babiana**

Flowers mostly zygomorphic, shades of blue to violet or yellow, dorsal tepal usually longer than perianth tube; ovary variously hairy.

79. **Babiana fragrans** *(Jacq.) Steud.*, Nomenclator botanicus, edn. 2, 1: 176 (1840); Goldblatt & Manning: 83 (2007). *Gladiolus fragrans* Jacq.: t. 14 (1797). Type: South Africa, without precise locality or collector, cultivated in Vienna, illustration Jacq.: t. 14 (1797).

Babiana plicata Ker Gawl.: t. 576 (1802a), illegitimate superfluous name for *Gladiolus fragrans* Jacq. (1797). Type: South Africa, without locality, illustration in Ker Gawl.: t. 576 (1802a).

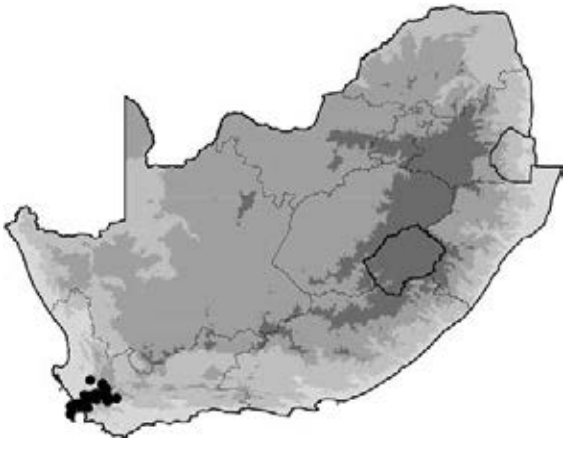
Babiana disticha Ker Gawl.: t. 626 (1803b). *Gladiolus distichus* (Ker Gawl.) Roem. & Schult.: 440 (1817). Type: South Africa, without precise locality, illustration in Ker Gawl.: t. 626 (1803b).

Babiana lilacina Eckl.: 31 (1827). Type: uncertain, possibly from Devils Peak, Cape Town, *Ecklon 123* '*Babiana lilicina*' (location unknown).

Plants 70–200 mm high. *Stem* erect, often branched, velvety. *Leaves* lanceolate to oblong, ascending, up to 20 mm wide, lightly pleated, shortly hairy. *Spike* ± erect, 4- to 10-flowered; bracts green with dry rust-coloured tips, usually densely hairy, 12–18 mm long, inner usually slightly shorter than outer, divided to base. *Flowers* zygomorphic, pale deep violet, occasionally creamy yellow, lower lateral tepals usually with narrow median streak or blotch, and with dark blue or purple markings near base, lightly to intensely fragrant; perianth tube narrowly funnel-shaped, 18–20 mm long; tepals subequal, dorsal ascending, 18–22 mm long, lower tepals joined to upper laterals for 2–3 mm, lower ± 18 mm long. *Stamens* unilateral; filaments suberect, 12–16 mm long; anthers 6–7 mm long, mid- to dark blue. *Ovary* densely hairy; style dividing between base and middle of anthers. *Flowering time*: mainly late August and September.

Distribution and ecology: South Africa, Western Cape, extending from Ceres and Malmesbury to the Cape Peninsula; occurring on sandstone, granite and occasionally clay slopes.

Diagnosis: seemingly relatively unspecialised in the section, *B. fragrans* is recognised by the subequal, spreading tepals, the dorsal only slightly longer than the lower, and small pale markings edged in darker blue or purple on the lower tepals. The perianth tube is about as long as or slightly longer than the dorsal tepal and the erect, usually branched stem bears spikes of up to 10 flowers. The suberect stamens are unilateral and the anthers parallel and contiguous, and usually dark blue. The soft-textured, hairy leaves are lightly pleated and often oblong rather than the usual sword-shape in sect. *Babiana*. The flowers have a strong, pleasant scent, likened to carnations. Somewhat variable across its range, *B. fragrans* from the interior southwestern Cape has a more strongly bilabiate flower with the dorsal tepal up to 5 mm longer than the lower and the upper lateral tepals are united for a short distance with the lower, thus forming a more pronounced lip than is evident in plants from the Cape Peninsula and nearby.



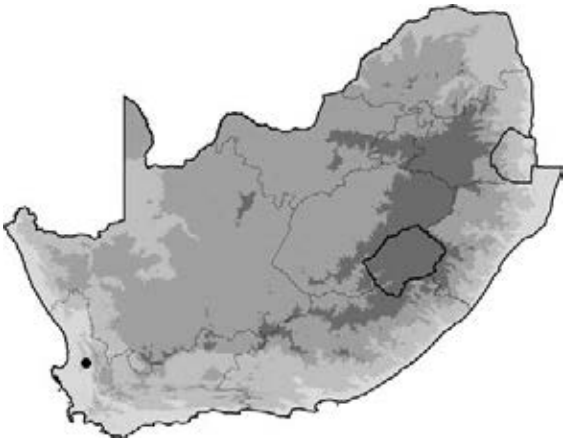
Distribution of ***Babiana fragrans***.

80. **Babiana tubaeformis** *Goldblatt & J.C. Manning* in Goldblatt et al. in Bothalia 38: 53 (2008), as a new name for *B. longiflora* Goldblatt & J.C.Manning: 94 (2004) & 84 (2007), illegitimate homonym, not *B. longiflora* (L.f.) Steud.: 686 (1840) [= *Tritonia cooperi* subsp. *cooperi*]. Type: South Africa, Western Cape, 3218 (Clanwilliam): ± 28 km north of Piketberg, 31 Aug. 2002, *P. Goldblatt & L.J. Porter 12129* (NBG, holo.; MO, iso.).

Babiana stricta var. *grandiflora* G.J.Lewis: 46 (1959). Type: South Africa, [Western Cape], 18 miles north of Piketberg, 28 July 1950, *G.J. Lewis 2197* (SAM, holo.; SAM, iso.).

Plants mostly 150–200 mm high. *Stem* erect, often branched, velvety hairy. *Leaves* lanceolate to oblong, mostly 9–12 mm wide, lightly pleated, fairly soft-textured, sparsely hairy. *Spike* suberect, 6- to 10-flowered; bracts green with dry rust-coloured tips, outer ± obtuse to bilobed at apex, densely hairy, mostly 16–20 mm long, inner slightly shorter than outer, divided to base. *Flowers* zygomorphic, lilac to deep mauve or violet, lower tepals white in centre with spear-shaped reddish basal mark, or with narrow median white stripe, lightly rose-scented; perianth tube slender, straight, widening in upper ⅓, 25–30 mm long; tepals subequal, ascending, 20–24 mm long, dorsal mostly 1–3 mm longer than lower 3, upper laterals joined to lower tepals for ± 2 mm. *Stamens* unilateral; filaments weakly arched, mauve, ± 15 mm long; anthers ± 6 mm long, dark purple, with narrow connective visible. *Ovary* densely hairy; style dividing between middle and apex of anthers, branches 3–4 mm long, expanded and densely ciliate at tips, exceeding anthers. *Flowering time*: mainly mid-August to mid-September.

Distribution and ecology: poorly collected, *B. tubaeformis* is known only from flats at the foot of the Piketberg and Porterville Mtns in Western Cape, South Africa; on stony sandstone ground in transitional fynbos–renosterveld.



Distribution of ***Babiana tubaeformis***.

Diagnosis: *Babiana tubaeformis* has been collected several times at the same locality or close by north of Piketberg. It differs from *B. nervosa* in its longer tubed flowers and particularly in the fairly broad, soft-textured leaves arranged in a spreading fan, unlike the fairly rigid, narrow, deeply pleated, ± erect, shortly hairy leaves of *B. nervosa*. Possibly most closely related to *B. fragrans*, which has comparable, soft-textured, long-hairy, fairly broad leaves and large floral bracts rust-coloured only at the tips. *Babiana tubaeformis* is recognised in sect. *Babiana* by the elongate perianth tube 25–30 mm long and the dark violet stamens reaching to about the middle of the dorsal tepal. Other long-tubed species of sect. *Babiana*, *B. ecklonii* and *B. latifolia*, are unlike *B. tubaeformis* in their odourless, dark violet flowers with a slender perianth tube 30–47 mm long, curved at the apex, and the lower tepals joined to one another for at least 4 mm (5–7 mm in *B. ecklonii*), thus forming a strongly bilabiate perianth with horizontally extended lower tepals and the dorsal erect. *Babiana fragrans* also has strongly scented flowers with a perianth tube 18–20 mm long, broader usually light blue (rarely pale yellow) tepals, and the style dividing opposite the lower third of the anthers.

81. **Babiana angustifolia** *Sweet*, Hortus Britannicus: 396 (1826), as a new name for *B. stricta* var. α Ker Gawl.: t. 637 (1803d); Goldblatt & Manning: 85 (2007). *B. stricta* var. *angustifolia* (Sweet) Baker: 166 (1877). *B. pulchra* G.J.Lewis: 48 (1959), illegitimate superfluous name for *B. angustifolia* Sweet. Type: South Africa, without precise locality or date, illustration in Ker Gawl.: t. 637 (1803d).

Babiana atrocyanea Eckl.: 33 (1827). Type: South Africa, [Western Cape], without precise locality, ?*Ecklon s.n.* (S, holo.).

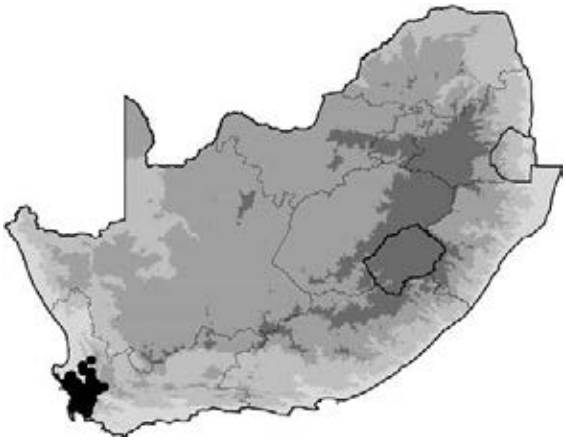
Babiana atrodeltoidea Eckl.: 33 (1827). Type: South Africa, [Western Cape], without precise locality, ?*Ecklon s.n.* [S, lecto., designated by Nordenstam: 289 (1972)].

Babiana stellata Eckl.: 32 (1827). Type: South Africa, [Western Cape], without precise locality, ?*Ecklon s.n.* (S, holo.).

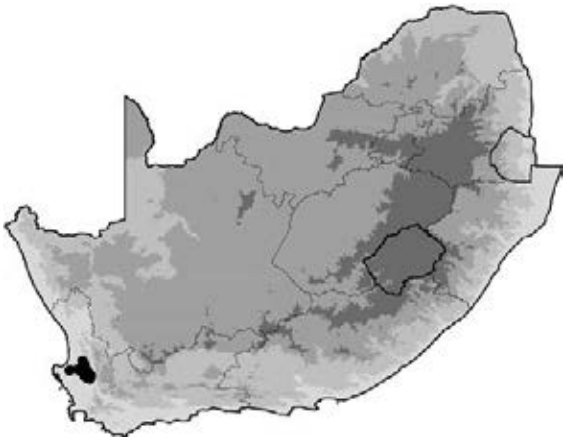
Babiana intermedia L.Bolus: 276 (1932b). Type: South Africa, between Darling and Yzerfontein, Sept 1932, *H.M.L. Bolus s.n.* (BOL 20167, holo.).

[*Acaste pulchra* Salisb.: 332 (1812), illegitimate name, genus invalid.]

Plants mostly 100–150 mm high. *Stem* velvety, usually unbranched, strongly deflexed. *Leaves* lanceolate, strongly pleated, stiffly erect, minutely velvety, inclined. *Spike* inclined, secund, 2- to 8-flowered; bracts green, rust-coloured at tips, velvety, 12–14 mm long, outer ± tricuspidate or trilobed apically, inner often slightly shorter than outer, divided to base. *Flowers* zygomorphic, inverted with perianth tube recurved, dorsal tepal horizontal, unilateral stamens curved back to



Distribution of ***Babiana angustifolia***.



Distribution of ***Babiana inclinata***.

lie above dorsal tepal and lower tepals suberect, dark blue to violet or purple, lower 3 tepals with black or red spear-shaped markings; perianth tube curved, narrowly funnel-shaped, 11–17 mm long; tepals subequal, cupped, 20–22 mm long, dorsal hardly different from others, up to 12 mm wide. *Stamens* unilateral; filaments arching over dorsal tepal, 8–10 mm long; anthers linear, facing spike apex, 4.5–6.0 mm long, blackish. *Ovary* densely hairy; style arching beneath stamens, dividing opposite anther apices, branches 4–5 mm long, with cuneate tips. *Flowering time*: August and September.

Distribution and ecology: extending from Porterville in the north to Somerset West in the south, in Western Cape, South Africa; on damp to seasonally wet sandy or loamy flats and lower slopes.

Diagnosis: *Babiana angustifolia* is recognised by the dark blue perianth with relatively broad, subequal tepals held in a shallow cup enclosing the stamens and style. The perianth is inverted so that the dorsal tepal and arched stamens face the spike apex, unusual in *Babiana*, shared with few other species. The lower tepals of the darkly pigmented perianth have blackish or occasionally dark red spear-shaped marks in the lower midline and this together with the blackish anthers gives the flowers a distinctive appearance. The flowers are often visited by hopliine scarab beetles, sometimes seen resting for long periods in the base of the floral cup, and these beetles may be the primary pollinators of *B. angustifolia*.

82. **Babiana inclinata** *Goldblatt & J.C.Manning* in Strelitzia 18: 86 (2007). Type: South Africa, Western Cape, flats at the foot of the Piketberg, north of town, 27 Sept. 2001, *P. Goldblatt & J.C. Manning 11931* (NBG, holo.; MO, PRE, iso.).

Plants mostly 150–300 mm high. *Stem* strongly inclined, velvety, usually branched. *Leaves* lanceolate, closely pleated, velvety, in loose basal fan. *Spike* inclined, secund, several–many-flowered; bracts green with rust-coloured tips, outer 9–12 mm long, obtuse or bilobed at tip, inner slightly shorter to ± as long as outer, divided to base. *Flowers* zygomorphic, inverted, with perianth tube recurved, dorsal tepal horizontal, unilateral stamens curved back to lie above dorsal tepal and lower tepals suberect, blue to violet, lower tepals often and dorsal sometimes cream-coloured, lower with black or reddish markings in lower ⅓, unscented; perianth tube curved, narrowly funnel-shaped, ± 10 mm long; tepals unequal, oblong-oblanceolate, dorsal held somewhat apart, 22–24 mm long, lower tepals joined to upper laterals for ± 2 mm, 18–20 mm long. *Stamens* unilateral; filaments arched over dorsal tepal, 12–15 mm long; anthers linear, facing spike apex, 5–6 mm long, often with narrow portion of connective visible between thecae; anthers and pollen purple, lilac or white. *Ovary* densely hairy; style dividing opposite middle of anther level, branches ± 3.5 mm long, expanded apically. *Flowering time*: mid-August and September.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, extending from Porterville and Gouda to Piketberg and Hopefield; occurring on damp clay flats and lower slopes.

Diagnosis: *Babiana inclinata* has been confused with the vegetatively similar *B. angustifolia*, which also has inverted flowers, but *B. inclinata* has a more widely cupped flower, unequal tepals that do not form a cup, a dorsal tepal 22–24 mm long and held well apart from the others, and the anthers are purple to lilac or white rather than almost black. The lower tepals are shortly united with the upper laterals for about 2 mm to form a distinct lower lip, and the free parts are 12–15 mm long. While the anthers of *B. inclinata* are the same size as in *B. angustifolia*, 5–6 mm long, the filaments are longer, 12–15 mm versus 8–10 mm in *B. angustifolia*. The tepals of *B. angustifolia* are ± equal, 20–22 mm long and overlap one another forming a cup and the filaments are 12–15 mm long. In the inverted flowers of the two species the unilateral stamens lie above the dorsal tepal and face the top of the spike.

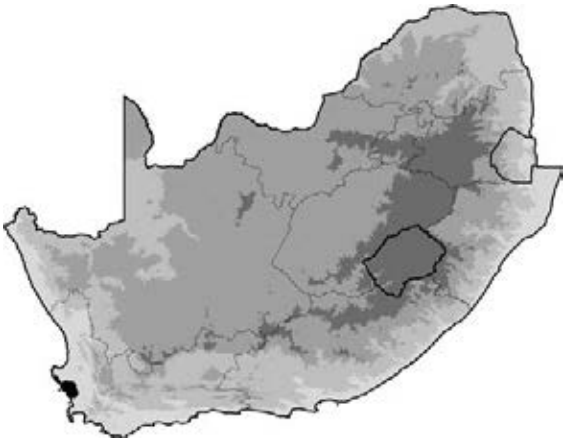
83. **Babiana rubrocyanea** *(Jacq.) Ker Gawl.* in König & Sims, Annals of Botany 1: 234 (1804); Lewis: 36 (1959); Goldblatt & Manning: 87 (2007). *Ixia rubrocyanea* Jacq.: 268 (1791a). *Ixia cyanea* Pers.: 49 (1805), either an orthographic error or if new then a superfluous name for *I. rubrocyanea* Jacq. *Gladiolus rubrocyaneus* (Jacq.) Vahl: 98 (1805). *Acaste venusta* Salisb.: 332 (1812), illegitimate superfluous name for *B. rubrocyanea* (Jacq.) Ker Gawl. *B. stricta* var. *rubrocyanea* (Jacq.) Baker: 165 (1877). [*Babiana rubro-coerulea* Pritz.: 134 (1854) orthographic error for *rubrocyanea*]. Type: South Africa, without precise locality, illustration in Jacq.: t. 285 (1791 [1788–1795]).

[*Ixia africana* Hornem. ex Roem. & Schult.: 424 (1817), invalid name only in synonymy.]

Plants 50–150 mm high. *Stem* strongly flexed outward and inclined, usually branched. *Leaves* lanceolate, pleated, hairy. *Spike* inclined, 5- to 10-flowered; bracts green with brown tips, velvety, outer trilobed at apex, 18–30 mm long, inner slightly shorter than outer, divided to base. *Flowers* subzygomorphic with only stamens and style unilateral, deep blue with red centre outlined in white, odourless; perianth tube narrowly funnel-shaped, 15–20 mm long; tepals subequal, symmetrically disposed, widely cupped, 20–24 mm long. *Stamens* unilateral (possibly sometimes symmetrically arranged); filaments arching over lower tepals, 10–13 mm long; anthers 6–7 mm long, facing spike apex, reddish brown; pollen brown. *Ovary* hairy above base; style dividing opposite middle of anthers, branches short, ± 2 mm long, with broad, flattened tips. *Flowering time*: August to mid-September.

Distribution and ecology: local between Darling and Mamre in Western Cape, South Africa; on stony and sandy granitic slopes in renosterveld.

Diagnosis: *Babiana rubrocyanea* is readily recognised by the deep blue flowers with a dark red centre, and unusual red-brown anthers and pollen. The tepals are subequal and symmetrically arranged but the stamens and style are usually unilateral with the anthers facing the spike apex. The style also has unusually short style branches with very broad tips. *Babiana regia* has superficially similar, dark blue flowers with a red centre but the stamens are symmetrically arranged in the centre of the flower, and the style banches below the anthers into filiform branches that are not or barely expanded apically.



Distribution of ***Babiana rubrocyanea***.

Babiana rubrocyanea is most likely allied to the *B. angustifolia* group of species and possibly most closely to *B. angustifolia*. That species has similarly cupped, subequal tepals, flowers borne on a strongly inclined stem, and outer floral bract bidentate with a central mucro. The latter recall the trilobed to obscurely tricuspidate bracts of *B. rubrocyanea*. Also, the unilateral stamens with the anthers facing the spike apexes of *B. rubrocyanea* have exactly the same orientation in *B. angustifolia*.

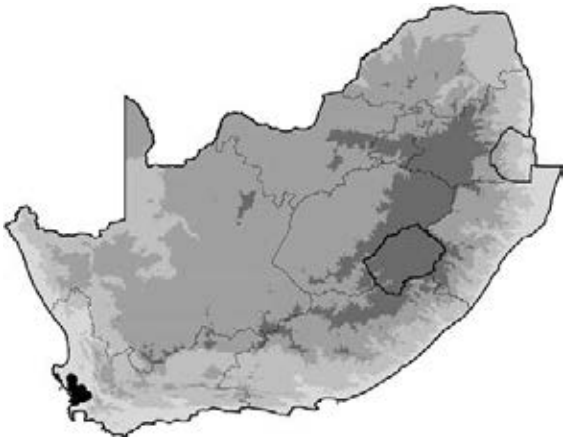
Both hopliine beetles and the horsefly, *Philoliche atricornis*, have been recorded visiting *B. rubrocyanea*.

84. **Babiana leipoldtii** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 33 (1959); Goldblatt & Manning: 87 (2007). Type: South Africa, [Western Cape], between Mamre and Darling, 4 Aug. 1940, *C.L. Leipoldt s.n.* (SAM 55686, holo.).

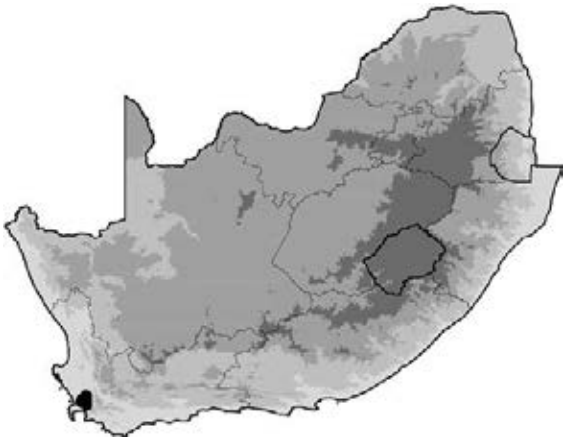
Plants 100–180 mm high. *Stem* usually erect or slightly inclined, often branched, velvety-hairy. *Leaves* lanceolate, pleated, hairy, usually reaching to ± base of spike. *Spike* erect or inclined, 4- to 8-flowered; bracts green with dry, rust-coloured tips, velvety, 20–35 mm long, inner slightly shorter than outer, divided to base. *Flowers* actinomorphic, blue-violet, somewhat darker in centre, lower tepals sometimes with small red markings in lower ⅓, usually lightly scented of violets; perianth tube funnel-shaped, flared in upper half, 15–20 mm long, walls thick and tightly enclosing style below; tepals subequal, spreading, 25–30 mm long, oblong-ovate. *Stamens* symmetrically arranged; filaments erect, surrounding style, 7–9 mm long; anthers linear, 6–8 mm long, white or yellow. *Ovary* densely hairy above; style dividing between base and middle of anthers, branches ± 4 mm long, expanded at tips. *Flowering time*: late July to mid-September.

Distribution and ecology: a relatively rare endemic of the coastal forelands of Western Cape, South Africa, extending from near Hopefield to Darling and Klipheuwel; on damp sandy or stony flats. The wet, poorly drained sandy flats where it grows are rapidly disappearing under the plough or are being invaded by alien *Acacia* species so that little of its former range remains.

Diagnosis: *Babiana leipoldtii* is distinctive in its actinomorphic flowers with erect, symmetrically arranged filaments enclosing the style and bearing linear, white or



Distribution of ***Babiana leipoldtii***.



Distribution of ***Babiana regia***.

yellow anthers. It may be most closely allied to *B. villosula*, which also has radially symmetric flowers and the two are easily confused. *Babiana villosula* has pale blue to mauve flowers with a small white centre, and usually bluish to mauve anthers, whereas *B. leipoldtii* has violet flowers darker in the centre and white or yellow anthers that contrast with the perianth colour. Both species have short filaments included in the upper part of the perianth tube and the anthers held at the mouth of the tube. Apart from the flowers, *B. leipoldtii* is distinguished from most other species with an actinomorphic flower by the relatively tall, aerial stem and somewhat lax spike. Related species have the stem extended only a short distance above the ground.

85. **Babiana regia** *(G.J.Lewis) Goldblatt & J.C.Manning* in Bothalia 34: 94 (2004) & 88 (2007). *B. stricta* var. *regia* G.J.Lewis: 45 (1959). Type: South Africa, [Western Cape], Bottelary Road near Stellenbosch, Sept. 1950, *G.J. Lewis & D.K. Davis 2216* (SAM, holo.; PRE, SAM, iso.).

Plants 50–120 mm high. *Stem* velvety, strongly flexed outward, simple or branched. *Leaves* narrowly lanceolate, deeply pleated, fairly stiff, shortly rough-hairy. *Spike* ascending, 4- to 10-flowered; bracts green, rust-coloured at tips, velvety-hairy, 12–22 mm long, inner ± as long as outer, divided to base. *Flowers* actinomorphic, deep blue with red centre sometimes edged with diffuse white zone, unscented; perianth tube narrowly funnel-shaped, 10–12 mm long, filiform near base, wider above; tepals subequal, obovate, 18–20 × 8–10 mm. *Stamens* symmetrically arranged; filaments erect, ± 8 mm long; anthers erect, 4–5 mm long, linear, reddish brown. *Ovary* densely hairy; style dividing ± 2 mm below anther bases, branches slender, ± 2 mm long, extending between filaments. *Flowering time*: mainly September to early October.

Distribution and ecology: restricted to the extreme southwestern corner of Western Cape, South Africa, in lowlands between Malmesbury and Stellenbosch; in seasonally damp, well-drained sandy and gravelly slopes and flats. Its habitat is largely given over to agriculture and it is now limited to only a few, small sites that no longer represent viable habitats.

Diagnosis: *Babiana regia* is easily recognised by its actinomorphic flower with broad, ovate, overlapping tepals that form a shallow cup, and coloured dark blue with a deep red centre. The stamens are arranged symmetrically around the short style that divides below the level of the linear anthers and the anthers bear reddish brown pollen. It was initially regarded merely as a colour form of *B. nervosa*, but that species has a zygomorphic flower with blue to mauve, white or cream-coloured, spreading tepals, the lower distinguished from the upper by different markings, unilateral stamens, sagittate anthers with an expanded connective and a style dividing at the base of the anthers. *Babiana rubrocyanea* from Darling, also with bowl-shaped purple flowers with a red centre, is distinguished by its mostly unilateral stamens with the anthers facing the spike apex, and the unusually short style branches with very broad tips. Flowers of *B. regia* produce no detectable nectar and are pollinated by hairy hopliine scarab beetles, of which the common southwestern Cape *Anisonyx ursus* was the most frequent visitor recorded at the one site.

86. **Babiana villosula** *(J.F.Gmel.) Ker Gawl. ex Steud.*, Nomenclator botanicus 1: 371 (1821); Lewis: 28 (1959); Goldblatt & Manning: 88 (2007). *Ixia villosula* J.F.Gmel.: 110 (1796). *B. obtusifolia* Ker Gawl.: 234 (1804), illegitimate superfluous name for *Ixia villosula* J.F.Gmel. *B. stricta* var. *obtusifolia* Baker illegitemate name: 166 (1877). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 284 (1791 [1788–1795]) '*Ixia villosa*'.

Ixia plicata L.: 4 (1756). *Gladiolus plicatus* (L.) L.: 53 (1762) [not *Babiana plicata* Ker Gawl. (1802a)]. Type: South Africa, without precise locality or collector (type, ?LINN) [name misapplied by Thunb.: 20 (1784) to *B. fragrans*].

Ixia caerulescens Pers.: 48 (1805). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 284 (1791 [1788–1795]) '*Ixia villosa*'.

Babiana orthosantha Baker: 27 (1906). Type: South Africa, [Western Cape], as 'Olifants River Valley, October' but incorrect, *Penther 941* (K, syn.).

Babiana hiemalis L.Bolus: 243 (1932a). Type: South Africa, [Western Cape], Wynberg Hill, Aug. 1932, *H.M.L. Bolus s.n.* (BOL 20151, holo.).

Plants 60–150 mm high, ± acaulescent. *Stem* short, often mostly subterranean, simple occasionally or with 1 or 2 branches, velvety hairy. *Leaves* lanceolate, pleated, softly hairy. *Spike* congested, erect, 2- to 8-flowered; bracts green with dry rust-coloured tips, 18–40 mm long, inner shorter than outer, margins hyaline, divided to base. *Flowers* actinomorphic, white or pale blue to mauve (rarely mauve-pink) with white at tepal bases and throat edged in darker blue, lightly acrid- or violet-scented; perianth tube 18–25(–30) mm long, erect, widening at throat; tepals subequal, 20–30 × 8–13 mm. *Stamens* symmetrically arranged; filaments erect, surrounding style, 3.5–6.0 mm long; anthers 4–6 mm long, divergent, pale blue, mauve, or whitish, linear or connective wider toward base. *Ovary* densely hairy; style dividing opposite base or lower ⅓ of anthers, branches filiform ± 4 mm long, tips hardly expanded. *Flowering time*: May to July, rarely in August.

Distribution and ecology: local in the southwestern corner of Western Cape, South Africa, from Darling and Malmesbury to Gordon's Bay and the Cape Peninsula; on stony sandstone flats and lower slopes in fynbos.

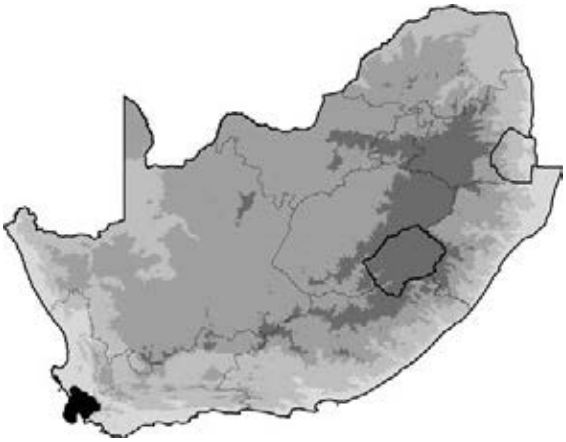
Diagnosis: *Babiana villosula* is recognised by the radially symmetric flowers typically with a pale blue perianth and white throat, or rarely uniformly white (or mauve-pink), short stamens with filaments up to 6 mm long, and usually pale blue or mauve (rarely whitish) anthers held in the mouth of the tube that contrast with the white throat. The anthers are usually linear with parallel lobes but occasional populations have the connective slightly expanded below and the lobes slightly diverging. The flowers are lightly scented with a perfume suggesting violets, usually combined with a light, acrid, somewhat unpleasant chemical component. Flowering early in the season, when few other geophytes are in bloom, *B. villosula* is pollinated by native honey bees foraging for the traces of nectar in the perianth tube as well as pollen.

87. **Babiana blanda** *(L.Bolus) G.J.Lewis* in Journal of South African Botany, Suppl. 3: 30 (1959); Goldblatt & Manning: 89 (2007). *B. macrantha* var. *blanda* L.Bolus: 276 (1932b). Type: South Africa, [Western Cape], near Melkbosstrand, cultivated at Kirstenbosch, Sept. 1932, *O.A. Eaton s.n. as Natl. Bot. Gard. 1110/26* (BOL, holo.).

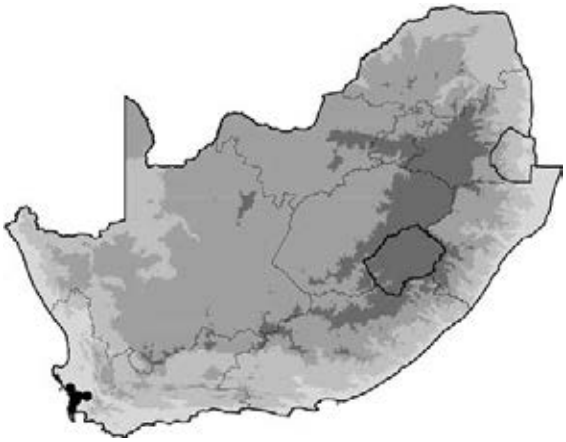
Plants 80–150 mm high. *Stem* erect, velvety-hairy, rarely 1- or 2-branched. *Leaves* oblong-lanceolate, pleated, hairy, blades held ± at right angles to sheaths. *Spike* suberect, 3- to 6-flowered; bracts green with dry rust-coloured tips, outer 24–35(–45) mm long, inner slightly shorter, divided to base. *Flowers* actinomorphic, pale to deep rosy pink, sometimes white in centre, unscented; perianth funnel-shaped, 20–27 mm long; tepals subequal, obovate or suborbicular, 23–33 × 14–20 mm, forming a shallow bowl. *Stamens* symmetrically arranged; filaments erect, surrounding style, 5–8 mm long; anthers linear, 7–9 mm long, pale pink, diverging. *Ovary* silky hairy above; style dividing below anther bases, branches 3–4 mm long, expanded apically. *Flowering time*: late August to September.

Distribution and ecology: local in Western Cape, South Africa, extending along the Atlantic Coast from Darling to Milnerton and near Agter-Paarl; in seasonally wet, sandy or loamy flats.

Diagnosis: the large-flowered *Babiana blanda* with its bright rosy pink, radially symmetric perianth is now unfortunately on the brink of extinction in the wild.



Distribution of ***Babiana villosula***.



Distribution of ***Babiana blanda***.

Never common, its specialised, seasonally wet habitat has now all but disappeared, and the remaining known wild plants are seriously threatened by encroachment of alien *Acacia* species and pasturage. It appears to be most closely related to *B. villosula*, which has similar, though generally smaller, radially symmetric flowers but blooms earlier in the season. The two may be distinguished by flower size and colour, the tepals of *B. villosula* are 20–30 × 8–13 mm and blue to blue-mauve (rarely white) with a small white centre, whereas those of *B. blanda* are 23–33 × 14–20 and rosy pink, and unscented, unlike *B. villosula*. The style branches of *B. villosula* are filiform with small expanded tips, whereas those of *B. blanda* have prominent, broad apices. The leaf blades of *B. blanda* also tend to be oriented more obliquely to the sheaths than in related species, but this character is variable and cannot be relied upon alone.

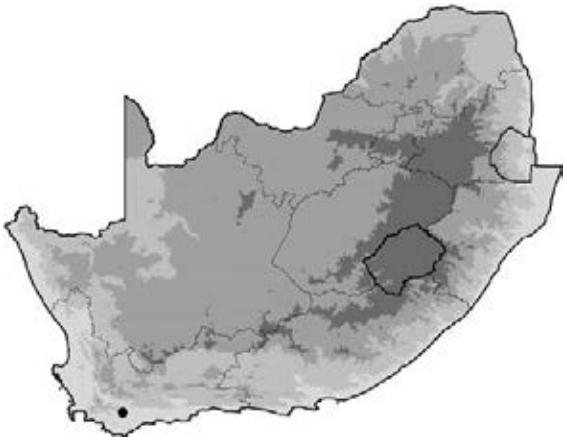
Lewis (1959) described several hybrids between *B. blanda* and *B. villosula*. Populations that we have seen on low sandstone outcrops between Klipheuwel and Joostenberg are variable between the two species in flower colour, tepal shape and style length, and presumably represent hybrid swarms.

88. **Babiana foliosa** *G.J.Lewis* in Journal of South African Botany, Suppl. 3: 35 (1959); Goldblatt & Manning: 90: (2007). Type: South Africa, [Western Cape], Riviersonderend, 4 Aug. 1951, *W.F. Barker 7343* (NBG, holo.).

Plants up to 100 mm high. *Stem* reaching shortly above ground level, simple or with 1 or 2 branches. *Leaves* lanceolate, pleated, hairy. *Spike* congested, 2- to 5-flowered; bracts velvety hairy, entirely green, 20–30 mm long, inner slightly shorter than outer, margins hyaline, divided to base. *Flowers* actinomorphic, mauve with cream-coloured markings; perianth tube straight, ± 20 mm long, widening toward throat; tepals subequal, 20–24 × 8–12 mm. *Stamens* symmetrically arranged; filaments surrounding style, ± 10 mm long; anthers 5–6 mm long. *Ovary* densely hairy; style dividing opposite anther bases, branches ± 4 mm long, with broad expanded tips. *Flowering time*: August.

Distribution and ecology: South Africa, Western Cape, near Riviersonderend; presumed to grow on clay-loam flats.

Diagnosis: known only from the type, *Babiana foliosa* is a puzzling plant, with radially symmetric flowers closely resembling those of winter-flowering *B. villosula* from west of the Hottentots Holland Mtns. At first it seems merely to be an eastern form of that species but its flowers have substantially longer filaments, ± 10 mm long vs. 4–6 mm in *B. villosula*, and a stouter perianth tube. The more numerous leaves, for which the species was named, and green bracts without dry rust-coloured tips, also make it easy to distinguish *B. foliosa* from other species of sect. *Babiana* with actinomorphic flowers.



Distribution of ***Babiana foliosa***.

Ser. **Strictae** *Goldblatt & J.C.Manning,* new series. Type: *Babiana nervosa* (Lam.) Goldblatt & J.C.Manning

Flowers zygomorphic or actinomorphic, variously coloured; anthers usually dark purple to black and linear or arrow-shaped with visible connective; ovary densely hairy.

89. **Babiana nervosa** *(Lam.) Goldblatt & J.C.Manning* in Bothalia 44: 47 (2014). *Gladiolus nervosus* Lam.: 724 (1788). Type: South Africa, without precise locality, attributed to *Sonnerat s.n.* (P: Herb. Lamarck, holo.).

Babiana stricta (Aiton) Ker Gawl.: t. 621 (1803a); Lewis: 40 (1959); Goldblatt & Manning: 90 (2007). *Gladiolus strictus* [Sol. in] Aiton: 63 (1789). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 621 (1803) [neo., designated by Goldblatt & Manning: 94 (2004)].

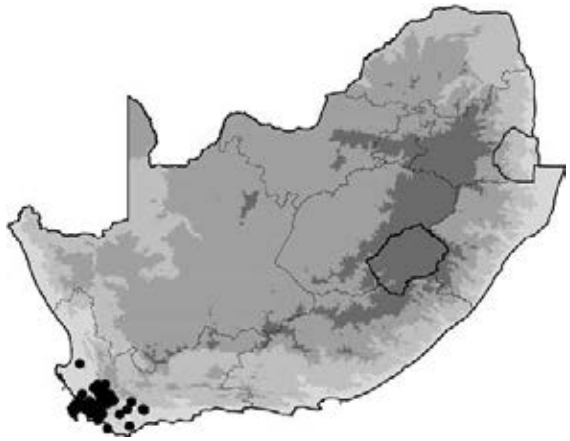
Babiana erectifolia G.J.Lewis: 3 (1938). *B. stricta* var. *erectifolia* (G.J.Lewis) G.J.Lewis: 43 (1959). Type: South Africa, [Western Cape], Brand Vlei, near Worcester, Sept. 1932, *G.J. Lewis s.n. as Natl. Bot. Gard 2686/32* (BOL, holo.).

Gladiolus ringens Thunb.: 186 (1800), illegitimate homonym, not *G. ringens* Andrews (1798). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB, syn.).

?*Babiana caesia* Eckl.: 32 (1827). Type: South Africa, without precise locality, ?*Ecklon s.n.* (location unknown, not at S).

Babiana flavocaesia Eckl.: 32 (1827). Type: South Africa, vicinity of Stellenbosch, ?*Ecklon s.n.* (S, holo.).

Plants 120–200 mm high. *Stem* slender, suberect to flexed outward, velvety, simple or branched. *Leaves* sword-shaped to almost linear, 4–7(–11) mm wide, fairly rigid and deeply pleated, shortly hairy. *Spike* ± erect



Distribution of ***Babiana nervosa***.

or weakly flexed, 4- to 9-flowered; bracts green with dry and brown apices, mostly 8–12(–15) mm long, inner divided to base. *Flowers* weakly zygomorphic, mauve to violet-blue, white or pale yellow, often with contrasting marks at base of lower tepals, apparently unscented or lightly violet-scented; perianth tube narrowly funnel-shaped, 8–18 mm long, widening in upper 3–4 mm; tepals subequal, 15–25 mm long. *Stamens* unilateral; filaments weakly arched or erect, 8–13 mm long; anthers arrow-shaped with broad connective wider at base, 4–7 mm long, usually dark blue-black. *Ovary* hairy; style usually dividing below anther bases, branches 3–4 mm long, expanded toward tips. *Flowering time*: mostly mid-August to early October.

Distribution and ecology: extending from the Cape Peninsula eastward to Worcester and Swellendam in Western Cape, South Africa; in damp to waterlogged clay or gravelly soils in renosterveld or fynbos.

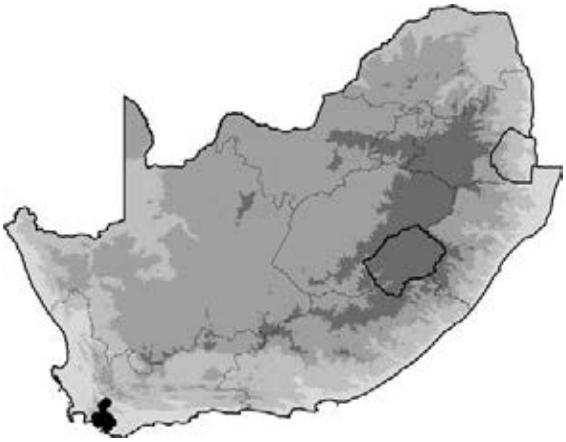
Diagnosis: *Babiana nervosa* is recognised by the several, narrow, deeply pleated, suberect leaves, a blue-mauve, purple-pink, or cream-coloured to pale yellow perianth and a narrow, but partly hollow perianth tube that usually contains nectar. The stamens are unilateral and suberect with sagittate anthers that have the connective expanded in the lower half, and a short style that divides opposite the base of the anthers. Although the tepals are subequal, the lower (adaxial three) have contrasting markings and the lower lateral tepals, and, sometimes along with the dorsal, may be cream-coloured, in contrast to the other tepals which may be bluish.

90. **Babiana purpurea** *Ker Gawl.* in Curtis's Botanical Magazine 26: sub. t. 1019 (1807a), new name for *Ixia purpurea* Jacq.: 268 (1791a), illegitimate homonym, not *I. purpurea* Lam. (1789); Lewis: 47 (1959); Goldblatt & Manning: 91 (2007). *I. flabelliformis* Salisb.: 37 (1796), new name for *I. purpurea* Jacq. and illegitimate superfluous name for *I. villosa* Aiton. *Gladiolus purpureus* (Ker Gawl.) Willd.: 198 (1797). *G. purpureus* (Jacq.) Vahl: 114 (1805), illegitimate homonym, not *G. purpureus* (Ker Gawl.) Willd. (1797). *B. stricta* var. *purpurea* (Ker Gawl.) Ker Gawl.: (1807b) [name misapplied to *B. villosa* (Aiton) Ker Gawl.]. Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 286 (1792 [1788–1795]).

Plants 100–200 mm high. *Stem* velvety, simple or 1- to 3-branched, often flexed outward, with prominent collar of fibres around base. *Leaves* narrowly lanceolate, firm, pleated, hairy. *Spike* velvety, suberect, 4- to 10-flowered; bracts green with rust-coloured tips, 15–25 mm long, inner divided to base. *Flowers* weakly zygomorphic, pink to reddish purple, lower tepals with darker markings near base, lightly fragrant; perianth tube straight, cylindric below, slightly expanded above, 18–28 mm long; tepals subequal, spreading, 18–25 mm long. *Stamens* unilateral; filaments nearly straight, 10–14 mm long; anthers arrow-shaped, parallel, connective not or hardly exposed, facing lower tepals, 6–8 mm long, purple. *Ovary* hairy; style arching behind filaments, exceeding anthers, branches slender, ± 4 mm long, with broad, bilobed tips. *Flowering time*: August and September.

Distribution and ecology: extending from Botrivier to Robertson and Bredasdorp in Western Cape, South Africa; on clay flats and slopes in renosterveld.

Diagnosis: *Babiana purpurea* has pink or purple flowers that at first glance appear to be radially symmetric but the stamens are unilateral and erect and the anthers are parallel, facing the lower tepals, which usually have contrasting markings near the base. The dark blue to blackish anthers are arrow-shaped, suggesting a relationship with *B. nervosa* and *B. villosa* of sect. *Babiana*. Unlike these species, however, the anther connectives are not visibly expanded. The flowers are evidently adapted for pollination by large anthophorine bees that visit the flowers in search of nectar, quantities of which are secreted from septal nectaries into the base of the perianth tube. It can be distinguished from *B. nervosa* by the pink to red-purple perianth colour, perianth tube 18–28 mm long, and unusual style branches, broadly



Distribution of ***Babiana purpurea***.

lobed at the tips and held above the anther apices. *Babiana nervosa* has white to creamy yellow or blue to blue-mauve flowers with creamy white markings on the lower lateral tepals, a perianth tube 10–18 mm long, and fairly short style branches up to 3 mm long, less prominently expanded at the tips, and usually dividing opposite the lower half to middle of the anthers. Although Lewis (1959) described the flowers of *B. purpurea* as sometimes having symmetrically disposed stamens, this condition is evidently rare and not representative of the species.

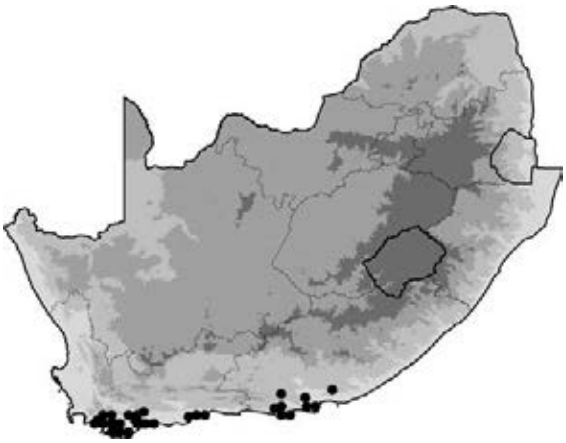
Babiana purpurea is sometimes confused with a second species of clay soils in the southern Cape, *B. patersoniae*, which extends from Napier and Riviersonderend to Port Elizabeth and Alexandria in Eastern Cape. That species has flowers with a longer perianth tube, 20–30 mm long, lightly flared from the base and curved near the apex, a bluish or mauve to nearly white perianth, and a strong sweet fragrance with a strong clove component. Flowers of *B. patersoniae* may be adapted for pollination by moths, for unlike most species of the genus, the flowers remain open at night when the intense fragrance seems most powerful. The style branches of *B. patersoniae* are also expanded at the tips but the style itself normally divides below the anther apices, in contrast to that of *B. purpurea* which divides at or beyond the anther tips.

91. **Babiana patersoniae** *L.Bolus* in South African Gardening and Country Life 21: 282 (1931); Lewis: 55 (1959); Goldblatt & Manning: 92 (2007). Type: South Africa, [Eastern Cape], Swartkops near Port Elizabeth, cultivated in Cape Town, Sept. 1931, *F.M. Paterson 39* (BOL, holo.; K, iso.).

[*Babiana caerulescens* Eckl.: 32 (1827), invalid name without description.]

Plants 150–250 mm high. *Stem* suberect, usually with 1 or 2 short branches, velvety. *Leaves* sword-shaped, firm, pleated, closely hairy. *Spike* erect, 2- to 5-flowered; bracts green with dry brown apices, lightly hairy, 12–30 mm long, inner slightly shorter to ± half as long as outer, divided to base. *Flowers* zygomorphic, white to pale blue to mauve, lower lateral tepals partly cream-coloured to yellow, with darker red to purple markings near base, usually strongly scented of cloves, especially at night; perianth tube nearly cylindric, lightly flared in upper half, 20–30 mm long, tepals subequal, dorsal 16–25 × 8–11 mm, lower tepals joined to upper laterals for 1–2 mm, 15–22 mm long. *Stamens* unilateral; filaments arched, 8–12 mm long; anthers 4–5 mm long, blue to blackish, linear to ± arrow-shaped with connective expanded below; pollen cream-coloured. *Ovary* hairy in upper half; style dividing between base and middle of anthers, branches ± 4 mm long, with prominent, spathulate tips. *Flowering time*: August to October.

Distribution and ecology: widespread across southern Western Cape from near Caledon eastward to Alexandria in Eastern Cape, South Africa; most often on clay and loamy slopes in grassland or renosterveld.



Distribution of ***Babiana patersoniae***.

Diagnosis: *Babiana patersoniae* is recognised by a combination of zygomorphic flowers with a moderately long, slender perianth tube 20–30 mm long, dark blue, usually arrow-shaped anthers (sometimes linear) and a densely hairy ovary. The flowers are pale blue to mauve, sometimes largely white, with the lower lateral tepals partly cream-coloured to yellow. The floral bracts range from 12–18 mm in plants from the west to up to 30 mm long in the east where it may possibly be confused with long-tubed but acaulescent *B. sambucina* (section *Teretifolieae*) but *B. patersoniae* always has the inner bracts divided to the base. In the west, *B. patersoniae* may be confused with *B. purpurea*, which also has dark anthers and inner bracts divided to the base but a pink to purple perianth, and longer tepals relative to the tube, which is narrow below and only wider in the upper third, whereas the tube of *B. patersoniae* has a wider diameter and is gradually flared in the upper half. Confusion is also possible with *B. fourcadei*, which also has bracts divided to the base, but a smooth ovary, and is often a more robust plant, usually bearing 3 to 5 short lateral branches. The intensely fragrant flowers of *B. fourcadei* have white lower lateral tepals edged distally in pale blue, long slender style branches not so obviously expanded at the tips, and a generally larger flower with the dorsal tepal 25–30 mm long.

Flowers of *Babiana patersoniae* are thought to be adapted for pollination by settling moths as they remain open at night when the pale colour is easily seen and the sweet clove fragrance is particularly intense. *Babiana patersoniae* is one of only two species of the genus that ranges across the southern coast of South Africa into Eastern Cape.

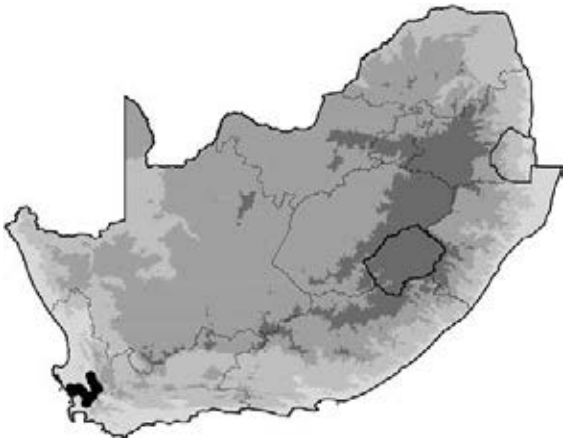
92. **Babiana melanops** *Goldblatt & J.C.Manning* in Strelitzia 18: 93 (2007). Type: South Africa, Western Cape, east-facing hill slope north of Mamre, on Darling road, 22 Aug. 1999, *P. Goldblatt & I. Nänni 11095* (NBG, holo.; K, MO, PRE, iso.).

Plants mostly 160–200 mm high. *Stem* velvety hairy, usually branched, suberect, strongly deflexed in fruit,

sheathed below ground with thick collar of fibres. *Leaves* lanceolate, pleated, densely hairy, fairly softly textured. *Spike* erect, mostly 6- to 10-flowered; bracts green with dry rust-coloured tips, outer 16–26 mm long, inner slightly shorter, divided to base. *Flowers* actinomorphic, blue or pale mauve, tepals darker in lower ⅓, unscented or scented of lemon; perianth tube slender, 16–27 mm long, filiform below, slightly flared in upper ⅓; tepals subequal, spreading, narrowed and claw-like below, 20–27 mm long. *Stamens* symmetrically arranged; filaments erect, 8–9 mm long, blue; anthers arrow-shaped to linear, with connective expanded and widest at base, blackish to dark purple, sometimes partly turquoise, 7–8 mm long. *Ovary* densely hairy; style dividing just below anther bases. *Flowering time*: August to early September.

Distribution and ecology: centred along the Atlantic Coast of Western Cape, South Africa, between Darling and Mamre, and from Wellington and the Tulbagh Valley; on granitic gravel slopes in renosterveld.

Diagnosis: *Babiana melanops* has long been confused with related *B. villosa*, which also has radially symmetric flowers and prominent, blackish stamens with arrow-shaped anthers but it differs in its suberect stem, tepals spreading horizontally when fully open, and narrowed at the base more-or-less into claws so that the perianth has small windows between the bases of adjacent tepals. The flowers of typical *B. melanops* are either dark blue or mauve with a dark, almost black centre. Plants from the hills near Mamre have sweetly scented flowers, and the perianth tube, 16–17 mm long, contains nectar but other populations, such as those near Darling, have odourless flowers with a longer tube, 20–27 mm long, and only traces of nectar at the top of the tube that is blocked internally by the style. The flowers of the Mamre plants are pollinated by a combination of apid bees, especially *Apis mellifera* foraging for nectar, and by hopliine beetles that assemble on the flowers and sometimes sleep in the flowers, which close at night. The unscented flowers of other populations are evidently pollinated exclusively by hopliine beetles.



Distribution of ***Babiana melanops***.

Plants assigned to *Babiana melanops* from near Wellington and in the Tulbagh Valley, growing on a sandy loam, sometimes in alluvial fans of sandstone rocks, lack the characteristic dark centre of the species and may represent a separate species..

93. **Babiana villosa** *(Aiton) Ker Gawl.* in Curtis's Botanical Magazine 16: t. 583 (1802b); Lewis: 37 (1959); Goldblatt & Manning: 94 (2007). *Ixia villosa* [Sol. in] Aiton: 58 (1789). *Belamcanda villosa* (Aiton) Moench: 214 (1802). *Gladiolus villosus* Vahl: 145 (1805), illegitimate homonym, not *G. villosus* Burm.f. (1768). *B. stricta* var. *villosa* (Aiton) Baker: 166 (1877). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 583 (1802b) [neo., designated by Goldblatt & Manning: 94 (2007)].

Ixia punicea Jacq.: 8 (1795 [1788–1795]). *Gladiolus puniceus* (Jacq.) Vahl: 114 (1805), illegitimate homonym, not *G. puniceus* Lam. (1788).Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 287 (1794 [1788–1795]).

Gladiolus latifolius Lam.: 49 (1791). Type: South Africa, without precise locality, as Ile de France, *Commerson s.n.* (P: Herb. Lamarck, holo.).

Babiana punicea Eckl.: 32 (1827). Type: South Africa, without precise locality, ?*Ecklon s.n.* (S, holo.).

Babiana villosa var. *grandis* G.J.Lewis: 39 (1959). Type: South Africa, [Western Cape], commonage at Malmesbury, 30 Aug. 1957, *G.J. Lewis 5230* (NBG, holo.; K, iso.).

[*Babiana rosea* Eckl.: 32 (1827), invalid name without description.]

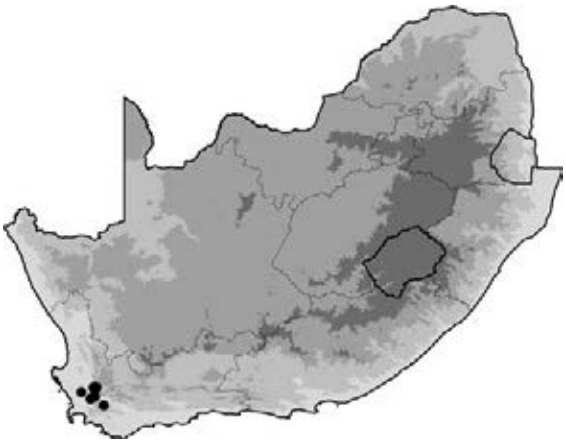
Plants 100–200 mm high. *Stem* usually strongly deflexed, velvety hairy, sometimes branched. *Leaves* lanceolate, pleated, hairy. *Spike* ascending, 3- to 8-flowered; bracts green with dry brown tips, outer, 13–24(–28) mm long, inner ½–⅔ as long, divided to base. *Flowers* actinomorphic, scarlet, purple or mauve-pink, unscented; perianth tube slender, 16–28(–36) mm long; tepals subequal, ovate, 28–33 × 12–15 mm, partly cupped even when fully open. *Stamens* symmetrically arranged; filaments erect, surrounding style, 8–15 mm long; anthers arrow-shaped with prominent connective wider in lower ⅓, dark purple to blackish, 7–9 mm long, up to 3 mm wide, ± latrorse. *Ovary* hairy; style dividing shortly below or opposite anther bases, branches 2–3 mm long. *Flowering time*: August and September.

Distribution and ecology: local in Western Cape, South Africa, in the Tulbagh and Malmesbury Districts; on clay or granitic gravel flats and slopes in renosterveld.

Diagnosis: *Babiana villosa* is recognised by the radially symmetric flowers with large black or purple, arrow-shaped anthers with a broad connective, widest in the lower third. The flowers range in colour from

brilliant scarlet-red to dark purple or deep pink, with a moderately long, slender perianth tube, mostly 16–28 mm long but in some populations up to 36 mm, and an unusually short style, dividing opposite the anther bases. Scarlet-flowered plants are restricted to the upper Tulbagh Valley but elsewhere flowers are deep purple, or on the Paardeberg near Malmesbury to the west, are pink. The latter plants have the longest tube in the species, up to 30–36 mm long.

Flowers of *Babiana villosa* are pollinated primarily by the hopliine scarab beetles, *Anisonyx ursus* and *A. ditus* in the Malmesbury District, and *Lepithrix ornatella* and *Peritrichia rufotibialis* in the Tulbagh Valley. Plants from the Darling–Mamre areas north of Cape Town with violet flowers with a dark centre are now treated as *B. melanops.*



Distribution of ***Babiana villosa***.

REFERENCES

ADANSON, M. 1763. *Familles des plantes*, vol. 2. Vincent, Paris.

AITON, W. 1789. *Hortus kewensis*, vol. 1. George Nicol, London.

ANDREWS, H. 1797. *Gladiolus longiflorus.* Long-flowered Gladiolus. *The Botanist's Repository* 1: t. 5.

ANDREWS, H. 1798. *Gladiolus ringens*. Gaping Ash-coloured sweet Gladiolus. *The Botanist's Repository* 1: t. 27.

ANDREWS, H. 1801. *Gladiolus nanus*. Dwarf Gladiolus. *The Botanist's Repository* 2: t. 137.

BAKER, J.G. 1876. New Gladioleae. *Journal of Botany, British and foreign* 14: 333–339.

BAKER, J.G. 1877 ['1878']. Systema Iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae.* Bell, London.

BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1901. Iridaceae. In H. Schinz, Beiträge zur Kenntnis der Afrikanischen-Flora (Neue folge) 13. *Bulletin de l'Herbier Boissier,* sér. 2, 1: 862–868.

BAKER, J.G. 1904. Iridaceae. In H. Schinz, Beiträge zur Kenntnis der Afrikanischen-Flora (Neue folge) 16. *Bulletin de l'Herbier Boissier,* sér. 2, 4: 1003–1007.

BAKER, J.G. 1906. Diagnoses Africanae XIV. *Bulletin of Miscellaneous Information, Kew* 1906: 15–31.

BENTHAM, G. & HOOKER, J.D. 1883. *Genera plantarum*, vol. 3(1). Reeve, London.

BERGIUS, P.J. 1767. *Descriptiones plantarum ex Capite Bonae Spei*. Salvius, Stockholm

BOLUS, L. 1925. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 1–30.

BOLUS, L. 1927. Plants new and noteworthy. *South African Gardening and Country Life* 17: 376–377.

BOLUS, L. 1931. Plants new or noteworthy. *South African Gardening and Country Life* 21: 281–282.

BOLUS, L. 1932a. Plants new or noteworthy. *South African Gardening and Country Life* 22: 243–244.

BOLUS, L. 1932b. Plants new or noteworthy. *South African Gardening and Country Life* 22: 275–276.

BROWN, N.E. 1905. *Babiana spathacea* and *B. gawleri. Hooker's icones plantarum* 28: t. 2710.

BROWN, N.E. 1932a. Contributions to a knowledge of the Transvaal Iridaceae. Part II. *Transactions of the Royal Society of South Africa* 20: 261–280.

BROWN, N.E. 1932b. New species of *Babiana*. *The Gardener's Chronicle*, ser. 3, 92: 466–467.

BURCHELL, W.J. 1824. *Travels in the interior of southern Africa*, vol. 2. Longman, Hurst, Rees, Orme, Brown & Green, London.

BURMAN, N.L. 1768. *Prodromus plantae capensium*. Leiden.

COMMELIN, J. 1697. *Horti medici amstelodamensis*, vol. 1. Amsterdam.

DINTER, K. 1931. Diagnosen neuer südwestafrikanischer Pflanzen. *Repertorium specierum novarum regni vegetabilis* 29: 253–256.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon.* Reiseverein, Esslingen.

GMELIN, J.F. 1796. *Systema naturae*, vol. 1. Beer, Leipzig.

GOLDBLATT, P. 1971. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460.

GOLDBLATT, P. 1979. New species of Cape Iridaceae. *Journal of South African Botany* 45: 81–89.

GOLDBLATT, P. & MANNING, J.C. 2004. Taxonomic notes and new species of the southern African genus *Babiana* (Iridaceae: Crocoideae). *Bothalia* 34: 87–96.

GOLDBLATT, P. & MANNING, J.C. 2005. Taxonomic notes in *Babiana* and *Ferraria* (Iridaceae) in arid western southern Africa. *Bothalia* 35: 9–12.

GOLDBLATT, P. & MANNING, J.C. 2007. A revision of the southern African genus *Babiana*, Iridaceae: Crocoideae. *Strelitzia* 18. South African National Biodiversity Institute, Pretoria.

GOLDBLATT, P. & MANNING, J.C. 2010. New taxa in *Babiana* (Iridaceae: Crocoideae) from coastal Western Cape, South Africa. *Bothalia* 40: 47–53.

GOLDBLATT, P. & MANNING, J.C. 2012. New species and subspecies of *Babiana*, *Hesperantha* and *Ixia* (Crocoideae) from southern Africa, range extensions, and morphological and nomenclatural notes on *Babiana* and *Geissorhiza*. *Bothalia* 42: 137–145.

GOLDBLATT, P. & MANNING, J.C. 2014. Nomenclatural corrections in *Babiana* and *Geissorhiza* (Iridaceae: Crocoideae). In P. Goldblatt & J.C. Manning, Nomenclatural adjustments in African plants 1. *Bothalia* 44: 42–50.

GOLDBLATT, P., MANNING, J.C. & GEREAU, R. 2008. Two new species of *Babiana* (Iridaceae: Crocoideae) from

western South Africa and notes on the original publication of the genus. *Bothalia* 38: 49–55.
HEYNHOLD, G. 1841. *Nomenclator botanicus hortensis*, vol. 1. Dresden and Leipzig.
HITCHCOCK, A.S. & GREEN, M.L. 1929. Standard species of Linnaean genera of Phanerogamae. *In* Nomenclature proposals by British botanists. *International Botanical Congress, Cambridge (England).* 1930: 111–199. HMSO, London.
JACQUIN, N.J. 1788–1795 ['1786–1783']. *Icones plantarum rariorum*, vol. 2. C.F. Wappler, Vienna.
JACQUIN, N.J. 1791a. *Collectanea*, vol. 3. C.F. Wappler, Vienna.
JACQUIN, N.J. 1791b. *Collectanea*, vol. 4. C.F. Wappler, Vienna.
JACQUIN, N.J. 1797. *Plantarum rariorum horti caesarei schoenbrunnensis*. C.F. Wappler, Vienna.
KER GAWLER, J.B. 1802a. *Babiana plicata*. Sweet-scented Babiana. *Curtis's Botanical Magazine* 16: t. 576.
KER GAWLER, J.B. 1802b. *Babiana villosa*. *Curtis's Botanical Magazine* 16: t. 583.
KER GAWLER, J.B. 1803a. *Babiana stricta*. Upright Babiana. *Curtis's Botanical Magazine* 17: t. 621.
KER GAWLER, J.B. 1803b. *Babiana disticha*. Hyacinth-scented Babiana. *Curtis's Botanical Magazine* 17: t. 626.
KER GAWLER, J.B. 1803c. *Babiana spathacea*. Stiff-leaved Babiana. *Curtis's Botanical Magazine* 17: t. 638.
KER GAWLER, J.B. 1803d. *Babiana stricta* var. α. Dark-blue-flowered upright Babiana. *Curtis's Botanical Magazine* 17: t. 637.
KER GAWLER, J.B. 1803e. *Babiana tubiflora*. Long-tubed Babiana. *Curtis's Botanical Magazine* 18: t. 680.
KER GAWLER, J.B. 1804 ['1805']. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.
KER GAWLER, J.B. 1807a. *Babiana sambucina*. Elder-flower-scented babiana. *Curtis's Botanical Magazine* 26: t. 1019.
KER GAWLER, J.B. 1807b. *Babiana stricta* (γ). Purple-flowered Babiana. *Curtis's Botanical Magazine* 26: t. 1052.
KER GAWLER, J.B. 1827. Genera iridearum. De Mat, Brussels.
KLATT, F.W. 1867–1868. Diagnoses Iridearum novarum. *Linnaea* 35: 380.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
LAMARCK, J.B.A.P.M. 1783. *Encyclopédie méthodique Botanique*, vol. 1. Paris.
LAMARCK, J.B.A.P.M. 1788. *Encyclopédie méthodique Botanique*, vol. 2. Paris.
LAMARCK, J.B.A.P.M. 1789. *Encyclopédie méthodique Botanique*, vol. 3. Paris.
LAMARCK, J.B.A.P.M. 1791. *Tableau encyclopédique et méthodique* 1. Pancoucke, Paris.
LEWIS, G.J. 1932. Plants new or noteworthy. *South African Gardening and Country Life* 22: 243–244.
LEWIS, G.J. 1934a. *Babiana brachystachys*. *Flowering Plants of South Africa* 14: t. 338.
LEWIS, G.J. 1934b. *Babiana subglabra*. *Flowering Plants of South Africa* 14: t. 545.
LEWIS, G.J. 1938. Eight new Iridaceae from the Cape Province. *Journal of South African Botany* 4: 1–11.
LEWIS, G.J. 1954. Some aspects of the morphology, phylogeny and taxonomy of the South African Iridaceae. *Annals of the South African Museum* 40: 115–135.
LEWIS, G.J. 1959. The genus *Babiana*. *Journal of South African Botany*, Suppl. 3.
LINNAEUS, C. 1753. *Species plantarum*. Salvius, Stockholm.
LINNAEUS, C. 1756. *Centuria II. plantarum*. Uppsala.
LINNAEUS, C. 1762. *Species plantarum*, edn. 2. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.
MACOWAN, P. 1890. New Cape plants. *Journal of the Linnean Society* 25: 385–394.
NORDENSTAM, B. 1970. Notes on South African Iridaceae: *Lapeirousia* and *Babiana*. *Botaniska Notiser* 123: 431–443.
NORDENSTAM, B. 1972 . Types of Ecklon's "Topographisches Verzeichniss" in the Museum of Natural History in Stockholm. *Journal of South African Botany* 38: 277–298.
PERSOON, C.H. 1805. *Synopsis plantarum*, vol. 1. Cramer, Paris.
PHILLIPS, E.P. 1929. *Babiana obliqua*. *Flowering Plants of South Africa* 9: t. 357.
PILLANS, N.S. 1934. Plants—New or Noteworthy. *South African Gardening & Country Life* 24: 267, 268.
PRITZEL, G.A. 1854. *Iconum botanicarum index*. Berlin.
REDOUTÉ, P.J. 1803. *Les Liliacées*, vol. 1. Didot, Paris.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium secundum*, vol. 1. J.G.Cotta, Stuttgart.
SALISBURY, R.A. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.
SCHINZ, H. 1906. Beiträge zur kenntnis der Afrikanischen-Flora (Neue folge) 9. *Bulletin de l'Herbier Boissier*, sér. 2, 6: 701–746.
SCHLECHTER, R. 1899 ['1900']. Plantae schlechterianae. *Botanische Jahrbücher für Systematik* 27: 86–220.
SCHRANK, F. DE P. 1822. Commentarius in Irideas capenses. *Denkschriften der Königlich-Baierischen Botanischen Gesellschaft in Regensburg* 2: 165–224.
SPRENGEL, K. 1824 ['1825']. *Systema vegetabilium*. Göttingen.
STEUDEL, E.G. 1821. *Nomenclator botanicus*, part 1. J.G. Cotta, Stuttgart & Tübingen.
STEUDEL, E.G. 1840. *Nomenclator botanicus*, edn. 2, vol. 1. J.G. Cotta, Stuttgart & Tübingen.
SWEET, R. 1826. *Hortus britannicus*. Ridgway, London.
THUNBERG, C.P. 1784. *Dissertatio de Gladiolo*. Uppsala.
THUNBERG, C.P. 1800. *Prodromus plantarum capensium*. Edman, Uppsala.
VAHL, M. 1805. *Enumeratio plantarum*, vol. 2. Copenhagen.
VOIGT, J.O. 1845. *Hortus suburbanus calcuttensis*. Bishop's College Press, Calcutta.
WILLDENOW, C.L. 1797. *Species plantarum*, vol. 1. Nauk, Berlin.

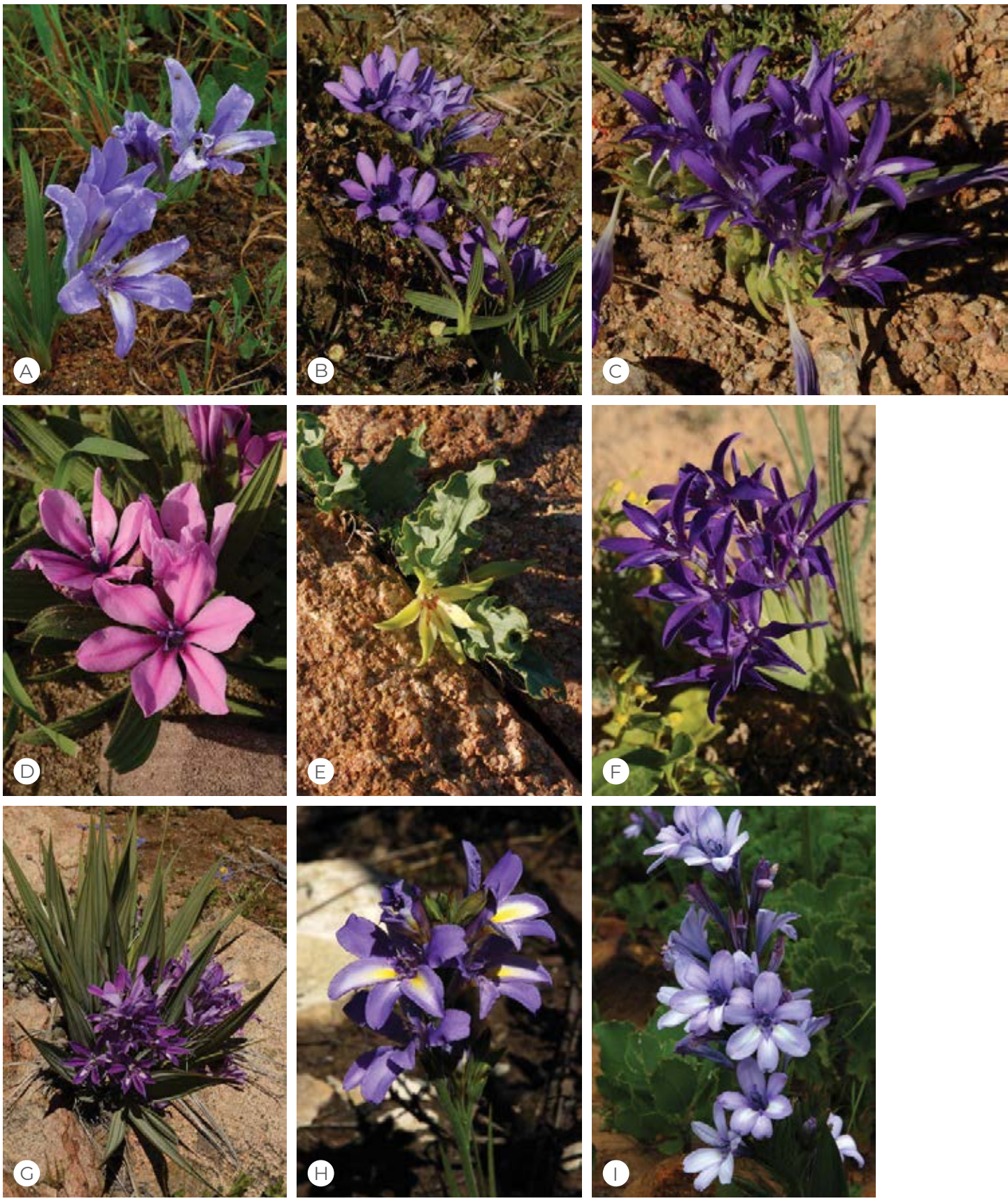


Plate 45. A, ***Babiana ambigua***, Darling, WC; B, ***B. angustifolia***, Hermon, WC; C, ***B. attenuata***, Garies, NC; D, ***B. blanda***, Klipheuwel, WC; E, ***B. cinnamomea***, Bitterfontein, NC; F, ***B. curviscapa***, Kamieskroon, NC; G, ***B. dregei***, Kamiesberg, NC; H, ***B. fourcadei***, Stilbaai, WC; I, ***B. fragrans***, Cape Town, WC.



Plate 46. A & B, ***Babiana framesii***, Nieuwoudtville, NC; C & D, ***B. hirsuta***, Dwarskersbos, WC; E, ***B. hypogea***, Bloemfontein, FS; F, ***B. inclinata***, Porterville, WC; G, ***B. latifolia***, Piketberg, WC (photograph: N. Helme).



Plate 47. A, ***Babiana melanops***, Tulbagh, WC; B, ***B. minuta***, Loeriesfontein, NC; C, ***B. montana***, Napier, WC; D, ***B. mucronata*** subsp. ***minor***, Vanrhynsdorp, WC; E, ***B. nana*** subsp. ***nana***, Bokbaai, WC; F, ***B. nervosa***, Botha, WC; G, ***B. odorata***, Hermon, WC; H, ***B. patersoniae***, Bredasdorp, WC.

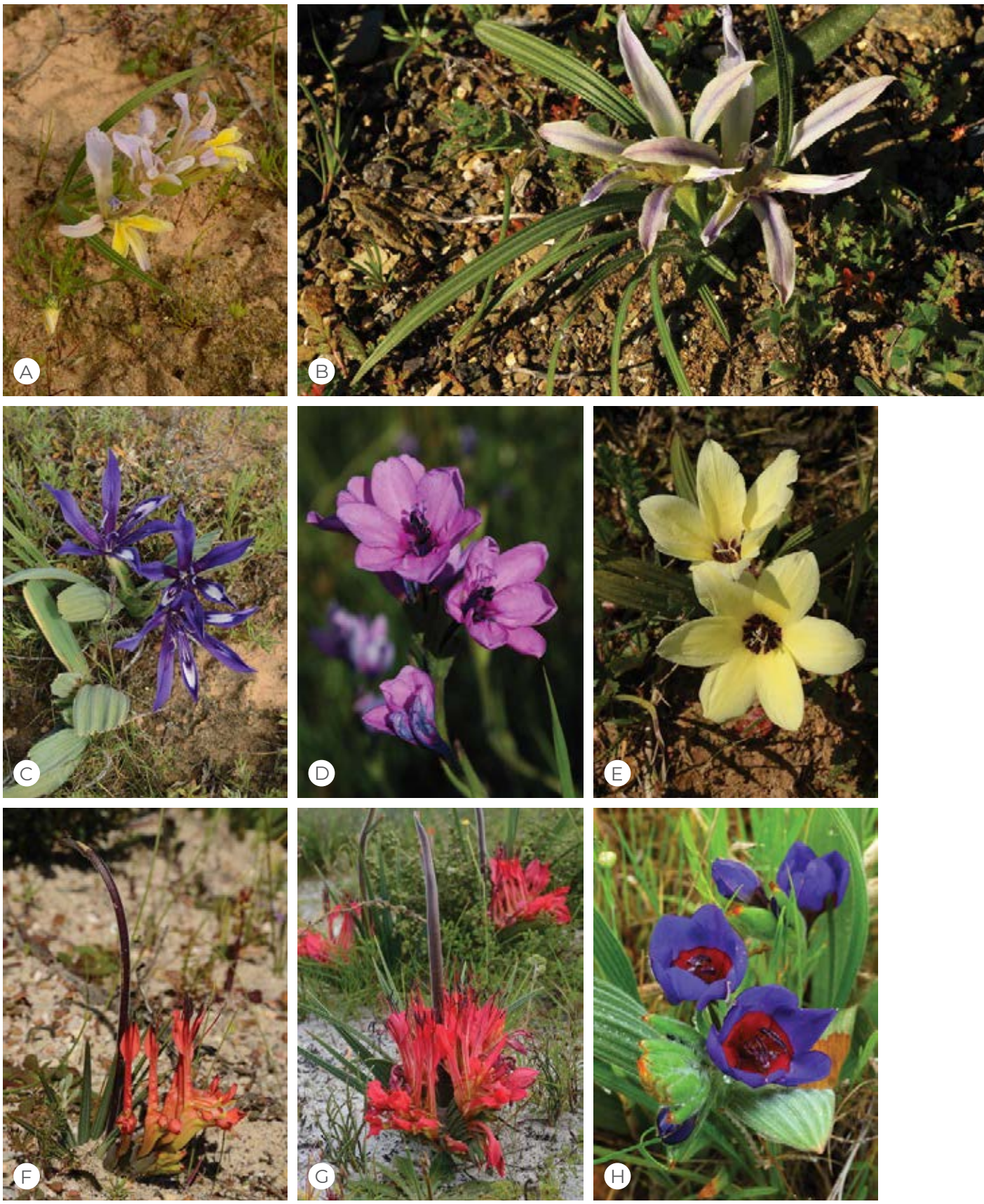


Plate 48. A, ***Babiana patula***, Worcester, WC; B, ***B. pauciflora***, Nieuwoudtville, NC; C, ***B. praemorsa***, Nieuwoudtville, NC; D, ***B. purpurea***, Bot River, WC; E, ***B. pygmaea***, Hopefield, WC; F, ***B. ringens*** subsp. ***australis***, Simonstown, WC; G, ***B. ringens*** subsp. ***ringens***, Atlantis, WC; H, ***B. rubrocyanea***, Darling, WC.

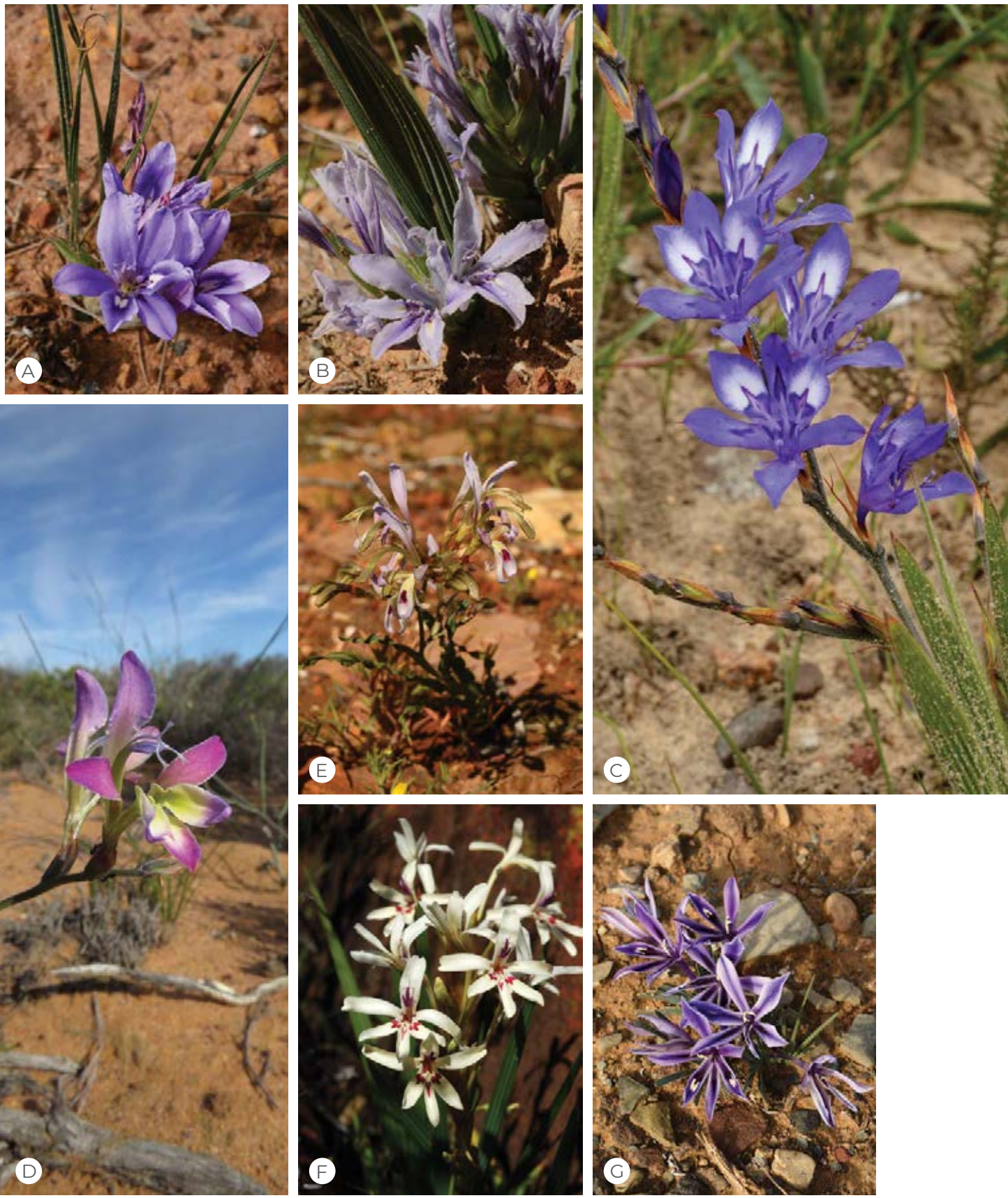


Plate 49. A, ***Babiana sambucina*** subsp. ***longibracteata***, Nieuwoudtville; B, ***B. scabrifolia***, Clanwilliam, WC; C, ***B. secunda***, Hermon, WC; D, ***B. spiralis***, Garies, NC (photograph: P. Emms); E, ***B. sinuata***, Trawal, WC; F, ***B. spathacea***, Calvinia, NC; G, ***B. truncata***, Calvinia, NC.

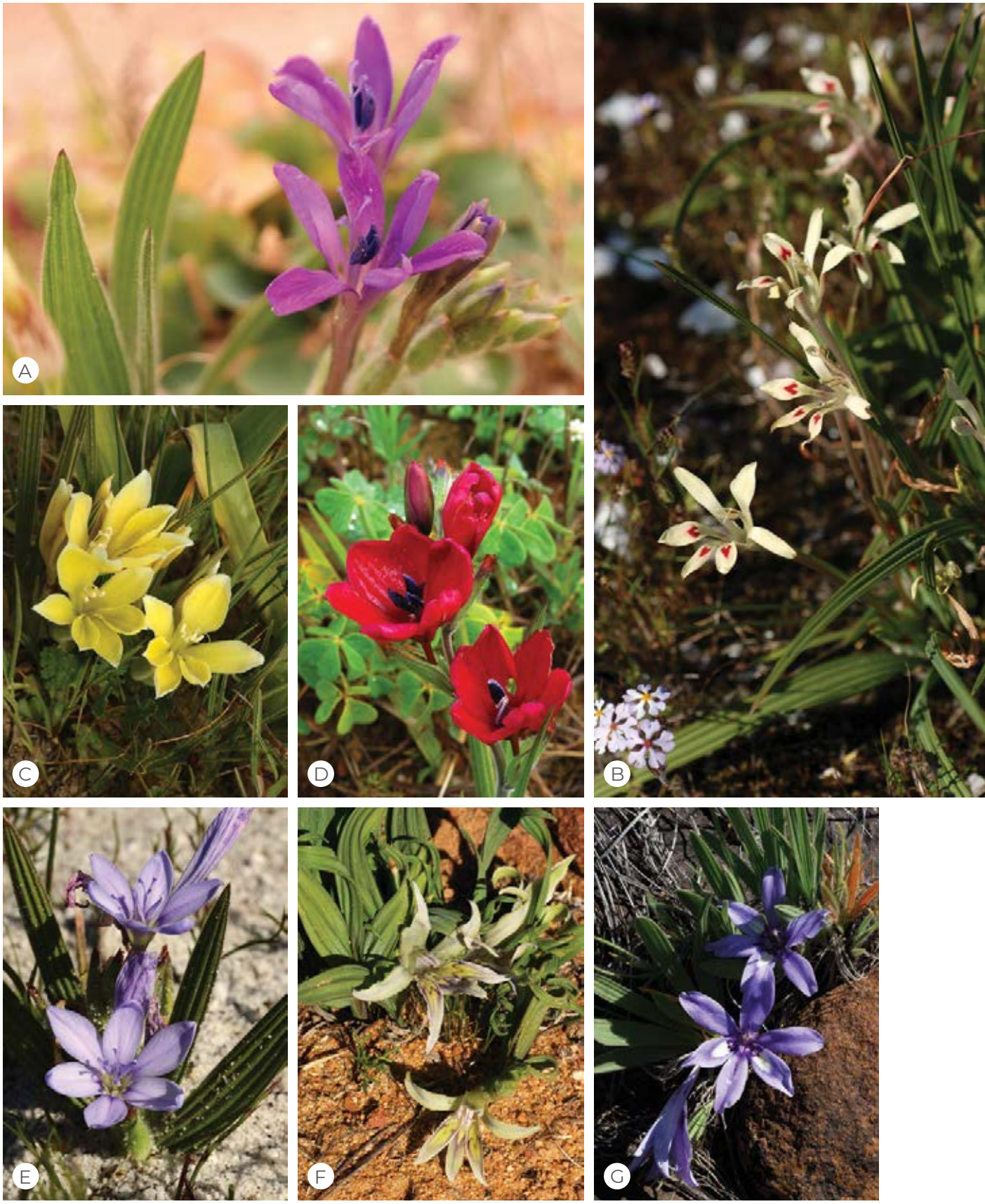


Plate 50. A, ***Babiana tubaeformis***, Piketberg, WC (photograph: N. Helme); B, ***B. tubiflora***, Dwarskersbos, WC; C, ***B. vanzyliae***, Nieuwoudtville, NC; D, ***B. villosa***, Tulbagh, WC; E, ***B. villosula***, Simonstown, WC; F, ***B. virescens***, Bitterfontein, NC; G, ***B. virginea***, Middelpos, NC.

23. **Chasmanthe**

Chasmanthe *N.E.Br.* in Transactions of the Royal Society of South Africa 20: 273 (1932). Type species: *C. aethiopica*.

Revisionary accounts: De Vos: 253–261 (1985); Goldblatt et al.: 48–62 (2004).

From the Greek, *chasme*, gaping, *anthos*, flower, alluding to the widely gaping mouth of the flower.

Deciduous geophytes. *Corm* depressed-globose rooting from below; tunics firm-papery, sometimes becoming coarsely fibrous with age. *Stem* round in cross section, simple or branched. *Leaves* several, foliage leaves in a basal 2-ranked fan, blades unifacial, with prominent central vein and numerous fine, closely spaced parallel secondary veins, sword-shaped, plane; cauline leaves few and reduced; marginal anatomy with thickened columnar epidermal cells and without marginal vein. *Inflorescence* a spike, flowers either arranged in 2 opposed ranks or on one side of axis (secund), usually many and crowded; bracts small, green, becoming dry at tips, inner as long or shorter than outer and notched apically. *Flowers* zygomorphic, orange, lower tepals with contrasting markings (rarely yellow) or lower laterals entirely green, unscented, with nectar from septal nectaries; perianth tube elongate, cylindric below and sometimes spirally twisted, expanded abruptly and horizontal above; tepals unequal, dorsal largest, extended forward and ± horizontal and concave, remaining tepals much smaller, directed forward or reflexed. *Stamens* unilateral, arched beneath dorsal tepal, lower (median) filament slightly longer than other 2; anthers parallel, subversatile, slightly diverging from ± middle. *Style* elongate, arching behind stamens; style branches slightly expanded at tips. *Capsules* globose, 3-lobed, leathery, sometimes purple inside, smooth or lightly warty outside. *Seeds* globose, 2 to 4 per locule, orange, shiny and smooth when fresh, coat sometimes fleshy, then wrinkled on drying, raphal vascular trace excluded. *Pollen* monosulcate-operculate, operculum 2-banded; exine perforate-scabrate. *Basic chromosome number* $x = 10$.

Species 3; South Africa, in Northern Cape, Western Cape and Eastern Cape, extending from coastal central Namaqualand and the Bokkeveld Plateau in the northwest to East London and Kentani in the east, usually in bush, or forest margins.

Evidently taxonomically isolated, *Chasmanthe* has often been associated with *Crocosmia* (subtribe *Freesiinae*) because of their similar vegetative appearance, including large corms and a fan of large, relatively soft-textured leaves, and mostly long-tubed orange to red flowers adapted for bird pollination. Differences in chromosome number, $x = 10$ in *Chasmanthe* but $x = 11$ in *Crocosmia*, cast doubt on an immediate relationship and molecular studies provide even stronger evidence for a distant relationship. Current evidence suggests that *Chasmanthe* is allied to *Babiana* ($x = 7$), but we see no support for this relationship based on morphology. Future phylogenetic study may yield additional information on the relationships of *Chasmanthe.*

All three species have flowers adapted for pollination by sunbirds, and the orange seeds, sometimes with fleshy seed coats, are believed to be distributed by birds. This mode of seed dispersal is rare in Iridaceae and may explain the relatively wide ranges of two of the species.

Key to species

1a Stem curved at base of an inclined to horizontal spike and flowers borne on the upper side of axis, usually in one rank; slender part of perianth tube spirally twisted; seeds fleshy when first exposed, later becoming dry and wrinkled; inside of capsule reddish to purple. . . . . 3. *C. aethiopica*

1b Stem and spike erect, often branched and flowers borne in two ranks; slender part of perianth tube not spirally twisted; seeds dry, shiny, with a hard seed coat; inside of capsule straw-coloured:

2a Tepals orange to scarlet, the lower ± spreading, except lower median; capsules warty and with nipple-like apex; upper tepal arising 3–7 mm beyond lower tepals . . . . . 1. *C. floribunda*

2b Upper and lower medial tepals orange to scarlet but lower laterals green, all directed forward; capsules smooth, rounded at apex; tepals all arising at ± same level. . . . . .2. *C. bicolor*

1. **Chasmanthe floribunda** *(Salisb.) N.E.Br.* in Transactions of the Royal Society of South Africa 20: 274 (1932); De Vos: 258 (1985); Goldblatt *et al.*: 58 (2004). *Antholyza floribunda* Salisb.: 324 (1812). *Petamenes floribunda* (Salisb.) E.Phillips: 44 (1941). Type: South Africa, without precise locality or collector, illustration in Sims: t. 561 (1802).

Antholyza praealta Delile in Redouté: t. 387 (1813). Type: South Africa, without precise locality or collector, illustration in Redouté: t. 387 (1813).

Chasmanthe floribunda var. *duckittii* G.J.Lewis in L.Bolus: 47 (1933). Type: South Africa, [Western Cape], near Darling, ex hort. Kirstenbosch, *F. Duckitt s.n. as Nat. Bot. Gard. 419/27* (BOL, holo.).

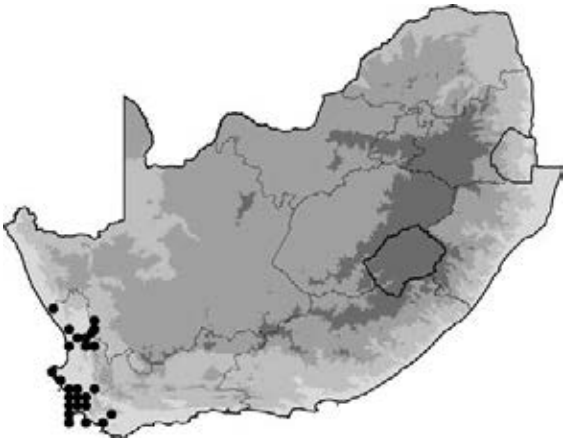


CHASMANTHE. C. aethiopica: A, flowering plant; B, half-flower; C, capsules. ***C. floribunda***: D, flower side view; E, capsule; F, seed.

Plants 500–1 200 mm high. *Corm* depressed-globose, 60–70 mm diam. when mature, with tunics firm-papery, becoming fibrous with age. *Stem* erect, usually branched, branches ascending. *Leaves* sword-shaped, medium-textured, with a prominent main vein, mostly 25–35 mm wide, occasionally barred light purple on sheaths. *Spike* erect, with flowers in two ranks, mostly 30- to 40-flowered; bracts (9–)13–15 mm long, green, flushed red on margins or entirely. *Flowers* deep orange to scarlet (rarely yellow), lower half of tube paler orange or yellow, unscented; perianth tube trumpet-shaped, slender below for (5–)7–8 mm, spirally twisted, abruptly expanded into a wide, cylindric upper part 20–25 mm long, slightly pouched at base, arching outward and horizontal above; tepals unequal, dorsal largest, (21–)24–26 × 6.5–8.0 mm, spathulate, spooned, upper lateral tepals ± 12 mm long, lower laterals ± 15 × 6 mm, lower median ± 10 mm long. *Filaments* with median 4–6 mm longer; anthers 6–7 mm long, parallel, median extending beyond dorsal tepal apex, purple; pollen purple. *Style* arching adaxial to filaments, usually dividing opposite middle of lateral anthers (or anther bases), branches 7–10 mm long. *Capsules* depressed-globose, 3-lobed, showing outline of seeds, 10–15 mm long, tapering to a nipple-like point, surface slightly warty. *Seeds* up to 4 per locule (up to 12 per capsule), globose or weakly angled by pressure, ± 5 mm diam., chalazal end flattened or concave, bright orange, coat hard and shiny. *Chromosome number* 2*n* = 20. *Flowering time*: July to September.

Distribution and ecology: extending in the South African winter-rainfall zone from coastal central Namaqualand in Northern Cape to the Cape Peninsula and east to Hermanus in Western Cape, also inland on the Bokkeveld Mtns near Nieuwoudtville; most common along the coast and coastal mountains, favouring sandstone and granite substrates but in dolerite outcrops in the western Karoo.

Diagnosis: readily distinguished from its congeners by the relatively large flowers, branched stem and erect spike, *Chasmanthe floribunda* has uniformly coloured, bright orange-scarlet flowers borne in an erect, two-ranked spike. It has long been confused with *C. aethiopica*, a shorter plant with an unbranched flowering stem and inflexed spike, either strongly inclined or nearly horizontal, with the flowers borne in a single row on the upper surface of the flowering axis.



Distribution of ***Chasmanthe floribunda***.

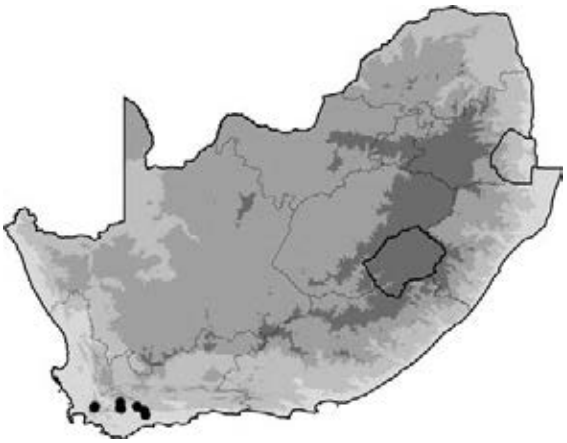
The Bokkeveld populations represent a distinct race of *C. floribunda* with some unusual features, most obviously the purple banding on the leaf sheaths and the pale orange perianth. The flowers are also slightly smaller than the coastal form, notably in their shorter perianth tube, up to 25 mm long, dorsal tepal ± 21 mm long, and style dividing below the anther bases, when more typically it divides opposite the middle of the anthers. An attractive, yellow-flowered variant, called var. *duckittii*, is descended from a single plant or small colony found in the 1920s near Darling, north of Cape Town.

Like all species of *Chasmanthe,* the flowers of *C. floribunda* are adapted for pollination by sunbirds. The Malachite Sunbird, *Nectarinia famosa,* is the most frequent visitor, but the Lesser Double-collared Sunbird, *Cinnyrus chalybeus*, may also be seen visiting the flowers.

2. **Chasmanthe bicolor** *(Gasp.) N.E.Br.* in Transactions of the Royal Society of South Africa 20: 273 (1932); De Vos: 259 (1985); Goldblatt et al. 55 (2004). *Antholyza bicolor* Gasp.: 118 (1832). *A. aethiopica* var. *bicolor* (Gasp.) Baker: 179 (1877). *Petamenes bicolor* (Gasp.) E.Phillips: 44 (1941). Type: South Africa, without precise locality or collector, illustration in Morren, La Belgique horticole 2: t. 25/1 (1852), neo. [as lecto.], designated by M.P.de Vos: 259 (1985).

   Antholyza aethiopica var. *minor* Lindl.: t. 1159 (1828). Type: South Africa, without precise locality or collector, illustration in Lindley: t. 1159 (1828).

Plants 700–900 mm high. *Corm* lightly depressed-globose, 20–25 mm diam., tunics thin-papery. *Stem* erect, usually with 1 to 3 short branches, spike strongly drooping in bud and early flowering. *Leaves* several in a basal fan, sword-shaped, with a prominent main vein, reaching ± base of spike, 17–33 mm wide. *Spike* erect, 2-ranked, mostly 18- to 28-flowered; bracts with dry tips, 6–10 mm long. *Flowers* nodding, orange-scarlet, lower lateral tepals green, tube yellow inside, unscented; perianth tube trumpet-shaped, slender below for 6–10 mm, abruptly expanded into a wide, cylindric upper part mostly 20–25 mm long, arching outward and horizontal above; tepals all arising ± at same level, unequal, dorsal largest, 27–40 mm long, spathulate, folded along midline, upper lateral and lowermost tepals directed forward, 5–8 mm long, lower laterals spreading to half-recurved, ± 8 mm long. *Filaments* 45–60 mm long; anthers 6–7 mm long, median usually exceeding dorsal tepal, purple; pollen purple. *Style* arching below filaments, dividing opposite middle of anthers, branches ± 3 mm long. *Capsules* ± ovoid, 3-lobed, showing outline



Distribution of ***Chasmanthe bicolor***.

of seeds, 15–20 mm long, smooth. *Seeds* globose, 2 per locule, 3.5–4.0 mm long, yellowish to orange, coat hard, semi-matte. *Flowering time:* July to August.

Distribution and ecology: a narrow endemic of Western Cape, South Africa, occurring near Robertson and MacGregor, and near Swellendam; along streams in the shade of evergreen riverine woodland and bush [records from Franschhoek evidently represent cultivated plants].

Diagnosis: *Chasmanthe bicolor* is recognised by the globose corm, unlike the almost disk-like corm of its two congeners, the slender flower with small lateral and lower tepals, the green colour of the lower lateral tepals and the yellow underside of the tube, and the short style branches, ± 3 mm long. The strongly drooping apex of the spike, evident even after the lower flowers have opened, is also distinctive. The spike is usually straight before the first flower buds open in *C. aethiopica* and *C. floribunda*. *Chasmanthe bicolor* appears to be most closely related to the more robust *C. floribunda*, which has a particularly large corm, and larger, bright orange-scarlet flowers with style branches 7–10 mm long.

3. **Chasmanthe aethiopica** *(L.) N.E.Br.* in Transactions of the Royal Society of South Africa 20: 273 (1932); De Vos: 256 (1985); Goldblatt et al.: 50 (2004). *Antholyza aethiopica* L.: 863 (1759). *Gladiolus stoloniferus* Salisb.: 41 (1796), illegitimate superfluous name for *A. aethiopica* L. *Petamenes aethiopica* (L.) Allan: 305 (1940). Type: South Africa, without precise locality or collector (LINN 60.3, holo.).

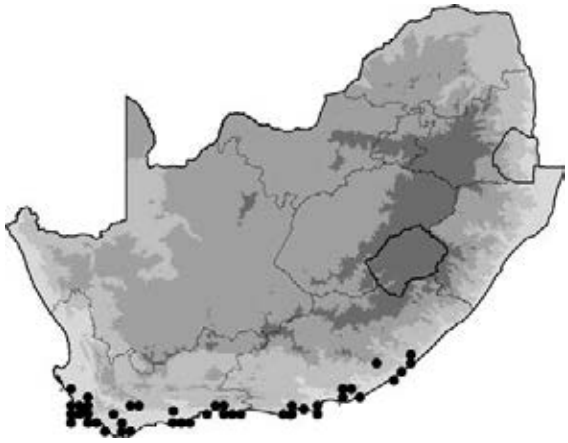
Antholyza ringens Andrews: t. 32 (1798), illegitimate homonym, not *A. ringens* L. (1753). *A. aethiopica* var. *ringens* Baker: 167 (1896). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 32 (1798).

Antholyza vittigera Salisb.: 324 (1812). *A. aethiopica* var. *vittigera* (Salisb.) Baker: 167 (1896). *Chasmanthe vittigera* (Salisb.) N.E.Br.: 274 (1932). *Petamenes vittigera* (Salisb.) E.Phillips: 44 (1941). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 1172 (1809).

Antholyza aethiopica var. *immarginata* Thunb. ex Baker: 230 (1892). *A. immarginata* (Thunb. ex Baker) N.E.Br.: 17 (1928). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB 1100, holo.).

Chasmanthe peglerae N.E.Br.: 273 (1932). *Petamenes peglerae* (N.E.Br.) E.Phillips: 44 (1941). Type: South Africa, [Eastern Cape], Kentani division, near Black Rock Cove, July 1902, *A.M. Pegler 500* (K, holo.; BOL, PRE, iso.).

Plants 400–650 mm high. *Corm* depressed-globose, 30–45 mm diam.; tunics papery to fibrous. *Stem* unbranched. *Leaves* several in a basal fan, sword-shaped, medium-textured, with prominent main vein, mostly 12–20 mm wide. *Spike* arching outward to almost horizontal, 10- to 16-flowered, flowers borne on upper side of axis; bracts green or flushed red on margins or entirely, 8–12(–15) mm long, inner minutely forked at tip. *Flowers* facing to side or toward base of spike, bright orange to scarlet, tube often yellowish on underside, unscented; perianth tube trumpet-shaped, slender below for (5–)7–10(–15) mm, twisted through 360°, abruptly expanded into a wide, cylindric upper part 16–25 mm long, lightly 3-pouched at base, arching outward; tepals unequal, dorsal largest, (22–)25–35 × 7–10 mm, spathulate, spooned distally, upper and lower lateral tepals mostly 10–15 mm long, spreading or half-reflexed, lowermost smallest, directed ± forward. *Filaments* arching under dorsal tepal, 40–50 mm long, median one 3–4 mm longer; anthers 5–7 mm long, median reaching ± to apex of dorsal tepal, light purple; pollen purple. *Style* horizontal, dividing opposite upper ⅓ of anthers, often ultimately exceeding them, branches 4–5 mm long. *Capsules* ovoid to barrel-shaped, 3-lobed, smooth, dark red to purple-black inside on opening. *Seeds* up to 3 per locule, more often 1 or 2 (3 to 9 per capsule), globose, initially 6–7 mm diam., bright orange, coat fleshy and smooth, becoming wrinkled on drying and 5–6 mm



Distribution of ***Chasmanthe aethiopica***.

diam. *Chromosome number* 2*n* = 20. *Flowering time*: April to June, sometimes as late as July.

Distribution and ecology: mainly in the winter-rainfall zone of southern Africa, extending from Darling, north of Cape Town in Western Cape, along the southern coast to Kei Mouth and Kentani in Eastern Cape; in coastal bush and along forest margins in a variety of soils.

Diagnosis: *Chasmanthe aethiopica* is readily recognised by its comparatively short stature, the spike seldom reaching more than 500 mm in height, unbranched flowering stem, and inclined to almost horizontal spike. The 10 to 16 flowers are borne in a single congested row on the upper side of the spike axis. The flowers are distinctive in the perianth tube being abruptly expanded above the narrow cylindric lower part, the wider upper part of the tube is lightly expanded into three pouches, and the lower part of the tube is twisted through 360°. Although all *Chasmanthe* species have orange seeds, only those of *C. aethiopica* have a fleshy coat when first exposed after the capsule walls split. The seed coat later becomes dry and wrinkled. The inside of the capsules is often flushed reddish to purple. Thus both vegetatively and in flower and fruit *C. aethiopica* stands apart in the genus. The confused taxonomic history of *C. aethiopica* and closely related *C. floribunda* is detailed by Goldblatt et al. (2004).

The long-tubed flowers are adapted for pollination by sunbirds, of which the Lesser Double-collared Sunbird, *Cinnyrus chalybeus*, is the most frequently recorded visitor. The Malachite Sunbird, *Nectarinia famosa*, is also recorded as a visitor to the flowers.

REFERENCES

ALLAN, H.H.B. 1940. *Bulletin of the New Zealand Department of Science and Industrial Research* 83: 305.

ANDREWS, H. 1798. *Antholyza ringens. The Botanist's Repository* 1: t. 32

BAKER, J.G. 1877 ['1878']. Systema Iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae.* Bell, London.

BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.

BOLUS, L. 1933. Plants—new and noteworthy. *South African Gardening and Country Life* 23: 46–47.

BROWN, N.E. 1928. The South African Iridaceae of Thunberg's Herbarium. *Journal of the Linnean Society of London, Botany* 48: 15–55.

BROWN, N.E. 1932. Contributions to a knowledge of the Transvaal Iridaceae. Part II. *Transactions of the Royal Society of South Africa* 20: 261–280.

DE VOS, M.P. 1985. Revision of the South African genus *Chasmanthe* (Iridaceae). *South African Journal of Botany* 51: 253–261.

GASPARRINI, G. 1832. Osservazioni intorno ad alcune piante coltivate nel Real Orto Botanico di Boccadifalco, presso Palermo. *Annali Civili del Regno delle Due Sicilie* 1(4): 116–125.

GOLDBLATT, P., MANNING & DUNLOP, G. 2004. *Crocosmia* and *Chasmanthe*: biology, classification and cultivation. Timber Press, Portland, Oregon.

KER GAWLER, J.B. 1809. *Antholyza aethiopica* (β). Lesser Scarlet Antholyza. *Curtis's Botanical Magazine* 29: t. 1172.

LINDLEY, J. 1828. *Antholyza aethiopica* L. var. *minor*. Small Cape Antholyza. *The Botanical Register* 14: t. 1159.

LINNEAUS, C. 1759. Systema Naturae, edn. 10, vol.2. Salvius, Stockholm.

MORREN, C.J.E. 1852. *Antholyza bicolor. La Belgique Horticole* 2: t. 25/1.

PHILLIPS, E.P. 1941. A note on N.E. Brown's sub-division of the genus *Antholyza* Linn. *Bothalia* 4: 43–44.

REDOUTÉ, P. 1813. *Antholyza prealta.* Les Liliacées, vol. 7. Didot Jeune, Paris.

SALISBURY, R.A. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.

SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.

SIMS, J. 1802. *Antholyza aethiopica.* Flat-leaved antholyza. *Curtis's botanical magazine* 16: t. 561.



Plate 51. A & B, ***Chasmanthe aethiopica***, Cape Peninsula, WC; C, ***C. aethiopica*** capsules and seeds, Cape Peninsula, WC; D, ***C. floribunda***, Hermon, WC.

24. **Sparaxis**

Sparaxis *Ker Gawl.* in Sims, Curtis's Botanical Magazine 15: sub. t. 548 (1802) & in König & Sims, Annals of Botany 1: 225 (1804a). Type species: *S. bulbifera* (L.) Ker Gawl.

Synnotia Sweet: t. 150 (1826a) [as *Synnetia*], corr. *Synnotia* by Sweet: 501 (1826b). *Sparaxis* sect. *Synnotia* (Sweet) Goldblatt: 57 (1991). Type: *Synnotia variegata* Sweet = *Sparaxis variegata* (Sweet) Goldblatt

Streptanthera Sweet: t. 209 (1827). Type: *Streptanthera elegans* Sweet = *Sparaxis elegans* (Sweet) Goldblatt

Anactorion Raf.: 34 (1838 as 1836). Type: *A. bicolor* (Thunb.) Raf. = *Sparaxis villosa* (Burm.f.) Goldblatt

Revisionary account: Goldblatt & Manning (2013).

From the Greek, *sparasso*, to tear, for the tattered appearance of the floral bracts.

Deciduous geophytes. *Corm* globose to conical, rooting from base; corm tunics of fine to moderately fine netted fibres or of coarse hard fibres often thickened below into claw-like ridges. *Stem* firm and relatively thick, ± erect, smooth, simple or branched, then either from near base or well above ground, sometimes with few, moderate-sized axillary cormlets below, or many small cormlets in all axils. *Leaves* several, mostly basal, sometimes also cauline, lowermost 2 or 3 membranous and sheathing (thus cataphylls), foliage leaves green, with blades lanceolate to linear or falcate, obtuse to acute, often obliquely acuminate, smooth, often with many closely set fine secondary veins, with prominent central vein, margins sometimes thickened; marginal anatomy with thickened columnar epidermal cells and without marginal vein. *Inflorescence* a spike, (1-) few- to several-flowered, lax, 2-ranked in bud, loosely spiral or nearly secund in bloom; bracts dry and crinkled, pale-translucent with brown streaks, ± entire to lightly lacerate, or outer (abaxial) with 3 long tapering cusps, inner (adaxial) smaller than outer, with 2 long tapering cusps. *Flowers* actinomorphic or zygomorphic, then with either only stamens and style asymmetrically arranged or perianth also asymmetric and ± bilabiate with upper (adaxial) tepal larger and often hooded and lower 3 tepals smaller, with contrasting marking and ± horizontal or directed downward; perianth tube short to long, funnel-shaped (cylindric below and expanded above), sometimes obliquely so, or elongate, much exceeding bracts and dimorphic with lower part cylindric and abruptly bent and widened above; tepals subequal in radially symmetric flowers or, in zygomorphic flowers, dorsal largest; lanceolate to obovate or spathulate, acute to obtuse. *Stamens* symmetrically or asymmetrically disposed; filaments straight, surrounding style, or curved outward with abaxial stamen twisted to lie opposite adaxial tepal, or all filaments ± parallel and opposite adaxial tepal; anthers straight, curved or spirally coiled, sub-basifixed, extrorse or functionally introrse. *Style* straight and erect or unilateral, branches either short, often with expanded tips, or long and filiform. *Capsules* barrel-shaped to ± globose, firm-membranous, showing outline of seeds. *Seeds* globose, relatively large, smooth, usually glossy, (2–)4 to 15 per locule. *Pollen* monosulcate-operculate with 2-banded operculum; exine perforate-scabrate. *Basic chromosome number x* = 10.

Species 16; restricted to the winter-rainfall zone of South Africa; centred in southwestern Western Cape but extending north to the southern margin of Namaqualand and the western Karoo in Northern Cape.

Although a small genus by the standards of southern African Iridaceae, *Sparaxis* is surprisingly diverse in floral morphology, associated pollination strategies and even compatibility relations. Flowers range from the short-tubed, actinomorphic and brightly coloured *S. tricolor* and *S. elegans* adapted primarily for pollination by hopliine beetles to those species with two-lipped, long-tubed purple and white or yellow flowers adapted for pollination by long proboscid nemestrinid flies. The less striking, small-flowered *S. villosa* and *S. parviflora* are pollinated by bees. Both the latter and *S. meteler-kampiae* are autogamous in the absence of pollinators. Floral zygomorphy is most likely ancestral in the genus, and the radially symmetric flowers of *S. fragrans* and *S. maculosa* and those of the *S. tricolor* group evidently represent two independent reversals.

Species of *Sparaxis* with zygomorphic flowers were previously treated as the genus *Synnotia*, but morphological, cytological and molecular studies have shown that the genus has no merit.

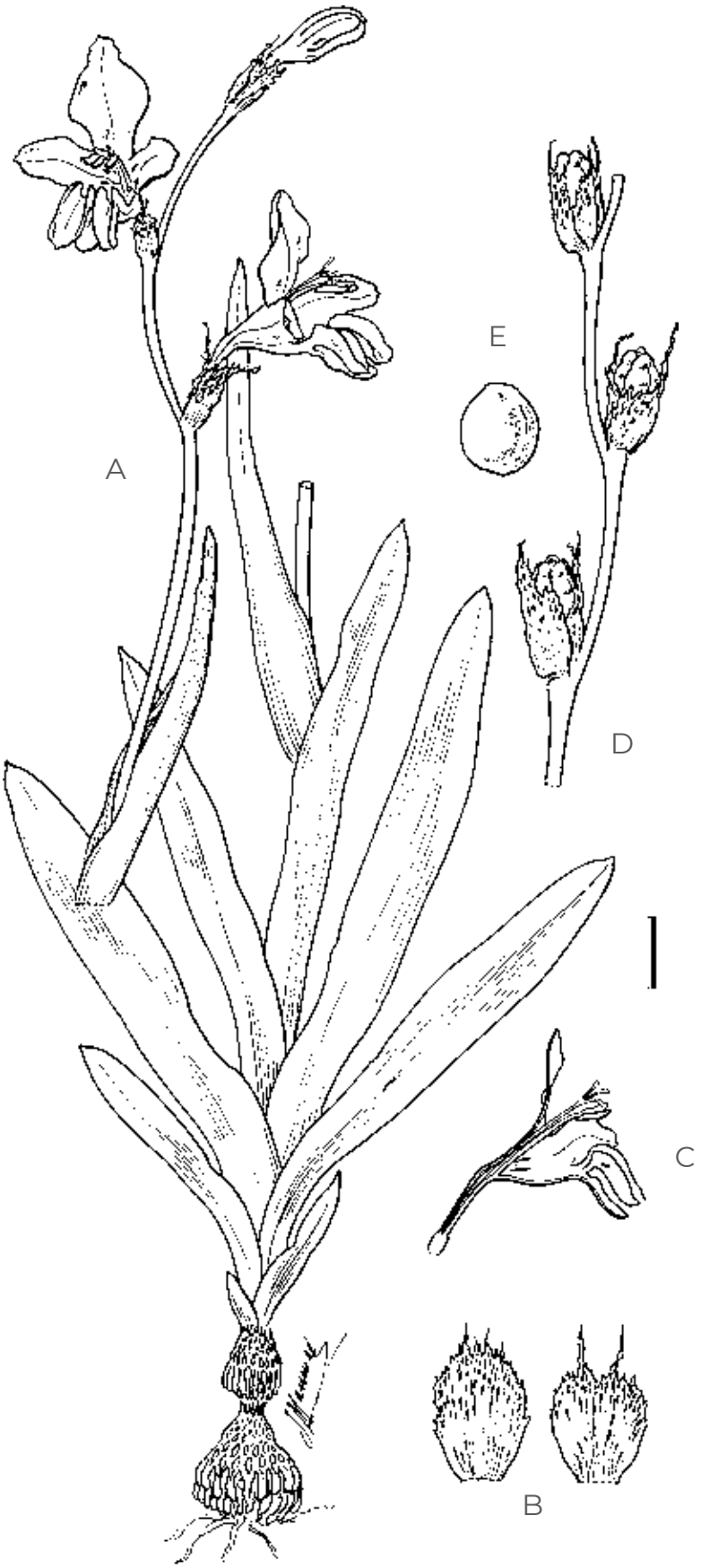
The relationships of *Sparaxis* are most likely with *Tritonia* and the monospecific *Duthiastrum*, with which leaf marginal anatomy is consistent. Basic chromosome number is *x* = 10 in both *Sparaxis* and *Duthiastrum* but *x* = 11 in most *Tritonia* species. The dry, papery and often torn floral bracts are reminiscent of *Dierama* and to a lesser extent *Ixia* and *Tritonia*.

Key to species

1a Perianth zygomorphic, with adaxial (upper) tepal largest, erect and often hooded and lower 3 tepals usually smaller and ± horizontal; stamens unilateral and arcuate with anthers parallel and ± contiguous:
2a Narrow lower part of perianth > 25 mm long, well exserted from bracts; tube bent abruptly (geniculate) at top of slender part into wide throat:
3a Flowers with upper tepal 25–30 mm long; anthers 5–7 mm long; style reaching at least to apex and sometimes exceeding anthers; style branches 4–7 mm long and spreading beyond anthers. . . . . 15. *S. variegata*
3b Flowers with upper tepal 14–17 mm long; anthers 3–4 mm long; style not reaching anther apices; style branches 2–3 mm long and tangled in anthers . . . . . 16. *S. metelerkampiae*
2b Narrow part of perianth tube < 25 mm long, exserted or included in bracts; tube gently to sharply curved at top of narrow part:
4a Corm tunics of fine fibres; flowers smaller, dorsal tepal < 10 mm long; filaments 4.5–8.0 mm long:
5a Flowers 32–36 mm long from base of perianth tube to tip of dorsal tepal . . . . . 4. *S. calcicola*
5b Flowers ± 18 mm long from base of perianth tube to tip of dorsal tepal. . . . . 5. *S. parviflora*
4b Corm tunics either of fine or coarse fibres thickened into claws below; flowers usually larger, dorsal tepal at least 15 mm long; filaments 10–20 mm long:
6a Corm tunics of hard, claw-like fibres not extending upward in a neck; upper tepal directed forward and somewhat hooded over stamens; filaments 12–13 mm long:
7a Upper tepal ± 16 mm long; throat ± unmarked; base of leaves unmarked; style dividing opposite lower half of anthers, branches ± 2 mm long . . . . . 14. *S. villosa*
7b Upper tepal 22–24 mm long; throat boldly marked with dark stripes; base of leaves lightly speckled with purple (not visible in dry material); style dividing near anther apices, branches ± 5 mm long 13. *S. caryophyllacea*
6b Corm tunics of fine fibres, usually extending upward in a neck; upper tepal erect or directed backwards; filaments 15–20 mm long:
8a Cylindric lower part of perianth tube < 8 mm long; leaf bases spotted red to purple (sometimes fading when dry. . . . . 12. *S. galeata*
8b Cylindric lower part of perianth tube 15–25 mm long:
9a Leaf bases speckled, blades with prominent submarginal vein; perianth tube ± 18 mm long. . . . .10. *S. auriculata*
9b Leaf bases unmarked, blades without prominent submarginal vein; perianth tube 20–25 mm long . . . . . 11. *S. roxburghii*
1b Perianth radially symmetric; stamens either symmetrically disposed around central style or abaxial stamen lying opposite adaxial tepal, and style eccentric and inclined opposite adaxial tepal:
10a Bracts 18–30 mm long, entire to slightly lacerate, always without discrete cusps; stamens symmetrically disposed around erect style; style branches 2–3 mm long:
11a Anthers spirally coiled and reaching only to apex of style; style branches greatly expanded. . . . . 3. *S. elegans*
11b Anthers straight or slightly twisted and curved, extending well beyond style branches; style branches not greatly expanded:
12a Anthers straight, yellow to ochre-coloured; spikes 2- to 5-flowered; tepals orange, marked with yellow and black . . . . . 1. *S. tricolor*
12b Anthers incurved, slightly twisted, red to brown; spikes (2-)5- to 10-flowered; tepals rose pink, marked with yellow and red to purple . . . . . .2. *S. pillansii*
10b Bracts 10–20 mm long, deeply lacerate with discrete cusps ± as long as or longer than rest of bract; stamens symmetrical or asymmetrical; style branches > 4 mm long:
13a Lateral margins of outer bracts irregularly serrate (or ± fringed); stamens symmetrically arranged around style; style branches ± 5 mm long:
14a Tepals with large black markings at base, 27–35 × 8–10 mm; leaves oblong to lanceolate, 9–12 mm wide and obliquely apiculate. . . . . 9. *S. maculosa*
14b Tepals unmarked, 18–25 × 5–8 mm; leaves linear to narrowly lanceolate, 2–5(–9) mm wide and acute . . . 8. *S. fragrans*
13b Lateral margins of outer bracts ± entire, not serrate or fringed; stamens and style unilateral, thus asymmetrically disposed; style branches 6–10 mm long:
15a Stem usually branched in middle of stem and bearing one or more cauline leaves; many small cormlets produced after flowering at all nodes . . . . . .7. *S. bulbifera*
15b Branches, if present, produced from base and stem lacking a cauline leaf; cormlets never produced above ground. . . . . 6. *S. grandiflora*

Sect. 1. **Streptanthera** *(Sweet) Goldblatt & J.C.Manning* in Strelitzia 32: 20 (2013). *Streptanthera* Sweet: t. 209 (1827). Type: *Streptanthera elegans* Sweet = *Sparaxis elegans* (Sweet) Goldblatt

Plants with corm tunics of fine fibres. *Spike* with floral bracts without cusps, the inner deltoid and acute, becoming lacerate with age. *Flowers* radially symmetric with tepals variously coloured, predominantly orange, red, salmon or white; perianth tube short, funnel-shaped, up to 12 mm long. *Stamens* symmetrically arranged around central style; anthers straight or S-shaped, then coiled around style.



Sparaxis villosa: A, flowering plant; B, outer bract (left) and inner bract (right); C, half-flower; D, capsules; E, seed.

Species 3: northern Western Cape and southwest Northern Cape, South Africa.

1. **Sparaxis tricolor** *(Schneev.) Ker Gawl.* in König & Sims, Annals of Botany 1: 225 (1804a); Goldblatt & Manning: 20 (2013). *Ixia tricolor* Schneev.: t. 39 (1794). *Streptanthera tricolor* (Schneev.) Klatt: 390 (1882). Type: South Africa, without precise locality or collector, illustration in Schneev.: t. 39 (1794).

Ixia tricolor Curtis: t. 381 (1797), illegitimate homonym, not *I. tricolor* Schneev. (1794). Type: South Africa, without precise locality or collector, illustration in Curtis: t. 381 (1797).

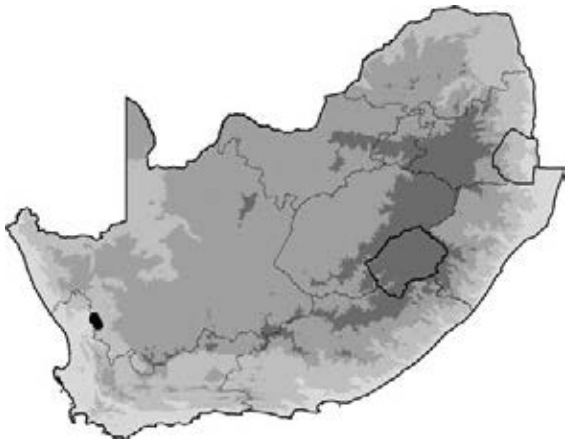
Sparaxis blanda Sweet: 398 (1826b). *S. tricolor* var. *blanda* (Sweet) Baker: 99 (1877). Type: South Africa, without locality or collector, illustration in Ker Gawl.: t. 1482, δ, *floris subroseo-albida* (1812).

Sparaxis griffinii Sweet: 398 (1826b). *S. tricolor* var. *griffinii* (Sweet) Baker: 99 (1877). Type: South Africa, without locality or collector, illustration in Ker Gawl.: t. 1482, γ, *floris violaceo-purpurea* (1812).

Sparaxis versicolor Sweet: t. 160 (1826c). *S. tricolor* var. *versicolor* (Sweet) Baker: 99 (1877). Type: South Africa, without precise locality or collector, illustration in Sweet: t. 160 (1826c).

Sparaxis lineata Sweet: t. 131 (1832). *S. grandiflora* var. *lineata* (Sweet) Baker: 99 (1877). *Streptanthera lineata* (Sweet) Klatt: 390 (1882). Type: South Africa, without precise locality or collector, illustration in Sweet: t. 131 (1832).

Plants mostly 300–400 mm high, with 1 to 3(–5) branches from base. *Corms* 10–20 mm diam., tunics of fine, pale, netted fibres. *Leaves* 5 to 10 in a basal fan, narrowly sword-shaped, acuminate, reaching ± to base of spike, 10–20 mm wide, closely veined with prominent main vein. *Spike* suberect, ± straight, 2- to 5-flowered, initially 2-ranked but ultimately subsecund; bracts dry, crinkled, light translucent brown with darker streaks, without visible veins, outer 20–30 mm long, narrowly deltoid, entire, later upper margins lacerate, inner usually slightly shorter, forked apically. *Flowers* radially symmetric, bright orange-scarlet, yellow in centre broadly edged with dark red-brown, unscented; perianth tube funnel-shaped, 9–12 mm long, lower narrow part ± 4.5 mm; tepals subequal, broadly lanceolate-ovate, 25–35 mm, outer 15–20 mm wide, inner 13–16 wide. *Stamens* symmetrically arranged; filaments 6–7 mm long, closely surrounding style, yellow; anthers linear, 8–9 mm long, weakly diverging, pale yellow; pollen white. *Style* dividing opposite lower ⅓ of anthers, branches 2–3 mm long, expanded in distal ⅓, notched at apex. *Capsules* ± barrel-shaped, 6–7 mm long, showing outline of seeds. *Seeds* globose, glossy reddish brown, ± 2.0–2.5 mm diam., 4 to 8 per locule. *Chromosome number* 2*n* = 20. *Flowering time*: September, rarely in late August.



Distribution of ***Sparaxis tricolor***.

Distribution and ecology: restricted to the northern end of the Bokkeveld Escarpment in Northern Cape, South Africa, where it is known from just a few farms northwest and south of Nieuwoudtville; in seasonally wet sites in loamy sand or among rocks along seasonal watercourses. Naturalised in parts of Australia.

Diagnosis: *Sparaxis tricolor* is recognised but its ± cup-shaped, radially symmetric, brilliant orange flowers with a yellow centre edged in dark red-brown to almost black. The dark markings enclosing the yellow extend as a narrow line almost to the base of the tepals. The yellow stamens are erect and surround the style, which divides opposite the lower third of the anthers into short branches 2–3 mm long. The ± narrowly deltoid-ovate bracts of *S. tricolor* and allied *S. elegans* and *S. pillansii* differ from those of other species in the genus in lacking obvious veins, and the outer are initially entire and acute, later becoming irregularly torn. The bracts, also crinkled and flecked with dark brown streaks, are quite different to the cuspidate bracts of other species of the genus. The radially symmetric flower is derived in *Sparaxis*, evidently an adaptation to hopliine beetle pollination. The contrasting markings on the bright orange flowers with dark brown edged yellow in the centre of *S. tricolor*, also called the harlequin flower, represent beetle marks that attract pollinating hopliine beetles. The horsefly *Philoliche atricornis* also visits the flowers and like the related *S. elegans*, *S. tricolor* evidently has a bimodal pollination system using both beetles and short-proboscid horseflies.

2. **Sparaxis pillansii** *L.Bolus* in South African Gardening and Country Life 22: 57 (1932a); Goldblatt & Manning: 23 (2013). Type: [Northern Cape], near Nieuwoudtville, Sept. 1931, *L. Bolus s.n.* (BOL 19182, holo.).

Plants 250–650 mm high, unbranched or with 1 to 3 branches from base. *Corm* 10–25 mm diam., tunics of moderately fine, netted fibres, often with fairly large cormlets in leaf axils. *Leaves* 8 to 10, all basal, reaching to ± middle of stem, lightly veined with central vein prominent. *Spike* suberect, lax, 4- to 9-flowered; bracts

dry, translucent with dark brown streaks, outer narrowly deltoid, with single main vein, sometimes torn distally, 24–29 mm long, inner shorter to ± as long, often forked apically for up to 6 mm. *Flowers* radially symmetric, old rose-coloured fading to dull pink, tepals each with a heart-shaped yellow base edged in dark red to purple-brown, yellow in tube, unscented; perianth tube funnel-shaped, 7–9 mm long, lower slender portion ± 3 mm long; tepals subequal, lanceolate, subacute, 22–29 × 12–14 mm, slightly cupped or spreading horizontally when fully open. *Stamens* symmetrically arranged; filaments erect, ± 7.5 mm long, white, clasping style; anthers arcuate or slightly twisted in upper half, 7–8 mm long, red-purple or white with red-purple on adaxial surface. *Style* slender, white or red distally, dividing opposite middle of anthers, branches 2–3 mm long, slender, often slightly wider and bilobed distally, dark red, extending between anthers. *Capsules* ± barrel-shaped, ± 7 mm long. *Seeds* globose, glossy reddish brown, ± 2.5 mm diam., 4 to 6 per locule. *Chromosome number* unknown. *Flowering time*: late September to mid-October.

Distribution and ecology: endemic to the Calvinia District in Northern Cape, South Africa, and best known in the dolerite hills east of Nieuwoudtville but extending as far east as Calvinia and the Keiskie Mtns southeast of Calvinia; usually in heavy red clay waterlogged for much of the growing season, sometimes in pools of standing water among dolerite boulders, but also in broken shale along seasonal washes and watercourses.

Diagnosis: usually a tall plant, sometimes reaching 650 mm, *Sparaxis pillansii* has lax spikes of large flowers coloured old rose to dull pink with a small yellow centre edged with red to purple. The shape of the radially symmetric flowers closely resembles that of *S. tricolor,* a shorter plant seldom exceeding 350 mm with bright orange flowers with a larger yellow centre. Molecular phylogenetic analysis shows *S. pillansii* and *S. tricolor* to be immediately related and sister to *S. elegans*. The species occupy very different soil types and their ranges complement one another. In some populations the anthers are very slightly twisted, a feature otherwise unknown in the genus, except for the exaggerated twisting of the anthers of *S. elegans*.

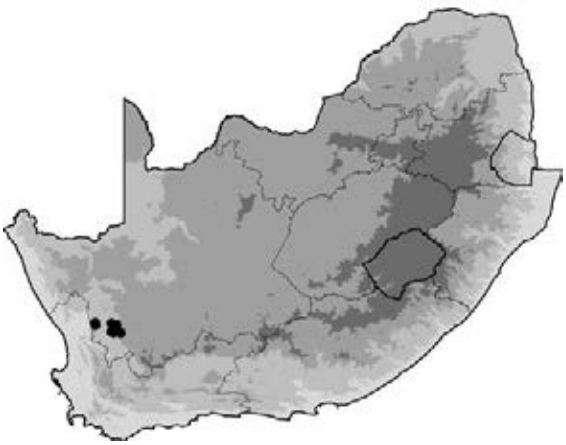
Pollination biology is the same as in the closely related *Sparaxis elegans* and *S. tricolor*, the flowers being visited by various hopliine beetles and also by the short-proboscid horse fly, *Philoliche atricornis*. Small empidid flies are also often seen in the flowers and no doubt are able to accomplish cross pollination as their bodies bear visible loads of the whitish pollen of *S. pillansii*.

3. **Sparaxis elegans** *(Sweet) Goldblatt* in Journal of South African Botany 35: 233 (1969); Goldblatt & Manning: 25 (2013). *Streptanthera elegans* Sweet: t. 209 (1827). Type: South Africa, without precise locality or collector, figure in Sweet: t. 209 (1827).

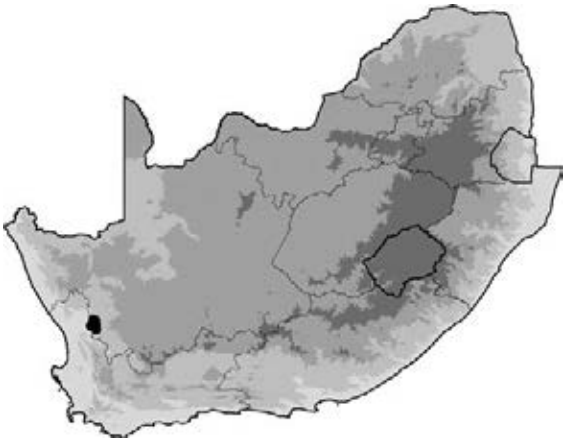
Streptanthera cuprea Sweet: t. 122 (1831) [Sweet: 501 (1830) invalid name]; Baker: 86 (1896); Pole-Evans: t. 320 (1928). *Sparaxis cuprea* (Sweet) Klatt: 378 (1867). Type: South Africa, without precise locality or collector, figure in Sweet: t. 122 (1831).

Streptanthera cuprea var. *non-picta* L.Bolus: 276 (1932b). Type: [Northern Cape], Nieuwoudtville, *Buhr s.n.* (BOL 19443, holo.).

Plants 100–300 mm high, stem usually simple or branching from base. *Corm* 10–17 mm diam., tunics of moderately fine, pale fibres. *Leaves* 5 to 9, ± as long as stem, 5–14 mm wide, closely veined with midrib prominent. *Spike* flexed at base of first flower, mostly 3- to 5-flowered; bracts dry, crinkled, pale-translucent with brown streaks, without visible veins, outer 18–22 mm long, deltoid, entire or lacerate apically, inner 16–20 mm long, forked apically. *Flowers* radially symmetric, predominantly salmon-pink or white, purple in centre edged with a violet transverse band containing yellow transverse marks and a pale streak in centre of each tepal, rarely without markings, unscented; perianth tube funnel-shaped, 6–10 mm long, narrow basal



Distribution of ***Sparaxis pillansii***.



Distribution of ***Sparaxis elegans***.

part 2–3 mm long; tepals subequal, ovate, spreading horizontally when fully open, 18–32 × 14–21 mm. *Stamens* symmetrically arranged; filaments 5–7 mm long, purple; anthers tightly S-shaped and twisted around style, ± 4 mm long, maroon; pollen red-brown. *Style* yellow below, purple distally, dividing opposite anthers, branches ± 2 mm long, strongly broadened distally and ± 2 wide, bilobed at tips. *Capsules* globose, mostly 6–8 mm long, enclosed by bracts. *Seeds* usually 6 per locule, globose, glossy dark reddish brown, ± 2 mm diam. *Chromosome number* 2*n* = 20. *Flowering time*: September.

Distribution and ecology: restricted to the western Bokkeveld Plateau and the Bokkeveld Mtns of Northern Cape, South Africa, and in the Klein Koebee in Western Cape to the south; on stony, tillite-derived soils in the north and on clays in the south but always in renosterveld.

Diagnosis: *Sparaxis elegans* is easily recognised by the distinctively marked flowers, purple anthers coiled around the style, red-brown pollen, and unusually broad style branches. The common form with salmon-pink flowers occurs in the Nieuwoudtville area, with the white-flowered form in the south of its range. The two colour morphs usually occur in pure stands, but white morphs mixed with the salmon-coloured are known from a few sites. The shift from salmon- to white-flowered populations is abrupt. Occasional orange-flowered populations in the northern Bokkeveld lack the characteristic markings in the centre of the flowers and were described as var. *non-picta*.

The strikingly coloured and patterned flowers are pollinated by hopliine beetles and the short-proboscid horsefly, *Philoliche atricornis*; the former using the flowers for sites of assembly and copulation, and the latter seeking the minute traces of nectar that the flowers produce

Sect. 2. **Sparaxis**

Sparaxis sect. *Synnotia* (Sweet) Goldblatt in Contributions from the Bolus Herbarium 13: 57 (1991). *Synnotia* Sweet: t. 150 (1826a, as *Synnetia*), corr. *Synnotia* by Sweet: 501 (1826b). Type: *Synnotia variegata* Sweet = *Sparaxis variegata* (Sweet) Goldblatt subsp. *variegata*

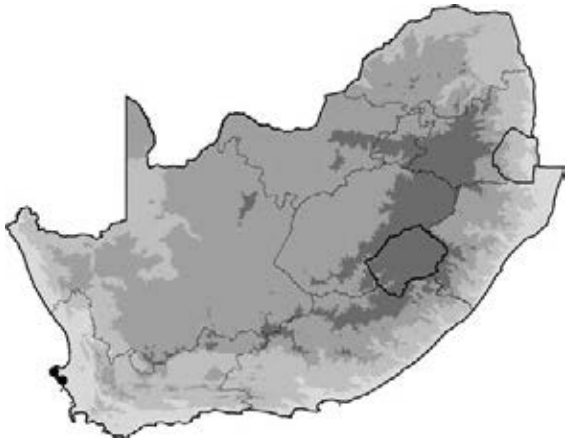
Plants with corm tunics of fine or coarse fibres. *Spike* with floral bracts with prominent cusps, these often brown. *Flowers* zygomorphic or radially symmetric, with tepals yellow often marked with purple, white, or purple; perianth tube funnel-shaped, short, up to 20 mm long or elongate and ± cylindric. *Stamens* unilateral or symmetrically arranged around central style; anthers straight.

Species 13: western half of Western Cape, South Africa.

4. **Sparaxis calcicola** *Goldblatt & J.C.Manning* in Strelitzia 32: 28 (2013). Type: Western Cape, Vredenburg, Jacobsbaai, crevices in limestone pavement, 25 Aug. 2007, *Goldblatt, Manning & Porter 12894* (NBG, holo.; K, MO, PRE, S, iso.).

Plants mostly 120–220 mm high. *Corm* 8–14 mm diam., tunics of pale, fine fibres, often matted together. *Stem* usually unbranched or with 1(2) branches from base, occasionally also from middle of stem, without cormlets in lower axils. *Leaves* 5 to 8, obtuse to acute or obliquely apiculate, usually reaching to ± base of spike or sometimes shortly exceeding it, (3–)5–10 mm wide, with prominent main vein, sometimes with thickened margins. *Spike* 3- to 5-flowered, branches with fewer flowers, weakly flexuose, suberect; bracts dry, wrinkled, pale with dark brown streaks below, rust-brown above, outer 12–14 mm long, irregularly lacerate with 3 prominent cusps, inner 10–12 mm long, 2-cusped. *Flowers* zygomorphic, upper tepals creamy white, upper lateral and lower tepals yellow with dark mark at limb base, lightly lemon-scented; perianth tube obliquely funnel-shaped, curving outward above, 13–15 mm long; tepals unequal, dorsal largest, erect, 20–22 × 8–10 mm, widest in midline, upper laterals spreading at right angles to tube, 14–16 × ± 6 mm long, lower tepals united in lower 2–3 mm, narrowed at base of free part into claws ± 3 mm long, expanding abruptly into oblong limbs ± 10 mm × ± 5 mm, channelled in lower half, spreading horizontally. *Stamens* unilateral; filaments arched, ± 8 mm long, white; anthers ± 4 mm long; pollen creamy yellow. *Style* arching above filaments, white, dividing opposite anther tips, branches diverging to weakly recurved, ± 3 mm long, expanded apically and ciliate on margins, convolute below apex. *Capsules* barrel-shaped, (7–)9–11 mm long. *Seeds* 4 to 6 per locule, globose, yellowish brown, 2.2–2.5 mm diam. *Flowering time*: early August to mid-September.

Distribution and ecology: restricted to the rocky limestone hills and coast immediately north and west of



Distribution of ***Sparaxis calcicola***.

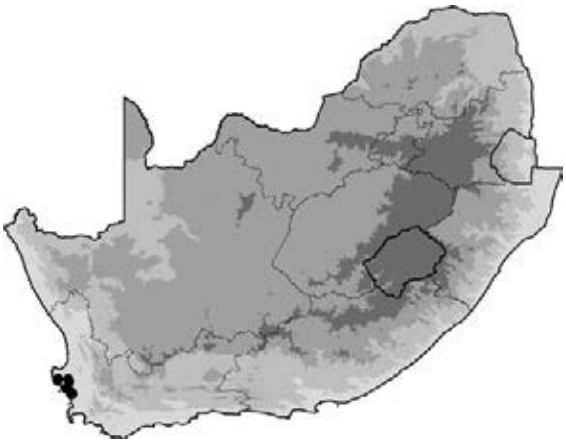
Saldanha Bay in Western Cape, South Africa; in loamy soil in limestone pavement and in calcrete, in low scrub dominated by *Osteospermum moniliferum* L. (Asteraceae) and among several other, mainly edaphic endemics of the Saldanha coast.

Diagnosis: *Sparaxis calcicola* is readily recognised by the bilabiate flower with a suberect dorsal tepal larger than the upper laterals, the short, arcuate stamens, and corms with tunics of fine, netted fibres. The flower is most like that of the more widespread *S. villosa*, which is, however, restricted to clay soils and has smaller flowers, the dorsal tepal somewhat hooded over the stamens, and corm tunics of coarse, claw-like fibres. The finely fibrous tunics and similarly oriented suberect dorsal tepal of *S. calcicola* recall *S. parviflora*, and the two species have been shown in molecular studies to be closely related, sharing a clade with *S. bulbifera* and *S. grandiflora*. *Sparaxis parviflora* has much smaller flowers, less than half the size of those of *S. calcicola*, the dorsal tepal 9–10 mm long and the tube 8–9 mm long.

The moderate-sized but brightly coloured and fragrant flowers are pollinated by honey bees, *Apis mellifera*, and possibly other large bees, which are rewarded by the small quantity of nectar secreted in the base of the tube.

5. **Sparaxis parviflora** *(G.J.Lewis) Goldblatt* in Annals of the Missouri Botanical Garden 79: 155 (1992); Goldblatt & Manning: 30 (2013). *Synnotia parviflora* G.J.Lewis: 140 (1956). Type: South Africa, [Western Cape], between Darling and Mamre, Sept. 1953, *Lewis 3556* (SAM, holo.; K, iso.).

Plants 120–200 mm high. *Corm* 10–15 mm diam., tunics of fine, pale, ± matted fibres. *Stem* simple or branched from near base. *Leaves* 5 to 7, obliquely apiculate, basal except uppermost, this inserted shortly above ground level, 7–14 mm at widest, sheathing lower part of stem. *Spike* (1–)3- to 5-flowered, weakly flexuose, secund; bracts pale below with whitish veins, becoming irregularly marked with brown distally, 10–15 mm long, outer obscurely 3–5-lobed, central lobe always longest, inner ± as long as outer, 2–4-lobed, but with 2 prominent, acute central lobes. *Flowers* zygomorphic, upper 3 tepals mauve or creamy yellow and lower 3 yellow with mauve or white tips, often with dark spots at base, abaxial half of throat darkly streaked, with weak spicy-sweet or rosy scent; perianth tube narrowly funnel-shaped, lower part clasping style, upper part curving outward, 8–9 mm long; tepals unequal, upper 3 largest, dorsal erect, 9–10 × ± 5 mm, upper laterals spreading at right angles to tube, ± 8.0 × 5.5 mm, lower 3 tepals united for ± 2 mm, lower laterals broadly channelled, horizontal with tips curving upward, ± 8.0 × 3.5 mm, lowermost held somewhat below lower laterals, 8 × 5 mm. *Stamens* unilateral, arcuate; filaments ± 4.5 mm long, reaching mouth of tube, white; anthers ± 4 mm long, purple when upper tepals



Distribution of ***Sparaxis parviflora***.

mauve or white with violet lines on locule sutures; pollen ± white. *Style* arched adaxial to filaments, white, dividing ± opposite anther bases, branches diverging, recurved distally, ± 3.5 mm long, channelled, ciliate along margins ± to base, slightly wider in upper half. *Capsule* barrel-shaped, 9–10 × ± 7 mm. *Seeds* (4)5 or 6 per locule, dark reddish brown, 2.4–2.8 mm diam. *Chromosome number* $2n = 20$. *Flowering time*: mid-August to mid-September.

Distribution and ecology: restricted to the coastal plain between Mamre and Saldanha Bay on the Atlantic Coast of Western Cape, South Africa; in sandy ground or in gritty, granite-derived soil, often in granite outcrops.

Diagnosis: *Sparaxis parviflora* is immediately recognised by its tiny flowers, the smallest in the genus, with white or mauve upper tepals and yellow lower tepals with white or mauve tips, and the finely fibrous corm tunics. The small flowers have a dorsal tepal 9–10 mm long, and the three lower ± 8 mm long. The plants are also fairly small, usually less than 150 mm tall and more often less than 100 mm, and the leaves are seldom more than 12 mm wide. In contrast, the seeds are the largest in the genus, up to 2.8 mm in diameter. In shape and colour the flowers are most like those of *S. calcicola*, but this species has much larger flowers, 20–22 mm long. Some forms of *S. villosa* have particularly small flowers, the upper tepal ± 10 mm long, and confusion between them is best avoided by examination of the corm tunics, those of *S. villosa* being coarsely fibrous and ± clawed below, contrasting starkly with the finely fibrous tunics of *S. parviflora*. Based on chromosome counts for a single population, *S. parviflora* is tetraploid with $2n = 40$, the only known polyploid in the genus in which the other 10 species counted are diploid.

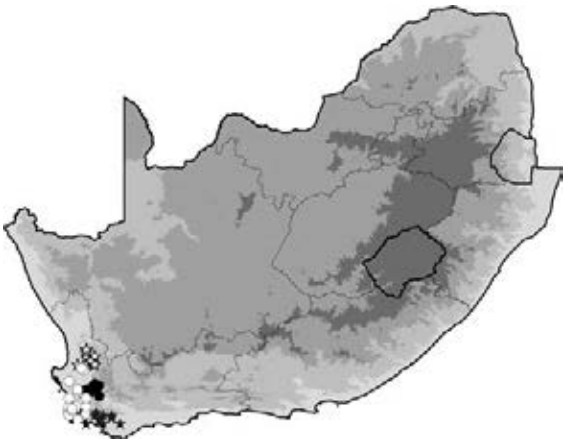
Flowering occurs fairly early in the season and plants are usually in fruit by mid-September. *Sparaxis parviflora* is facultatively autogamous, not surprising in a plant with such small, inconspicuous flowers. In the wild the weakly scented flowers are often visited by honey bees.

6. **Sparaxis grandiflora** *(D.Delaroche) Ker Gawl.* in König & Sims, Annals of Botany 1: 225 (1804a); Baker: 116 (1896); Goldblatt & Manning: 32 (2013). *Ixia grandiflora* D.Delaroche: 23 (1766). Type: South Africa, [Western Cape], near Tulbagh Road Station, 9 Sept. 1968, *Goldblatt 303* (BOL, neo., designated by Goldblatt: 239 (1969); MO, iso.).

Plants mostly 120–300 mm high. *Corm* globose, 6–15 mm diam., tunics of fine, pale netted fibres. *Stem* simple or 1- to 3(–5)-branched from base. *Leaves* 6 to 10, in basal fan, ± lanceolate to weakly falcate, mostly ½–⅔ as long as stem, (4–)7–12 mm wide, obtuse-acuminate or acute, with prominent main vein and numerous fine secondary veins. *Spike* suberect or inclined, mostly 2- to 6-flowered; bracts dry, crinkled, pale, usually with brown streaks, 12–16(–20) mm long including cusps, outer ± lacerated distally, with 3 prominent, twisted dark brown cusps, inner slightly smaller, with 2 prominent cusps. *Flowers* with radially symmetric perianth but unilateral stamens, white to pale or deep yellow with outer tepals often flushed purple outside, often with dark marks at tepal bases, or violet or dark plum-purple but pale in tube, usually unscented but sometimes faintly sweet-scented or strongly scented of *Freesia*; perianth tube funnel-shaped, 10–14 mm long, narrow basal part 3–5 mm long; tepals subequal or outer 3 slightly larger, 22–45 × 10–18(–25) mm. *Stamens* unilateral but diverging, abaxial stamen twisted to lie against adaxial tepal; filaments 7–10 mm long; anthers facing inward, 7–12(–14) mm long, white. *Style* unilateral, slender, white, lying against adaxial tepal, dividing opposite middle of anthers or up to 2 mm beyond anther tips, branches filiform, 6–9 mm long. *Capsules* ± barrel-shaped, 6–10 mm long, *Seeds* 7 or 8 per locule, ± 1.8 mm diam. *Chromosome number* 2*n* = 20. *Flowering time*: August and September.

Distribution and ecology: relatively widespread in the southwestern Western Cape, South Africa, extending from Clanwilliam (and possibly Graafwater) in the northwest to Bredasdorp in the southeast; at low elevations and usually on heavy clay soils, but occasionally found on sandy ground, often waterlogged in winter.

Diagnosis: *Sparaxis grandiflora* is readily recognised by a combination of the unilateral orientation of the stamens but radially symmetric perianth and the branching produced only from the base, typically below ground level. Unlike other Iridaceae with unilateral stamens, the filaments are not parallel with contiguous anthers but are divergent and held well apart from one another. Only *S. bulbifera* has similarly unilateral stamens and a radially symmetric perianth, but it always bears cauline leaves and branches arise on the upper part of the stem. After flowering in *S. bulbifera*, numerous small cormlets are produced at the aerial nodes in addition to larger cormlets at the underground nodes. The tepals are also consistently ovate-elliptic in *S. bulbifera* but are often slightly spathulate in *S. grandiflora*.



Distribution of ***Sparaxis grandiflora*** subsp. ***grandiflora***, ●; subsp. ***acutiloba***, ☆; subsp. ***fimbrimarginata***, ○; subsp. ***violacea***, ★.

Sparaxis grandiflora is unusually variable in flower colour and tepal shape and as a result four allopatric subspecies are recognised. Although finely circumscribed, each subspecies seems to represent a separate race of the species, geographically isolated by mountain ranges and associated edaphic barriers. Bright yellow-flowered plants in the Olifants River Valley have relatively narrow tepals and represent subsp. *acutiloba*. Distributed west and southwest of the Olifants River Mtns, subsp. *fimbriata* has white to pale yellow flowers, often with dark markings at the bases of the tepals. Also tentatively included here is a collection of purple flowered plants said to have been collected near Graafwater. The populations with pale yellow flowers in the hills north and west of the Piketberg have the broader tepals of subsp. *fimbriata* and are included in that subspecies but are obviously intermediate in perianth colour between typical subsp. *fimbriata* and yellow-flowered subsp. *acutiloba*.

In the Tulbagh Valley the typical form of *Sparaxis grandiflora*, mostly with intensely pigmented, plum-purple flowers and slightly spathulate tepals, is largely isolated from subsp. *fimbriata* by the Elandskloof Mtns. Plants from the Caledon District east of the Hottentots Holland Mountains treated as subsp. *violacea* have pale violet or white flowers with markedly obtuse and often spathulate tepals. Populations examined in bloom have flowers strongly scented of freesia, but flowers of other subspecies have at best only a faintly flowery scent or no scent at all.

Key to subspecies

1a Flowers dark plum-purple (rarely white mutants present); tepals spathulate; plants from Tulbagh Valley, rarely westward to Gouda . . . . . 6b. subsp. *grandiflora*

1b Flowers white, yellow or pale violet to light purple; tepals spathulate to narrowly ovate:

2a Flowers clear, deep yellow; tepals narrowly ovate, acute or subacute; plants from Olifants River Valley. . . . . 6c. subsp. *acutiloba*

2b Flowers white, pale yellow, cream-coloured or pale violet; tepals ovate to spathulate, obtuse:
3a Tepals spathulate, white, sometimes marked with violet or uniformly pale violet; usually strongly scented of freesia; plants from east of Hottentots Holland Mtns. . . . . .6d. subsp. *violacea*
3b Tepals narrowly ovate, usually white to pale yellow, often mauve on reverse of tepals (?rarely purple), not obviously scented; plants from west of Olifants River-Hottentots Holland Mtn axis . . . . . .6a. subsp. *fimbriata*

6a. subsp. **fimbriata** *(Lam.) Goldblatt* in Journal of South African Botany 35: 242 (1969); Goldblatt & Manning: 35 (2013). *Ixia fimbriata* Lam.: 339 (1789). *Sparaxis fimbriata* (Lam.) Ker Gawl.: 226 (1804a). Type: South Africa, without precise locality or collector, illustration in Miller: t. 237, fig. 1, 2 (1758).

Ixia sparsa Mill.: 7 (1768). Type: uncertain, possibly illustration in Miller: t. 237, fig. 1,2 (1758).

Ixia liliago DC. in Redouté: t. 109 (1805). *Sparaxis grandiflora* var. *liliago* (DC.) Ker Gawl.: t. 258 (1818). *S. liliago* (DC.) Sweet: 398 (1826b). Type: South Africa, without precise locality or collector, illustration in Redouté: t. 109 (1805).

Sparaxis grandiflora var. *striata* Sweet: 501 (1830). Type: South Africa, without precise locality or collector, illustration in Ker Gawler: t. 779 (Oct. 1804b).

[*Ixia lacera* L. ex Ker Gawl.: t. 548 (1802) et Roem. & Schult.: 398 (1817), invalid name only in synonymy (based on *LINN58*/18 & *58/19*). *Sparaxis lacera* L. [as Herb. Banks] ex Ker Gawl.: 226 (1804a), invalid name only in synonymy.]

Plants up to 300 mm high. *Leaves* ± sword-shaped, lowermost sometimes falcate, obtuse–acute-acuminate, ⅔ to ± as long as stem. *Flowers* mostly white, cream-coloured or pale yellow (?rarely purple), yellow in throat, bases of tepals each with small to prominent dark-purple-black spot, flushed grey-mauve to purple on reverse of outer tepals; tepals obovate or elliptic, 28–40(–45) × (8–)10–16(–23) mm, obtuse or subacute. *Stamens*: anthers 9–10 mm long. *Style* dividing between middle and apex of anthers, branches (5–)7–9 mm long.

Distribution and ecology: extending in Western Cape, South Africa, from the Cape Peninsula and Somerset West in the south through the Boland and Swartland to the Piketberg in the north (including an outlying population with purple flowers said to have been collected north of Graafwater); on clay flats and slopes.

Diagnosis: subsp. *fimbriata* is distinguished by the white to cream-coloured or pale yellow flowers with ovate tepals mostly 28–40 mm long (a collection included here, known only from a poorly localised site north of Graafwater has atypical purple flowers but appears otherwise to conform to subsp. *fimbriata*, although the tepals are unusually narrow, 8–9 mm wide). Particularly large-flowered plants occur near Darling, with tepals up to 45 mm long and up to 23 mm wide. Populations at low elevations east and west of the Piketberg have pale yellow flowers with the tepals sometimes acute at the tips and thus approach subsp. *acutiloba*. Subsp. *fimbriata* is seldom seen in gardens today, which is a pity, for it makes an attractive rock garden and container subject.

6b. subsp. **grandiflora**

Ixia uniflora L.: 27 (1767). Type: South Africa, without precise locality or collector (*LINN58/19*, holo.).

Ixia holosericea Jacq.: 9 (1797). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 17 (1797).

Ixia aristata var. *atropurpurea* [Ker Gawl in] Andrews: t. 87 (1800). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 87 (1800).

Sparaxis meleagris Eckl.: 27 (1827). Type: unknown.

Sparaxis stellaris D.Don in Sweet: t. 383 (1837). *S. grandiflora* var. *stellaris* (D.Don) Baker: 99 (1877). Type: South Africa, without precise locality or collector, illustration in Sweet: t. 238 (1837).

Sparaxis atropurpurea Klatt: 389 (1882), illegitimate superfluous name for *Ixia holosericea* Jacq. Type: South Africa, [Western Cape], Tulbaghskloof, *Zeyher s.n.* [B: Herb. Lubeck, lecto., designated by Goldblatt: 240 (1969)].

Plants mostly 150–200 mm high. *Leaves* lanceolate, acute to acuminate, up to 10 mm wide, lower sometimes falcate. *Flowers* deep red-purple but white in throat and tube (rarely whitish, sometimes flushed or speckled purple inside and outside); tepals spathulate, obtuse, 25–30 × 8–18(–25) mm, spreading ± horizontally when fully open. *Stamens*: anthers 10–12 mm long. *Style branches* ± 7 mm long.

Distribution and ecology: largely restricted to the Tulbagh Valley, South Africa, with a single collection from Voëlvlei just west of the Elandskloof Mtns and outside the Tulbagh Valley; in heavy clay at low elevations in habitats now largely given over to agriculture, burning or clearing of the veld stimulates flowering.

Subsp. *grandiflora* is recognised by the plum-red flowers white in the throat and tube (occasional white-flowered morphs have been recorded in some populations) with spathulate tepals broadest in the upper third. The flowers have been reported to be pollinated by hopliine beetles: flower colour and radially symmetric perianth with a pale throat is consistent with this pollination system. Vegetatively subsp. *grandiflora* closely matches subsp. *fimbriata*, which occurs in similar habitats on the coastal plain west of the mountains that isolate the Tulbagh Valley. The two subspecies appear to intergrade around Voëlvlei near Gouda at the western foot of the Elandsberg Mtns.

6c. subsp. **acutiloba** *Goldblatt* in Journal of South African Botany 35: 245 (1969) [description], Flora of Southern Africa 7(2), part 1: 163 (1999) [citation of type material]; Goldblatt & Manning: 37 (2013). Type: [Western Cape]: 8 miles [± 12 km] south of Clanwilliam, wet clay, 28 Aug. 1968, *Goldblatt 264* (BOL, holo.; MO. iso.).

?*Ixia monanthos* D.Delaroche: 21 (1766). *Sparaxis monanthos* (D.Delaroche) N.E.Br.: 135 (1929). Type: South Africa, without precise locality or collector (G—Herb. Burman, holo.).

Sparaxis lutea Eckl.: 28 (1827). Type: South Africa, without precise locality, ex Hort. Ludwig, *Ecklon s.n.* (S, holo.).

Plants mostly up to 350 mm high, rarely up to 450 mm. *Leaves* sword-shaped to almost linear, acute to acuminate, ± ⅔ as long as stem, mostly 6–10 mm wide. *Flowers* bright yellow, bases of tepals with a small to prominent purple-black spot, sometimes flushed mauve on reverse of tepals, especially outer, faintly sweet-scented; tepals narrowly oblanceolate to obovoid, acute to subobtuse, 24–30 × 12–14 mm. *Stamens*: anthers 9–10 mm long. *Style* dividing opposite lower to upper ⅓ of anthers, branches ± 6 mm long.

Distribution and ecology: found only in the Olifants River Valley in Western Cape, South Africa, and extending from the central part of the valley near Citrusdal to some 10–12 km south of Clanwilliam; at fairly low elevations along the valley bottom in exposures of Bokkeveld shales in this area of predominantly Cape Sandstone-derived soils.

Diagnosis: subsp. *acutiloba* is recognised by the bright, clear yellow flowers with comparatively narrow, oblanceolate to narrowly obovate tepals mostly 24–30 × 12–14 mm and the relatively narrow leaves, mostly 6–10 mm wide. The tepals remain ascending and the flower thus remains cup-like even when fully open.

6d. subsp. **violacea** *(Eckl.) Goldblatt* in Journal of South African Botany 35: 244 (1969); Goldblatt & Manning: 38 (2013). *Sparaxis violacea* Eckl.: 27 (1827). Type: South Africa, [Western Cape], Bot River, *Ecklon & Zeyher Irid 114* (SAM, lecto., designated by Goldblatt: 244 (1969); MO, isolecto.).

Sparaxis cana Eckl.: 28 (1827). Type: South Africa, without precise locality, ex Hort. Ludwig, Cape Town, *Ecklon s.n.* (S, holo.).

Plants rarely more than 200 mm high, sometimes only 60 mm high, usually unbranched. *Leaves* often markedly falcate to lanceolate, ± ⅓–½ as long as stem, obtuse acuminate or acute, 6–12 mm wide, margins slightly thickened and sometimes turning purple. *Flowers* pale violet with white throat and tube or ± white, then often with violet spots at tepal bases, tepals flushed grey-mauve on reverse, especially outer tepals, strongly scented of freesia; tepals spathulate, obtuse, 22–37 × 7–16 mm. *Anthers* up to 7 mm long.

Distribution and ecology: occurring across the low, rolling hills of the Overberg of Western Cape, South Africa, extending from Bot River in the west to Fairfield near Napier in the east; on clay slopes and flats in renosterveld.

Diagnosis: subsp. *violacea* is recognised by the pale violet to white flowers with markedly spathulate tepals. Generally less robust than the other subspecies, plants seldom exceed 200 mm high. The leaves are somewhat shorter and broader than in other subspecies and have notably thickened margins. The strong freesia-like odour of the flowers is unique among the subspecies, which have unscented or at best very faintly scented blooms.

7. **Sparaxis bulbifera** *(L.) Ker Gawl.* in König & Sims, Annals of Botany 1: 226 (1804a); Baker: 116 (1896, excluding *S. grandiflora* subsp. *violacea* as var. β, *violacea*); Goldblatt & Manning: 39 (2013). *Ixia bulbifera* Mill. ex L.: 4 (1756). *Belamcanda bulbifera* (L.) Moench: 214 (1802, as *Belemcanda*). *Pardanthus bulbiferus* (L.) Klatt: 551 (1862). Type: South Africa, without precise locality or collector [LINN 58/16, neo., designated by Goldblatt: 237 (1969)].

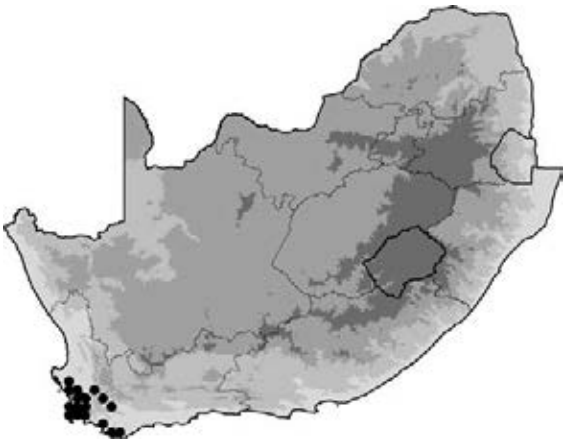
Ixia alba L.: 862 (1759). Type: unknown, said by Lewis: 185 (1962) to be *Sparaxis bulbifera* without explanation.

Ixia bulbifera Mill.: (1768), illegitimate homonym, not *I. bulbifera* L. (1756). Type: South Africa, without precise locality or collector, illustration in Miller: t. 236, f. 2 (1758).

Sparaxis albiflora Eckl.: 28 (1827). Type: South Africa, without precise locality, *Zeyher s.n.* [SAM, lecto, designated by Goldblatt: 237 (1969)].

Sparaxis miniata Klatt: 389 (1882). Type: South Africa, without precise locality, *Drège 3968* (S, holo.).

Plants 150–300(–500) mm high. *Corm* 9–15 mm diam., tunics of fine pale fibres. *Stem* usually with up to three branches from aerial nodes, after flowering bearing several small cormlets at each aerial node as well as below ground. *Leaves* 5 to 9, narrowly sword-shaped, acute, both basal and cauline, reaching to ± base of spike, 4–11 mm wide, closely veined with prominent main vein. *Spike* fairly lax, flexed below base of first flower, mostly 2- to 4-flowered; bracts dry, crinkled, uniformly pale or streaked with brown, outer mostly 14–16 mm long, with 3 subequal cusps slightly longer than body of bract, loosely twisted, inner bracts similar but slightly shorter, 2-cusped. *Flowers* with radially symmetric perianth but unilateral stamens, white but yellow in throat and tube, sometimes with small black spot at base of each tepal, outer tepals often purple outside, usually faint sweet rose-scented; perianth



Distribution of ***Sparaxis bulbifera***.

tube funnel-shaped, 14–16 mm long, narrow basal part 5–7 mm long; tepals subequal, narrowly ovate to lanceolate, 25–28 × ± 12 mm. *Stamens* unilateral but not parallel, abaxial stamen twisted to lie against adaxial tepal; filaments 7–8 mm long; anthers facing inward, 7–8 mm long, white; pollen white. *Style* unilateral, lying against adaxial tepal, white, dividing at or up to 2 mm beyond anthers tips, branches filiform, ± 10 mm long. *Capsules* ovoid to oblong, usually barrel-shaped, ± 8 × 6 mm with 9 or 10 seeds per locule, or oblong, ± 11 × 5 mm long with 11 or 12 seeds per locule. *Seeds* globose, ± 2 mm diam., glossy brown. *Flowering time*: mainly September to mid-October, occasionally in August.

Distribution and ecology: widespread in southwestern Western Cape, South Africa, extending from Hopefield and Saldanha Bay in the west to Bredasdorp in the east; on flats and the lower slopes of hills and mountains, mainly in sandy ground, usually waterlogged in winter, but on wet clay soils, often in disturbed sites.

Diagnosis: the large white flowers of *Sparaxis bulbifera* are easily confused with those of white flowered *S. grandiflora* subsp. *fimbriata*, and they are indeed strikingly similar in their radially symmetric perianth but unilateral stamens and unilateral style with long slender style branches. The tepals of *S. bulbifera* are narrowly ovate to lanceolate, whereas those or *S. grandiflora* subsp. *fimbriata* tend to be broader, usually widest in the upper third and sometimes spathulate. The two species are more easily distinguished by vegetative features: *S. grandiflora* produces branches from the base; thus close to or below ground level, whereas branching in *S. bulbifera* is aerial and even when unbranched, the stems of this species have one or more aerial nodes, each bearing a leaf, and after flowering a cluster of small cormlets. Differences in habitat also help separate the two: *S. grandiflora* favours clay ground, sometimes waterlogged in winter but relatively well drained, whereas *S. bulbifera* is rarely encountered away from wet, sandy flats. The two species are evidently immediately related and, not surprisingly, hybrids between the two have been recorded where their habitats overlap.

Pollination of *Sparaxis bulbifera* is generalist: hopliine beetles, halictid bees and honey bee workers are frequently seen visiting the flowers.

8. **Sparaxis fragrans** *(Jacq.) Ker Gawl.* in König & Sims, Annals of Botany 1: 225 (1804a); Baker: 117 (1896); Goldblatt & Manning: 42 (2013). *Ixia fragrans* Jacq.: 7 (1795 [1788–1795]). *Romulea fragrans* (Jacq.) Eckl.: 19 (1827). *Gladiolus odorus* Schrank: 206 (1822), as a new name for *I. fragrans* Jacq. (1795) not *G. fragrans* Jacq. (1797) and also an illegitimate homonym, not *G. odorus* Salisb. (1796). Type: South Africa, Western Cape, without precise locality, illustration in Jacq.: t. 274 (1794 [1788–1795]).

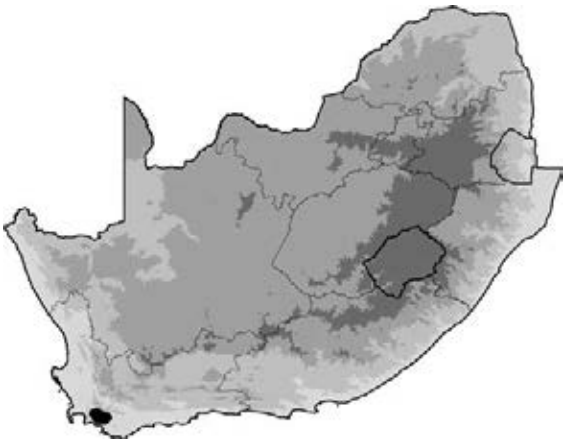
   Ixia sordida Hornem.: 6 (1819). Type: South Africa, without precise locality, cultivated in Copenhagen, Denmark, *Horneman s.n.* (C, holo.).

   Synnotia stenophylla Baker: 865 (1901). Type: South Africa, [Western Cape], *Ecklon & Zeyher Irid. 118* (Z, holo. [with misplaced flower of *S.* cf. *metelerkampiae*]; PRE, SAM, TCD, iso.).

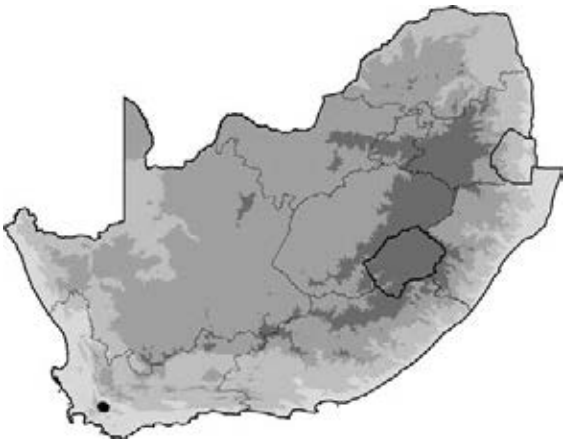
Plants mostly 100–200 mm high. *Corm* globose, ± 15 mm diam., tunics of fine, pale fibres extending upward as collar around stem base. *Stem* unbranched or with a branch produced from base, with small cormlets in underground leaf axils. *Leaves* 6 to 10, all ± basal, reaching to ± base of spike, narrowly sword-shaped to sublinear, 2–9 mm wide, obtuse, obliquely apiculate, closely veined with ± prominent central vein. *Spike* slightly inclined, 1- to 3(4)-flowered, weakly flexuose, flowers spirally arranged; bracts dry, crinkled, translucent with light brown streaks, 15–18 mm long, lateral margins fimbriate, distally drawn into long tapering cusps, outer 3-veined and 3 prominently 3-cusped, inner 2-veined and 2-cusped, cusps often twisted or coiled. *Flowers* radially symmetric, pale to deep yellow to pale beige, often flushed brown or grey-purple on reverse of outer tepals, occasionally with small black spot near tepal bases, sweetly or unpleasantly sour smelling; perianth tube funnel-shaped, 6–8 mm long, narrow basal part ± 4 mm long; tepals subequal, ± oblong, 18–25 × ± 7 mm. *Stamens* symmetrically arranged; filaments erect, ± 6 mm long, enclosing style; anthers contiguous below, diverging above, 6–9 mm long, pale yellow. *Style* dividing opposite upper ⅓ of anthers, branches filiform below, gradually expanded and recurved in distal half, ± 5 mm long, extending outward between anthers. *Capsules* ± globose, 9–10 × ± 7 mm. *Seeds* light brown, up to 6 per locule, ± 2 mm diam. *Chromosome number* 2*n* = 20. *Flowering time*: mid-August to late September.

Distribution and ecology: endemic to the Caledon District in southwestern Western Cape, South Africa, extending from Bot River and Villiersdorp in the west to the eastern end of the Caledon Swartberg; favouring clay flats and slopes, often waterlogged in the winter months.

Diagnosis: *Sparaxis fragrans* is recognised by the small yellow to buff-coloured, mostly unpleasantly scented



Distribution of ***Sparaxis fragrans***.



Distribution of ***Sparaxis maculosa***.

flowers borne in few-flowered spikes, symmetrically disposed stamens and narrow, acute leaves. It shares virtually identical, fringed bract margins and radially symmetric flowers with *S. maculosa*, evidently its closest relative, but the latter has larger, unscented blooms boldly marked at the base of the tepals with large maroon-purple markings divided longitudinally by a pale yellow line. The flowers are pollinated by a range of small insects, including halictid bees, native honey bee workers and hopliine beetles.

9. **Sparaxis maculosa** *Goldblatt* in Annals of the Missouri Botanical Garden 79: 153 (1992); Goldblatt & Manning: 44 (2013). Type: South Africa, [Western Cape], Farm Stettyn, between Worcester and Villiersdorp, 8 Sept. 1988, *Perry & Manning 3603* (NBG, holo.; K, MO, NBG, PRE, iso.).

Plants 100–200(–300) mm high. *Corm* globose, ± 15 mm diam., tunics of fine pale closely matted fibres. *Stem* simple or 1- or 2-branched from base. *Leaves* 7 to 9, ± basal, ± ⅔ as long as spike, lanceolate(–oblong), 9–12 mm wide, abruptly expanded adaxially above sheath, obliquely apiculate, closely veined with ± prominent central vein. *Spike* 1- or 2(3)-flowered, weakly flexuose, flowers spirally arranged; bracts dry, crinkled, translucent with brown streaks, lateral margins fimbriate, 15–20 mm long, distally drawn into long tapering cusps, outer with 3 prominent veins, 3-cuspidate, inner with 2 prominent veins and 2-cuspidate. *Flowers* actinomorphic, bright yellow, tepals each with dark maroon-purple, heart-shaped mark with central yellow streak in lower ⅓, unscented; perianth tube funnel-shaped, 6–7 mm long, narrow basal part ± 2.5 mm long; tepals subequal, ± oblong, 27–35 × 8–10 mm. *Stamens* symmetrically arranged; filaments erect, 6–7 mm long; anthers linear, diverging, contiguous below, 9.5–11.0 mm long, pale yellow. *Ovary* globose, ± 2.5 mm long; style dividing opposite the lower ⅓ of anthers, branches filiform, 4.5–5.0 mm long, extending outward between upper ⅓ of anthers. *Capsules* ± globose, shortly stipitate on stalks ± 1 mm long, 6–9 × 5–6 mm, not splitting at apex, walls eventually fragmenting by horizontal cracks. *Seeds* reddish brown, up to 8 per locule, ± 2 mm diam. *Flowering time*: late August and September.

Distribution and ecology: known from just a few farms in the Stettyn area of the Hoeksrivier drainage north of Villiersdorp in Western Cape, South Africa; in heavy clay in renosterveld. *Sparaxis maculosa* evidently originally consisted of a single extended population, but just three fragmentary colonies of the species are known today.

Diagnosis: *Sparaxis maculosa* is recognised by the radially symmetric yellow flowers with a dark centre and long-cuspidate bracts with the lateral margins slightly and irregularly serrated. The bracts are almost identical to those of *S. fragrans*, which also has a radially symmetric flower, leaving no doubt that the two are immediately related. *Sparaxis fragrans* is consistently a more slender plant with linear to narrowly lanceolate (or falcate) leaves, 2–8 mm wide and predominantly yellow to buff-coloured flowers with narrower tepals, ± 7 mm wide, sometimes with small dark marks at the tepal bases. The flowers of *S. fragrans* mostly have a slightly unpleasant, acrid odour, whereas those of *S. maculosa* lack scent. It is likely that the flowers are adapted for hopliine beetle pollination, given the conspicuous dark markings of the flowers and their lack of scent, but there are no observations on pollination of the species. Compatibility relations are likewise unknown. Molecular-based phylogenies show the species pair to be phylogenetically isolated within sect. *Sparaxis*.

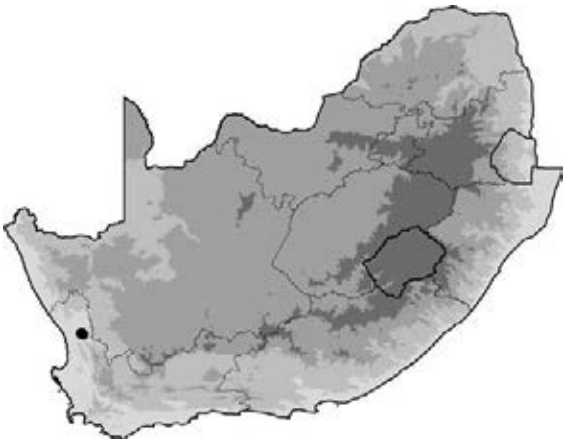
10. **Sparaxis auriculata** *Goldblatt & J.C.Manning* in Bothalia 29: 59 (1999); Goldblatt & Manning: 46 (2013). Type: South Africa, [Western Cape], Farm Keurlandshoek (Colinshoek), slopes of the Gifberg, 7 Aug. 1998, *Goldblatt & Manning 10966* (NBG, holo.; K, MO, PRE, S, iso.).

Plants 150–400 mm high, stem usually 1- or 2-branched from axils of cauline leaves, inclined above. *Corm* globose-conical, 12–14 mm diam., tunics of medium-textured fibres mostly oriented vertically. *Leaves* 5 to

8, mainly basal, uppermost inserted in middle of stem, reaching to between middle of stem and base of spike, narrowly lanceolate, acute, mostly 10–15 mm wide, with prominent submarginal vein, margin thus appearing somewhat thickened, sheathing parts of leaves speckled with purple (often fading when dry). *Spike* mostly 5- to 7-flowered, weakly flexuose, ± secund; bracts pale below with whitish veins, becoming streaked with light brown above, 15–20 mm long, lightly lacerate with prominent central cusp, inner bracts slightly shorter, with 2 terminal cusps. *Flowers* zygomorphic, bilabiate, pale yellow, dorsal tepal usually pale mauve, lower tepals deep yellow fading to white at tips, abaxial half of throat obscurely lined with grey-purple, unscented; perianth tube obliquely funnel-shaped, distal part curving outward, ± 18 mm long, lower tepals united for 6–7 mm, basal cylindric portion narrow and clasping style; tepals unequal, dorsal largest, broadly ovate, erect, ± 25 × 18–20 mm, upper lateral tepals oblong-ovate, ± 20 × 10–12 mm, spreading distally, lower 3 tepals abruptly deflexed and pinched together at bases, directed downward, ± 18 × 8 mm, strongly channelled, lower laterals with prominent auricular lobes at base. *Stamens* unilateral and arcuate; filaments ± white, ± 18 mm long; anthers 7–8 mm long, creamy white, exserted; pollen creamy white. *Ovary* 3.5 mm long, oblong-trigonous; style arching over stamens, white, ± 4 mm long, dividing just below anther tips, branches filiform, diverging and recurved in distal half, slightly wider toward apex. *Capsules* ± barrel-shaped, trilobed, ± 6(–7) × ± 6 mm, showing outline of seeds. *Seeds* 3 or 4 per locule, ± 2.2 mm diam., glossy light brown. *Flowering time*: August to early September.

Distribution and ecology: a local endemic of the Gifberg–Matsikamma Mtn complex in the Vanrhynsdorp District of northern Western Cape, South Africa; recorded in rocky sites on sandstone at low to middle elevations and locally common among rocks and in cleared places on bush-covered sandstone slopes.

Diagnosis: the flowers of *Sparaxis auriculata* resemble those of the common southwestern Cape *S. villosa* in general appearance but are substantially larger in all respects. In *S. auriculata* the dorsal tepal is ± 25 × 18–20 mm and the anthers 7–8 mm long, compared with a dorsal tepal 14–19 × 10–12 mm and anthers 3–4 mm in *S. villosa*. Furthermore, the style in the latter species divides near the anther bases, the style branches are ± 3 mm long, rarely reaching beyond the middle of the anthers, and the lower tepals are inclined slightly below the horizontal and without auriculate basal lobes, whereas *S. auriculata* has longer anthers, style branches dividing just below the anther tips, ± 4.5 mm long and exceeding the anthers. The downward-directed lower tepals bear unusual prominent auriculate lobes above the base. *Sparaxis auriculata* can also be distinguished by vegetative features: the corms are narrowly conic with tunics of medium-textured fibres, the leaf sheaths are liberally spotted with dark purple, and the leaf blades are unique in *Sparaxis* in the prominent submarginal vein that makes the margins appear thickened. The corms of *S. villosa* differ substantially being globose with coarse,



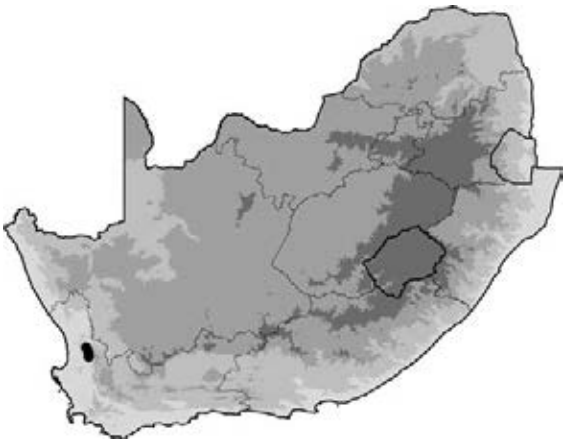
Distribution of ***Sparaxis auriculata***.

netted fibres, the vertical elements of which are thickened into claw-like ridges below, and the leaves lack the dark spotting so marked in *S. auriculata*.

The narrow, conical corms and soft corm tunics are characteristic of only two other species of *Sparaxis*, *S. galeata* and *S. roxburghii*, both occurring in northern Western Cape. The underground part of the stem is enclosed by a thick collar of fine fibres and the leaves have speckled sheaths but the two differ from *S. auriculata* in floral details. *Sparaxis galeata* has short-tubed, extremely sweetly fragrant flowers with a reflexed dorsal tepal, and prostrate, obtuse leaves, and it favours dry, stony, clay flats and slopes. The rare *S. roxburghii* has long-tubed flowers (perianth tube 20–25 mm long), otherwise resembling those of *S. galeata*, and is known from a few populations in the mid-Olifants River Valley on stony slopes. Neither species has the submarginal vein of *S. auriculata*. Molecular phylogenies place *S. roxburghii* as immediately related to *S. auriculata*. The flowers share the common pollination system of the genus, large-bodied, long-tongued bees that visit the flowers to forage for nectar.

11. **Sparaxis roxburghii** *(Baker) Goldblatt* in Annals of the Missouri Botanical Garden 79: 156 (1992); Goldblatt & Manning: 48 (2013). *Synnotia bicolor* var. *roxburghii* Baker: 198 (1892); 135 (1896). *Synnotia roxburghii* (Baker) G.J.Lewis: 146 (1956). Type: South Africa, [Western Cape], 15 miles [± 22 km] N of Citrusdal, 26 Aug. 1957, *Lewis 5207* (NBG, neo., designated by Goldblatt: 156 (1992); MO, iso.). [The location of the original type, without precise locality, *Roxburgh s.n.*, is unknown].

Plants 280–450 mm high, stem often with 1(2) branches from aerial nodes. *Corm* 25–30 mm diam., tunics of fine, netted fibres, extending upward in collar around stem base. *Leaves* 7 to 9, all basal except uppermost, narrowly lanceolate, ± ½ as long as stem, 8–15 mm wide. *Spike* subsecund, mostly 5- to 7-flowered; bracts 15–20(–25) mm long, pale with brown streaks, margins lightly lacerate, outer with long central cusp, inner ± as



Distribution of ***Sparaxis roxburghii***.

long as outer, with 2 long cusps. *Flowers* zygomorphic, mauve to lilac, dorsal tepal darker than upper laterals, lower tepals yellow in lower ⅔, tipped purple; perianth tube 20–30 mm long, cylindric part 13–23 mm long, curved and expanding gradually distally, upper part funnel-shaped; tepals unequal, dorsal largest, lanceolate, 22–28 × 10–12 mm, upper laterals 18–20 × ± 8 mm, lower 3 smallest, joined for 6–7 mm, ± 13 mm × ± 5.5 mm. *Stamens* unilateral, arcuate; filaments 15–20 mm long; anthers 4–5 mm long; pollen yellow. *Ovary* ± 4 mm long; style dividing near anther bases, branches ± 4 mm long, spreading outward, filiform. *Capsules* ± globose, 5–6 × ± 5 mm. *Seeds* 3(4) per locule, size unknown. *Flowering time*: late August to mid-September.

Distribution and ecology: known with certainty from a few small populations in the Olifants River Valley between Citrusdal and Clanwilliam in Western Cape, South Africa, a short distance south of the Farm Kriedoukrans; in stony clay ground in dry fynbos.

Diagnosis: the finely fibrous corm tunics forming a neck around the stem base and the erect to reflexed, rather than hooded, upper tepal suggest that *Sparaxis roxburghii* is most closely related to *S. galeata*, from which it is distinguished by the elongate perianth tube, 20–30 mm long vs. ± 15 mm in *S. galeata*. Molecular studies, however, suggest that *S. roxburghii* is most closely related to *S. auriculata*, which has a funnel-shaped rather than largely cylindric perianth tube ± 18 mm long. All three species have unusually small and nearly globose capsules containing only 2 to 4 seeds per locule.

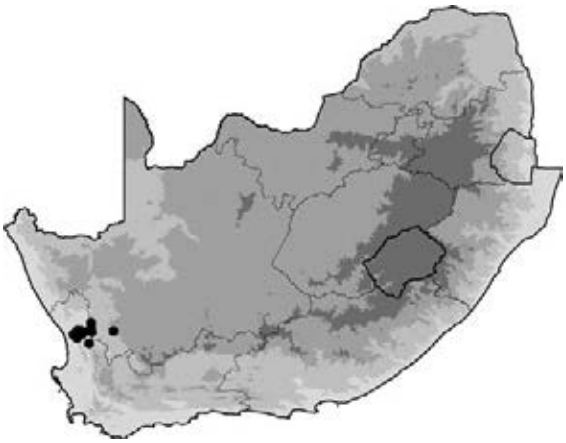
The long-tubed flowers are almost certainly adapted for pollination by a long-proboscid fly.

12. **Sparaxis galeata** *Ker Gawl.* in König & Sims, Annals of Botany 1: 225 (1804a), as a new name in *Sparaxis*. *Gladiolus galeatus* Jacq.: 167 (1791), illegitimate homonym, not *G. galeatus* Burm.f.: 1768 (= *G. alatus* L.); Goldblatt & Manning: 50 (2013). *Synnotia galeata* (Ker Gawl.) Sweet: 398 (1826a); Lewis: 143 (1956). *Hebea galeata* (Ker Gawl.) Eckl.: 41 (1827). *Anactorion galeatum* (Ker Gawl.) Raf.: 34 (1838). Type: South Africa, [Western Cape], without precise locality or collector, illustration in Jacq.: t. 258 (1794 [1788–1795]).

Plants 120–200(–350) mm high. *Corm* 16–22 mm diam.; tunics of pale, fine fibres accumulating in thick mass extending upward to ground level in collar around base. *Stem* branching only from base or unbranched. *Leaves* 5 to 7, narrowly lanceolate, obtuse to acute, obliquely apiculate, usually inclined toward ground, ± half as long as stem, 10–18 mm wide, speckled purple on sheaths. *Spike* ± secund, 4- to 7-flowered, branches with fewer flowers, weakly flexuose, straight or inclined; bracts pale with dark brown streaks, becoming brown above, somewhat lacerate, outer 13–16 mm long, 3-cusped with central cusp more prominent, inner slightly shorter than outer, 2-cusped. *Flowers* zygomorphic, upper tepals violet or dull yellow-brown, lower tepals deep yellow shading to violet at tips, upper laterals fading to pale yellow distally, throat streaked purple and yellow on abaxial side, with heavy, sweet slightly spicy odour; perianth tube obliquely funnel-shaped, 12–15 mm long; tepals unequal, dorsal largest, erect, 25–30 × 14–15 mm, widest in midline, upper laterals recurved, ± 22 mm long, lower tepals united with upper lateral for ± 5 mm and to each other for ± 2 mm, free parts ± 17 × 5–6 mm, narrowly clawed at base, limbs channelled, flexed downward. *Stamens* unilateral, arcuate; filaments 18–20 mm long, translucent purple; anthers 5–6 mm long before dehiscence, shrinking to ± 3 mm; pollen yellow. *Style* arched above filaments, purple, dividing opposite middle to apex of anthers, branches weakly recurved, 4–5 mm long, filiform, slightly expanded and forked at tips. *Capsules* barrel-shaped to subglobose, 5–8 mm long. *Seeds* ± 2.2 mm diam., yellow-brown, 2 or 3(4) per locule. *Chromosome number* $2n = 20$. *Flowering time*: early August to mid-September.

Distribution and ecology: occurring in the lower Olifants River Valley between the Nardouws Mtns and the foot of the Matsikamma Mtns and Kobee Valley in Western Cape and in the Bokkeveld Mtns near Lokenberg in Northern Cape, South Africa (an isolated record from the Farm Driefontein southwest of Calvinia requires confirmation); on dry arid stony clay flats and slopes.

Diagnosis: *Sparaxis galeata* is recognised by the large flowers with a particularly large, erect dorsal tepal, 20 × 12 mm, held vertically above the small, spooned and down-curved lower tepals. The flowers are usually strongly scented. The finely fibrous corm tunics accumulate in a dense mass around the corm and base of the stem, and the somewhat obtuse leaves are speckled with red to purple at the base. The capsules are unusually small for the genus, 5–8 mm long and contain at most 4 seeds per locule (compared with as many as 8 to 10 per locule in *S. villosa* and 10 to 12 in *S. metelerkampiae*). Based on morphology alone, *S. galeata* has been considered most closely allied to *S. roxburghii*, which



Distribution of ***Sparaxis galeata***.

has similar finely fibrous corm tunics that form a collar around the stem base, usually speckled leaf bases, and a prominent, erect dorsal tepal. Flowers of *S. roxburghii* are differently coloured, and have a perianth tube 20–30 mm long compared to 12–15 mm in *S. galeata*. The molecular-based phylogeny suggests that *S. roxburghii* is more closely allied to *S. auriculata*, but all three species are clearly related and share unusually small, rounded capsules with up to four seeds per locule.

A population on the southern slopes of Mauwerskop near Vanrhynsdorp has somewhat smaller, rather dull beige flowers, the dorsal tepal yellow-brown and only 16–20 mm long (vs. 25–30 mm in other populations), but the shape of the flower and all other features correspond with typical *S. galeata*. Flowers of this population have filaments ± 18 mm, anthers ± 6 mm, and notably a shorter style dividing opposite the middle of the anthers rather than at their apices.

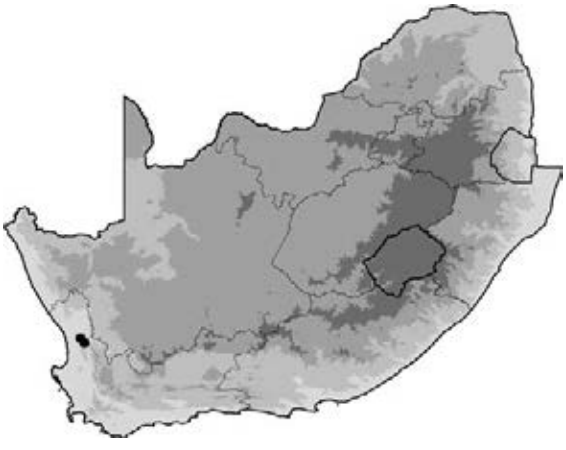
The large, brightly coloured and strongly fragrant flowers are adapted for pollination by large, long-tongued bees, which visit the flowers to forage on the small quantity of nectar secreted in the base of the tube. The flowers are self-incompatible and strongly protandrous. The stigmatic tips of the style branches recurve late in the flowering cycle and then come in contact with pollen, but self-pollination rarely occurs.

13. **Sparaxis caryophyllacea** *Goldblatt* in Annals of the Missouri Botanical Garden 79: 156 (1992); Goldblatt & Manning: 53 (2013). Type: [Western Cape], middle slopes of the Nardouw Mtns, north of Clanwilliam, 13 Aug. 1976, *Goldblatt 3851* (NBG, holo.; K, MO, PRE iso.).

Plants 120–300 mm high. *Corm* 13–18 mm diam.; tunics of hard, coarse, vertical fibres, often thickened below into claw-like ribs. *Stem* often with 1 or 2 branches produced in axils of cauline leaves. *Leaves* 5 to 7, mostly basal, upper 1 or 2 cauline, inserted in mid-part of stem, broadly oblanceolate, reaching ± middle of stem, 10–15 mm wide, usually obtuse, apiculate, sometimes obliquely so, lower leaves usually speckled with red to purple (fading on drying), often inclined (leaves of juvenile plants usually ± prostrate). *Spike* straight or barely flexuose, 2- to 4-flowered, ± secund, lateral spikes when present with fewer flowers; bracts pale below with whitish veins, becoming light brown above, outer 12–14 mm long, lacerate, with prominent central cusp, inner 2-cusped. *Flowers* zygomorphic, pale yellow with dorsal tepal shading to violet in distal half, upper later tepals cream-coloured above base, lower tepals deep yellow, fading to cream-coloured at tips, throat yellow with prominent dark streaks, sweetly carnation-scented; perianth tube funnel-shaped, curving outward distally, ± 20 mm long; tepals unequal, dorsal erect to slightly hooded, 24–28 × 12–14 mm, upper laterals ± 16 × 8–9 mm, directed forward, lower tepals united for 3 mm, ± horizontal proximally, ± 12 × 6–7 mm, flexed downward and channelled distally. *Stamens* unilateral and arcuate; filaments ± 12 mm long, whitish; anthers ± 4.5 mm long, white, only partially exserted; pollen ± white. *Ovary* ± 3.5 mm long, ovoid-trigonous; style arched over filaments, dividing shortly below anther apices, branches ± 6 mm long, recurved distally between anthers, conduplicate below, becoming narrowly channelled toward upper ⅓. *Capsule* broadly ovoid, 10–11 × 6–7 mm. *Seeds* globose, glossy brown, 1.8–2.2 mm diam., usually 10 per locule. *Chromosome number* 2*n* = 20. *Flowering time*: August.

Distribution and ecology: a very local endemic known only from the western slopes at the northern end of the Nardouw Mtns in Western Cape, South Africa; growing in stony clay, below the contact line with the lowermost band of Table Mountain Sandstone that caps the Nardouw range.

Diagnosis: the flowers of *Sparaxis caryophyllacea* most closely resemble those of *S. villosa*, but the similarity may be because this is the ancestral flower type in the genus rather than an indication of close relationship. It can be distinguished by the relatively large flower size alone, the dorsal tepal 24–28 mm long compared with 12–16 mm in *S. villosa*, and in addition the pale yellow perianth is conspicuously striped with black in the throat



Distribution of ***Sparaxis caryophyllacea***.

and strongly carnation scented. Another diagnostic feature is the red to purple speckling on the sheaths of the lower leaves. This character is also present in *S. galeata*, presumably due to convergence, for the two do not seem immediately related. In the molecular phylogeny based on plastid and nuclear gene sequences, *S. caryophyllacea* is retrieved as sister to the *S. tricolor* clade (but with weak statistical support) and together with these three species comprises a clade sister to the remaining species of *Sparaxis*. However, in the nuclear gene-based phylogeny, *S. caryophyllacea* is retrieved in an entirely different position, as sister to a clade including *S. villosa* plus the two long-tubed species, *S. metelerkampiae* and *S. variegata*. This clade shares one notable synapomorphy, coarsely fibrous corm tunics. In light of the nuclear gene-based phylogeny and the shared coarsely fibrous corm tunics *S. caryophyllacea* is provisionally regarded as allied to the *S. villosa–variegata* species group.

Sparaxis caryophyllacea is self-compatible and sets full capsules, containing ± 30 seeds, when hand pollinated with its own pollen and is sometimes autogamous in the greenhouse. In nature the species is most likely normally outcrossing, and is pollinated by large-bodied anthophorine bees.

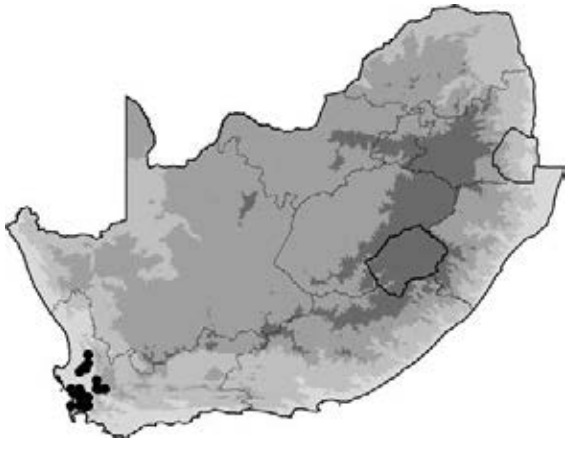
14. **Sparaxis villosa** *(Burm.f.) Goldblatt* in Annals of the Missouri Botanical Garden 79: 156 (1992); Goldblatt & Manning: 55 (2013). *Gladiolus villosus* Burm.f.: 2 (1768). *Synnotia villosa* (Burm.f.) N.E.Br.: 133 (1929); Lewis: 142 (1956). Type: South Africa, [Western Cape], without precise locality, illustration in Breyne: t. 8, f. 2 (1739) [lecto., effectively designated by Brown: 133 (1929)].

Gladiolus bicolor Thunb.: no. 16, t. 2, f. 1 (1784). *Ixia bicolor* (Thunb.) Ker Gawl.: t. 548 (1802). *Sparaxis bicolor* (Thunb.) Ker Gawl.: 225 (1804a). *Synnotia bicolor* (Thunb.) Sweet: 398 (1826b); Baker: 134 (1896), excl. syn. *Gladiolus galeatus* and var. *roxburghii*. *Hebea bicolor* (Thunb.) Eckl.: 42 (1827). *Anactorion bicolor* (Thunb.) Raf.: 34 (1838). Type: [Western Cape], Groene Kloof, *Thunberg s.n.* (UPS–THUNB, syn. [two sheets]).

Plants 150–350 mm high. *Corm* 9–15 mm diam., tunics of hard, coarse fibres, netted above, thickened and vertical below, often forming claw-like ridges. *Stem* simple or with 1 branch from axil of cauline leaf. *Leaves* 5 to 7, mostly in a basal fan, uppermost inserted in middle of stem, narrowly lanceolate, obliquely apiculate, reaching to between middle of stem and base of spike, 5–15 mm wide, sheathing lower part of stem. *Spike* weakly flexuose, subsecund, 2- to 4-flowered; bracts pale below with whitish veins, becoming irregularly streaked light brown above, outer 15–25 mm long, ± 3 cuspidate with central cusp prominent, becoming irregularly lacerate, inner ± as long as outer, with 2 prominent cusps. *Flowers* zygomorphic, creamy yellow with dorsal tepal violet in upper half and lower tepals deep yellow fading to cream-coloured at tips, abaxial half of throat streaked yellow and violet, unscented; perianth tube obliquely funnel-shaped, upper part curving outward, (12–)15–16 mm long; tepals unequal, dorsal largest, erect to slightly hooded, (10)15–16 × 9–10 mm, upper laterals ± 12 mm long, directed forward, lower 3 tepals united basally for ± 2 mm, ± horizontal below, ± 10 mm long, channelled and flexed downward distally. *Stamens* unilateral, arcuate; filaments ± 13 mm long, white; anthers violet above, cream-coloured below, ± 3 mm long, fully exserted; pollen ± white. *Ovary* 4–5 mm long, oblong-trigonous; style arched over filaments, purple, dividing just below or opposite anther bases, branches ± 2 mm long, ascending, recurved distally, ciliate along margins ± to base, slightly expanded distally. *Capsules* barrel-shaped, ± 12 × 6–7 mm. *Seeds* 1.7–2.1 mm diam., light brown, (8)9 or 10 per locule. *Chromosome number* $2n = 20$. *Flowering time*: mid-August to late September.

Distribution and ecology: scattered through the western forelands of the Western Cape, South Africa, from the Cape Peninsula northward along the West Coast and through the Tulbagh and Olifants River Valleys as far north as Piketberg and Citrusdal; in renosterveld on heavy clay and granite-derived soils, often in rocky sites but also under low shrubs where it blooms more erratically than in open habitats. Naturalised in the Mt Lofty Range of South Australia.

Diagnosis: *Sparaxis villosa* is recognised by its comparatively small flowers with an erect to slightly hooded, dorsal tepal usually ± 16 mm long, much exceeding the yellow lower tepals, ± 10 mm long. The distinctive coarse corm tunic fibres are also shared with the rare *S. caryophyllacea*, but this species has larger flowers, the dorsal tepal ± 20 mm long. The two long-tubed species, *S. metelerkampiae* and *S. variegata*, also have similar corm tunics but the long perianth tube immediately sets them apart. These distinctive corm tunics define the lineage comprising these four species. A particularly small-flowered variant of *S. villosa* occurs on granite outcrops at Vredenburg, the dorsal tepal ± 10 mm long and perianth tube ± 12 mm long. These plants might easily be misidentified as *S. parviflora* were it not for the distinctive woody tunics.



Distribution of ***Sparaxis villosa***.

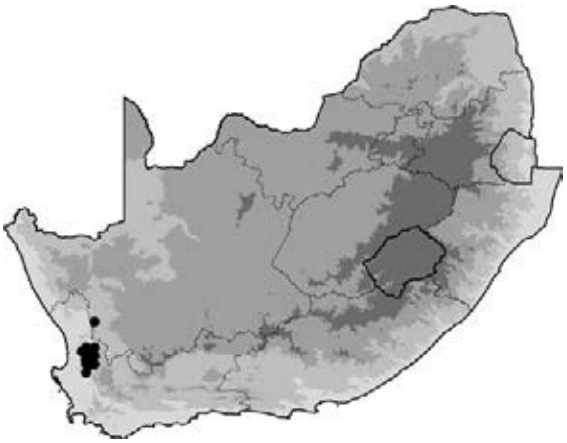
The modest-sized and fairly inconspicuous flowers appear likely to be insect pollinated but the species is self-compatible. Plants from two populations have proven to be autogamous in the greenhouse. The anthers shed pollen directly onto receptive stigmas. Selfing results in the production of full capsules with (8)9 or 10 seeds per locule (typically 27 to 30 seeds per capsule), the normal complement for the species. The autogamous habit may account for the comparatively wide range of *S. villosa*. Hybrids between *S. villosa* and *S. metelerkampiae* have been recorded at the foot of Piekenierskloof Pass. Although mostly separated geographically and edaphically, the ranges of the two species overlap for a short distance and at this locality they co-occur on loamy soils at the shale-sandstone interface.

15. **Sparaxis variegata** *(Sweet) Goldblatt* in Annals of the Missouri Botanical Garden 79: 157 (1992); Goldblatt & Manning: 58 (2013). *Synnotia variegata* Sweet: t. 150 (1826b); Lewis: 147 (1956), in part excluding var. *metelerkampiae*. Type: South Africa, without precise locality or collector, illustration in Sweet: t. 150 (1826a).

Sparaxis wattii Harv.: 330 (1838). Type: South Africa, [Western Cape], without precise locality, *Watt s.n.* (TCD, holo.; GH, K, iso.).

Plants 100–180(–300) mm high. *Corm* 12–22 mm diam.; tunics of coarse, hard fibres, with thickened vertical strands in lower half. *Stem* simple or sometimes branched near middle. *Leaves* several in a tight fan, inclined or appressed to ground, 100–150 × 8–14 mm. *Spike* secund in 2 ranks, 3- to 8-flowered, branches always with fewer flowers than main spike; bracts pale with brown streaks, margins irregularly toothed, outer 20–25 mm long, inner ± as long, divided distally into 2 long cusps. *Flowers* zygomorphic, bilabiate, either pale yellow with dorsal tepal violet and lower laterals purple at tips or less often upper three tepals violet, throat yellow to white with longitudinal purple streaks, unscented; perianth tube cylindric below, abruptly bent at right angles into wide horizontal part, cylindric part 30–32 mm long, ± 2 mm diam., upper part ± 12 mm long, slightly inflated, ± 12 mm wide at mouth; tepals unequal, dorsal longest, ± erect, lanceolate-ovate, 25–30 × 16–18 mm, upper laterals ± 20 × 10 mm, recurving in distal half, lower tepals united basally for 5–7 mm, ± clawed, limbs channelled, ± 12 × 4.5 mm. *Stamens* unilateral and arcuate; filaments ± 20 mm long; anthers parallel, white, striped purple on locule sutures, 6–7 mm long. *Ovary* ovoid, ± 3 mm long; style dividing near anther tips, branches recurving gradually, 4–5 mm long, channelled and broader in distal ½. *Capsules* oblong, 9.0–11.5 × ± 6 mm. *Seeds* globose, brown, ± 2 mm diam., (5–)8 or 9(10) per locule. *Flowering time*: late August to mid-September.

Distribution and ecology: centred in the lower Olifants River Valley between Clanwilliam and Bulshoek in Western Cape, South Africa; on rocky, often south-trending sandstone slopes, sometimes along the courses of temporary streams.



Distribution of ***Sparaxis variegata***.

Diagnosis: the large flowers of *Sparaxis variegata* are either yellow with the dorsal tepal pale violet or predominantly violet with the lower tepals either yellow or white, tipped with violet and the throat white streaked with purple lines. The typical violet-flowered form occurs in the south of the range, notably at Rondegat, south of Clanwilliam. The larger size of the flowers, including the tepals and anthers, a style that divides near the anther apices, and often the predominantly yellow perianth, distinguish *S. variegata* from closely allied *S. metelerkampiae*. The longer style with the branches arched above the anthers makes self-pollination unlikely, but in any event, the species is genetically self-incompatible. The capsules, up to 11.5 mm long, typically contain 8 to 10 seeds per locule. Like its close relative *S. metelerkampiae*, *S. variegata* has corms with coarsely fibrous tunics and flowers with a long perianth tube with a strong bend at the apex of the slender, cylindric part of the tube.

Both *Sparaxis variegata* and *S. metelerkampiae* are pollinated by long-proboscid flies, but flowers are also occasionally visited by large, long-tongued bees. The bees cannot reach nectar in the lower part of the tube and reported visits are either exploratory and may be part of a bimodal pollination system utilising both bees and flies. Some interbreeding and introgression may occur with *S. metelerkampiae* in the large population of *S. variegata* on south-trending slopes near Rondegat. Flower size is unusually variable at this locality and the predominantly purple colouration may be derived through hybridisation with *S. metelerkampiae* growing nearby.

16. **Sparaxis metelerkampiae** *(L.Bolus) Goldblatt & J.C.Manning* in Bothalia 29: 61 (1999). *Synnotia metelerkampiae* L.Bolus: 77 (1923). *Sparaxis variegata* var. *metelerkampiae* (L.Bolus) G.J.Lewis: 148 (1956). *Sparaxis variegata* subsp. *metelerkampiae* (L.Bolus) Goldblatt: 158 (1992). Type: South Africa, [Western Cape], Eendekuil, *Metelerkamp s.n.* (BOL16039, holo.; K, PRE iso.).

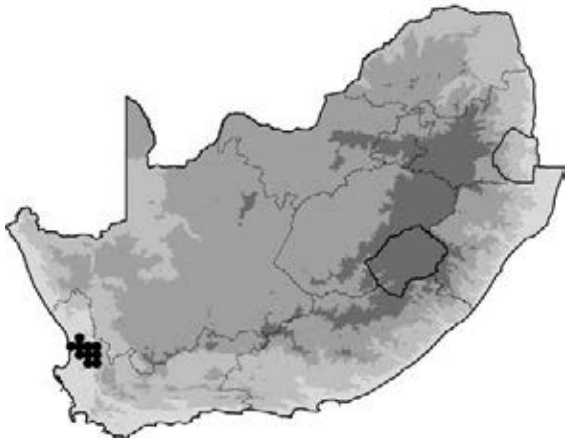
[*Sparaxis orchidiflora* G.Lodd.: t. 1099 (1826), invalid name without description.]

[*Sparaxis luteoviolacea* Eckl.: 27 (1827), invalid name without description (based on *Ecklon & Zeyher 76.8*: C, E, G, GH, P).]

Plants 120–300 mm high. *Corm* 10–16 mm diam., tunics of coarse netted fibres usually thickened below into claw-like ridges. *Stem* simple or 1(2)-branched from aerial part of stem, inclined above leaf sheaths. *Leaves* 5 to 7, lanceolate, obtuse to acute, apiculate, sometimes obliquely so, basal except uppermost, this inserted in middle of stem, ± ½–⅔ as long as stem, 7–12 mm wide, sheathing lower part of stem, often inclined toward ground. *Spike* ± secund, 2- to 5-flowered; bracts pale or irregularly streaked with brown, slightly crinkled, outer 15–18 mm long, 3-cuspidate, central cusp more prominent, inner slightly shorter, with 2 prominent cusps. *Flower* violet-purple with cream-coloured to yellow (rarely reddish) markings on lower tepals; perianth tube with cylindric lower part 35–40 mm long, upper part 10 mm long, 6–7 mm wide at mouth; tepals unequal, dorsal largest and erect with margins incurved, 15–20 mm long, 8–11 mm wide, upper laterals 12 mm long, ± 5 mm wide, directed forward below and outward distally, lower tepals united with upper lateral for ± 3 mm and to each another for ± 4 mm, limbs channelled below and flexed downward in distal half, ± 12 × 4–5 mm. *Stamens* unilateral, arcuate; filaments 10–12 mm long, purple, reaching top of tube or exserted up to 3 mm; anthers 3–4 mm long, purple, median anther extending beyond tips of laterals; pollen pale yellow. *Style* usually dividing opposite lower ⅓ of anthers or below them (possible hybrids have style dividing opposite or beyond anther tips), purple, branches diverging, 2–3 mm long, extending between anther bases. *Capsule* cylindric-trilobed, 12–15 mm long, 5 mm wide. *Seeds* glossy brown, globose, 1.3–1.6 mm diam., 10 to 12 per locule. *Chromosome number* 2*n* = 20. *Flowering time*: August to mid-September.

Distribution and ecology: extending through the northern part of Western Cape, South Africa, from the Gifberg in the north, through the Olifants River Valley and adjacent mountains to Piekenierskloof and Eendekuil in the south and to Leipoldtville in the west (an early record from Oorlogskloof on the southern Bokkeveld Mtns requires confirmation); in sandy and stony ground, always in well-drained situations.

Diagnosis: *Sparaxis metelerkampiae* has long-tubed, purple flowers with the lower tepals each with a white longitudinal streak, at the centre of which is a pale yellow or reddish mark. The tepals are smaller than those of immediately related *S. variegata*, the dorsal tepal 15–20 mm long vs. 25–30 in *S. variegata*, and the style is short, dividing below or opposite the lower third of the anthers and has branches 2–3 mm long. In *S. variegata* the longer style divides close to the anther tips and the branches are 4–5 mm long. The shorter style of *S. metelerkampiae* results in the style branches and anthers coming into contact during anthesis, ensuring self-pollination if insect-mediated pollen transfer fails. The species has been treated as a variety or subspecies of *S. variegata* on the basis of intermediates between the two but they are usually easy to distinguish and have quite different compatibility relations. Some of the variation in perianth size in both species may be due to growing conditions and possibly to hybridisation locally, as both share the same pollinator.



Distribution of ***Sparaxis metelerkampiae***.

Greenhouse studies have shown that the species is fully self-compatible and autogamous. Flowers consistently set full capsules with 10 to 12 seeds per locule without hand pollination and in the absence of insect visitors. The flowers are, however, adapted for pollination by long-proboscid flies and often receive visits from these flies. *Sparaxis metelerkampiae* appears to hybridise with *S. variegata* south of Clanwilliam and hybrids with *S. villosa* have been recorded at the foot of Piekenierskloof Pass.

NATURAL HYBRIDS (see Goldblatt & Manning 2013).

REFERENCES

ANDREWS, H. 1800. *Ixia aristata* var. *atropurpurea*. *The Botanist's Repository* 2: t. 87.

BAKER, J.G. 1877 ['1878']. Systema iridearum. *Journal of the Linnean Society*, *Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae*. Bell, London.

BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–71. Reeve & Co., Ashford, Kent.

BAKER, J.G. 1901. Iridaceae. In H. Schinz, Beiträge zur Kenntnis der Afrikanischen Flora (Neue Folge). *Bulletin de l'Herbier Boissier*, sér. 2, 1: 853–868.



Plate 52. A, ***Sparaxis bulbifera***, Cape Town, WC; B, C & D, ***S. elegans***, Nieuwoudtville, NC; E, ***S. grandiflora*** subsp. ***acutiloba***, Citrusdal, WC; F, ***S. grandiflora*** subsp. ***fimbriata***, Hermon WC; G, ***S. grandiflora*** subsp. ***grandiflora***, Tulbagh, WC; H, ***S. metlerkampiae***, Citrusdal, WC;



Plate 53. A, ***Sparaxis parviflora***, Hopefield, WC; B, ***S. pillansii***, Calvinia, NC; C & D, ***S. tricolor***, Nieuwoudtville, NC; E, ***S. roxburghii***, Citrusdal, WC; F, ***S. variegata***, Trawal, WC; H, ***S. villosa***, Tulbagh, WC.

BOLUS, L. 1923. Novitates Africanae. *Annals of the Bolus Herbarium* 3: 70–85.
BOLUS, L. 1931. Plants—new and noteworthy. *South African Gardening and Country Life* 22: 57.
BOLUS, L. 1932a. Plants—new or noteworthy. *South African Gardening and Country Life* 22: 57.
BOLUS, L. 1932b. Plants—new or noteworthy. *South African Gardening and Country Life* 22: 275–277.
BROWN, N.E. 1929. The Iridaceae of Burmann's Florae capensis prodromus. *Bulletin of Miscellaneous Information, Kew* 1929: 129–137.
BREYNE, J. 1739. *Prodromus fasciculi rariorum plantarum*. Danzig, J.P. Breyne.
BURMAN, N.L. 1768. *Prodromus plantae capensium*. Leiden.
CURTIS, W. 1797. *Ixia tricolor*. Three Ixia. *The Botanical Magazine* 11: t. 381.
DELAROCHE, D. 1766. *Descriptiones plantarum aliquot novarum*. Verbeek, Leiden.
ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.
GOLDBLATT, P. 1969. The genus *Sparaxis*. *Journal of South African Botany* 35: 219–252.
GOLDBLATT, P. 1991. An overview of the systematics, phylogeny and biology of the southern African Iridaceae. *Contributions from the Bolus Herbarium* 13: 1–74.
GOLDBLATT, P. 1992. Phylogenetic analysis of the South African genus *Sparaxis* (including *Synnotia*) (Iridaceae: Ixioideae), with two new species and a review of the genus. *Annals of the Missouri Botanical Garden* 79: 143–159.
GOLDBLATT, P. 1999. *Sparaxis* (Iridaceae). In G. Germishuizen, *Flora of southern Africa* 7(2: 1): 150–168. National Botanical Institute, Pretoria.
GOLDBLATT, P. & MANNING, J.C. 1999. New species of *Sparaxis* and *Ixia* (Iridaceae: Ixioideae) from Western Cape, South Africa, and taxonomic notes on *Ixia* and *Gladiolus*. *Bothalia* 29: 59–63.
GOLDBLATT, P. & MANNING, J.C. 2013. Systematics and biology of the Cape genus *Sparaxis* (Iridaceae). *Strelitzia* 32: 1–76.
HARVEY, W.H. 1838. *Genera of South African plants*. Robertson, Cape Town.
HORNEMANN, J.W. 1819. *Supplementum horti botanici hafniensis*. Schultes, Copenhagen.
JACQUIN, N.J. 1791 ['1790']. *Collectanea*, vol. 4. C.F. Wappler, Vienna.
JACQUIN, N.J. 1788–1795 ['1786–1793']. *Icones plantarum rariorum*, vol. 2. C.F. Wappler, Vienna.
JACQUIN, N.J. 1797. *Plantarum rariorum horti caesarei schoenbrunnensis*, vol. 1. C.F. Wappler, Vienna.
KER GAWLER, J.B. 1802. *Ixia bicolor*. Ringent Ixia. *Curtis's Botanical Magazine* 15: t. 548
KER GAWLER, J.B. 1804a ['1805']. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.
KER GAWLER, J.B. 1804b. *Sparaxis grandiflora* var. β. Streaked-flowered sparaxis. *Curtis's Botanical Magazine* 20: t. 779.
KER GAWLER, J.B. 1812. *Sparaxis tricolor* (β, γ, δ). Three sparaxis. *Curtis's Botanical Magazine* 236: t. 1482.
KER GAWLER, J.B. 1818. *Sparaxis grandiflora*; γ, liliago. Redouté's sparaxis. *The Botanical Register* 3: t. 258.
KLATT, F.W. 1862. Specimen e familia Iridearum. *Linnaea* 31: 533–570.
KLATT, F.W. 1867. Diagnoses iridearum novarum. *Linnaea* 35: 378.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
LAMARCK, J.B.A.P.M. 1789. *Encyclopédie méthodique. Botanique* 3. Paris.
LEWIS, G.J. 1956. A revision of the genus *Synnotia*. *Annals of the South African Museum* 50: 137–151.
LEWIS, G.J. 1962. South African Iridaceae. The genus *Ixia*. *South African Journal of Botany* 28: 45–195.
LINNAEUS, C. 1756. *Centuria II. plantarum*. Uppsala.
LINNAEUS, C. 1759. *Systema naturae*, edn. 10, vol.2. Salvius, Stockholm.
LINNAEUS, C. 1767. *Mantissa plantarum*. Salvius, Stockholm.
LODDIGES, G. 1826. *Sparaxis orchidiflora*. *The Botanical Cabinet* 11: t. 1099. C. Loddiges & Sons, London.
MILLER, P. 1758. *Figures of plants*, vol. 2. P. Miller, London.
MILLER, P. 1768. *The gardeners dictionary*, edn 8. P. Miller, London.
MOENCH, C. 1802. *Supplementum ad methodus plantas*. Marburgi Cattorum, Marburg.
POLE-EVANS, I. 1928. *Streptanthera cuprea*. *Flowering Plants of South Africa* 8: t. 320.
RAFINESQUE, C. 1838 ['1836']. *Flora Telluriana*, vol. 4. Published by author, Philadelphia.
REDOUTÉ, J.P. 1805. *Ixia liliago*. *Les Liliacéées*, vol. 2. Didot Jeune, Paris.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium*, vol. 1. J.G. Cotta, Stuttgart.
SALISBURY, R.A. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SCHNEEVOGT, G.V. 1794. *Ixia tricolor*. *Icones plantarum rariorum*. Haarlem.
SCHRANK, F. DE P. 1822. Commentarius in Irideas capenses. *Denkschriften Königlich-Baierischen Botanischen Gesellschaft in Regensburg* 2: 165–224.
SWEET, R. 1826a. *Synnotia variegata* Sweet. *British Flower Garden* 2: t. 150.
SWEET, R. 1826b. *Hortus Britannicus*. London.
SWEET, R. 1826c. *Sparaxis versicolor*. *British Flower Garden* 2: t. 160.
SWEET, R. 1827. *Streptanthera elegans*. *British Flower Garden* 3: t. 209.
SWEET, R. 1830. *Hortus Britannicus*, edn. 2. London.
SWEET, R. 1831. *Streptanthera cuprea*. *British Flower Garden* ser. 2, 2: t. 122.
SWEET, R. 1832. *Sparaxis lineata*. *British Flower Garden* ser. 5: t. 131.
SWEET, R. 1837. *Sparaxis stellaris*. *British Flower Garden* 7: t. 383.
THUNBERG, C.P. 1784. *Dissertatio de Gladiolo*. Uppsala.

25. **Duthiastrum**

Duthiastrum *M.P.de Vos* in Journal of South African Botany 41: 91 (1975), as a new name for *Duthiella* M.P.de Vos: 301 (1974), illegitimate homonym, not *Duthiella* C.Mueller Hal. ex Broth. in Engl. & Prantl.: 1009 (1908). Type: *Duthiella linifolia* (Phillips) M.P.de Vos = *Duthiastrum linifolium* (Phillips) M.P.de Vos

Revisionary accounts: De Vos: 301–309 (1974); De Vos: 139–141 (1999).

Named for the pioneering South African botanist, Miss A.V. Duthie (1881–1963), combined with the Latin, *aster*, star.

Deciduous geophytes. *Corm* globose, axial in origin; tunics of fine, netted fibres. *Cataphylls* 2 or 3, membranous or papery. *Leaves* several, unifacial, linear to narrowly sword-shaped, mostly basal, in a tight 2-ranked fan, blades plane, with a definite main vein, leathery; margin without vascular bundle, epidermal cells columnar with thickened walls. *Stem* subterranean, branched below ground. *Inflorescence* subterranean, branched, of 1(2) sessile flowers terminal on axes; bracts oblanceolate, membranous, concealed by leaves, inner 2-veined and slightly shorter than outer, notched apically. *Flowers* actinomorphic, long-lived, salver-shaped, yellow (rarely orange), unscented, with nectar from septal nectaries; perianth tube elongate, cylindric; tepals subequal, spreading, lanceolate. *Stamens* symmetrically disposed, erect; filaments inserted shortly below top of perianth tube; anthers suberect, yellow. *Ovary* subterranean, club-shaped and conspicuously stalked; style filiform, 3-branched distally, branches narrowly oblanceolate, longitudinally folded. *Capsules* borne at ground level, ellipsoid, conspicuously stalked, cartilaginous. *Seeds* globose, flattened at chalazal end, hard, smooth and shiny, testal cells obscured by thick cuticle; ovular vascular trace excluded. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number* $x = 10$.

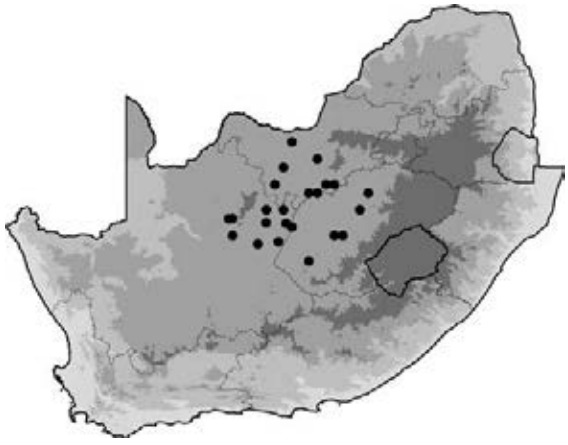
Species 1, central South Africa.

A distinctive, monospecific genus recognised by its contracted, subterranean stem, basal fan of sword-shaped leaves with anatomically specialised margins, mostly solitary, yellow flowers with an elongate perianth tube, and subterranean, conspicuously stalked ovary and capsules. Several of these states, notably the branched inflorescence with 1(2) flowers per branch, long-tubed flowers with the floral tube largely blocked by the style and thus functioning as a pseudostalk, and stalked capsules, are correlated with the stemless habit and are thus not independent. The finely netted corm tunics are characteristic of several related genera including *Ixia* and *Sparaxis*. Among them, similar, derived seeds with a smooth, glossy testa and excluded vascular bundle and the specialised leaf margin anatomy are found also in *Chasmanthe*, *Sparaxis* and *Tritonia*, and molecular data place *Duthiastrum* as sister to *Sparaxis*. The two genera share the basic chromosome number $x = 10$.

1. **Duthiastrum linifolium** *(E.Phillips) M.P.de Vos* in Journal of South African Botany 41: 91 (1975). *Syringodea linifolia* E.Phillips: 125 (1913). *Duthiella linifolia* (E.Phillips) M.P.de Vos: 306 (1974). Type: South Africa, [Northern Cape], without precise locality or collector *SAM 20664* (SAM, holo.).

Plants 60–150 mm high. *Corm* 10–15 mm diam.; tunics of fine, netted fibres. *Stem* up to 100 mm long, subterranean, branched. *Leaves* 6 to 9, mostly basal, linear to narrowly lanceolate, 40–120 × (1.5–)3.0–6.0 mm, with prominent main and secondary veins. *Spike* 1- or 2-flowered; bracts 25–60 mm long, membranous and pellucid, inner as long as or shorter than outer. *Flowers* bright yellow (rarely dull orange with yellow star in centre), outer tepals veined or flushed brownish purple beneath, unscented, opening midday and closing at dusk; perianth tube 40–80 mm long, ± 1 mm diam., occluded by style but widening gradually to 2 mm in upper 10 mm; tepals spreading, elliptic, 12–25 × 4–8 mm. *Filaments* 4–6 mm long; anthers 5–7 mm long, incurved apically, yellow. *Ovary* with stalk 1.5–15.0 mm long; style dividing opposite anthers, branches 3–6 mm long. *Capsules* ellipsoid, 20–25 mm long, stalked. *Seeds* 2–3 mm diam. *Flowering time*: March to May (June).

Distribution and ecology: scattered through central South Africa in the Vaal–Orange drainage basin, from Kimberley in Northern Cape to Mmbatho in Northwest



Distribution of ***Duthiastrum linifolium***.



Duthiastrum linifolium: A, flowering plant; B, dehiscing capsules; C, seed.

and eastward to Kroonstad in Free State, with a recent unconfirmed sight record from Devon near Heidelberg in Gauteng of a population with dull orange flowers. The species is locally common in alluvial washes, mainly in limey silt or on chalky flats.

The flowers open in the early afternoon around 13:00 and close shortly after dark each day. The perianth tube, although elongate, has a relatively thick wall and functions as a pseudo-pedicel: the interior is occluded by the long style except near the apex where the tube widens slightly. The little nectar that is produced is forced by capillary action into the top of the tube where it is accessible to a range of insects with short mouthparts, including various bees, the most likely pollinators. The capsules protrude above ground level at maturity, carried up to the surface by elongation of the stem.

REFERENCES

DE VOS, M.P. 1974. *Duthiella*, 'n nuwe genus van die Iridaceae. *Journal of South African Botany* 40: 301–309.

DE VOS, M.P. 1975. 'n Nuwe naam vir *Duthiella*. *Journal of South African Botany* 41: 91.

DE VOS, M.P. 1999. *Duthiastrum*. In G. Germishuizen (ed), *Flora of southern Africa* 7 (2, 1) (Iridaceae: Ixioideae: Ixeae: Ixiinae and Tritoniinae): 139–141. National Botanical Institute, Pretoria.

ENGLER, A. & PRANTL, K. 1908. *Die naturlichen Pflanzenfamilien* 1(3, 231). W. Engelmann, Leipzig.

PHILLIPS, E.P. 1913. Contributions to the Flora of South Africa. *Annals of the South African Museum* 9: 111–127.



Plate 54: ***Duthiastrum linifolium***, Kimberley, NC.

26. **Dierama**

Dierama *K.Koch,* Index Seminum Hortus Berolinensis 1854, Appendix 10 (1855). Type: *Dierama ensifolium* K.Koch & C.D.Bouché = *D. pendulum* (L.f.) Baker

From the Greek, *dierama*, a funnel, describing the shape of the flower.

Revisionary account: Hilliard & Burtt (1991).

Evergreen perennials, solitary or growing in clumps. *Rootstock* a depressed-globose corm rooting from below and axial in origin, persisting; tunics of coarse, netted fibres, often accumulating in a dense mass. *Stem* aerial, slender and wiry, often drooping above, rarely erect, usually several-branched, subtending bracts dry and thread-like. *Leaves* several, often without a definite midrib in mature plants, plane, linear, leathery and fibrotic; with marginal vascular bundle and unspecialised epidermal cells. *Spikes* pendent or erect, axes wiry; bracts dry, usually papery and translucent, occasionally solid and herbaceous or leathery in centre or lower part, becoming torn above, usually brown-streaked or -spotted, outer with prominent main vein and numerous smaller lateral veins, acute or attenuate, inner smaller than outer, 2-veined, forked apically. *Flowers* actinomorphic, bell-shaped, long-lived, usually nodding, mostly pink to mauve but also maroon or purple, yellow or white, with dark markings near tepal bases, unscented, with nectar from septal nectaries; perianth tube funnel-shaped, relatively short; tepals subequal, cupped or spreading distally, often enclosing stamens and style. *Stamens* symmetrically disposed, central; filaments slender; anthers linear, dehiscing longitudinally. *Ovary* globose, sessile; style filiform, surrounded by stamens, usually included in floral cup, branches short, slender, slightly expanded above and recurved. *Capsules* globose, cartilaginous. *Seeds* globose or lightly angled, flattened at the chalazal end, smooth, hard, often shiny, ovular vascular trace excluded. *Pollen* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number* $x = 10$.

Species ± 45, southern and eastern tropical Africa, centred in eastern southern Africa with 37 species in the region, and six species restricted to tropical Africa from Zimbabwe through Malawi, Tanzania and Kenya to Ethiopia; mainly montane but also coastal in South Africa, favouring rocky grassland but also in marshes and along streams. Primarily a genus of highland grassland but extending to near the coast along the temperate eastern seaboard of South Africa, most diverse in KwaZulu-Natal with 26 species (Hilliard & Burtt, 1991).

Dierama is recognised by the mostly evergreen habit, tough, fibrous leaves, and slender, wiry stems with drooping spikes of radially symmetric, funnel-shaped flowers subtended by large, dry, papery or sometimes partly herbaceous floral bracts, generally pale with brown streaks and veins. A few species are exceptional in having semi-erect spikes with nearly upright flowers. The adult leaves are distinctive in lacking a prominent central vein, although this is present in the juvenile state.

Dierama is one of a small group of allied genera with more-or-less dry floral bracts and specialised seeds with a smooth, glossy testa and a vascular bundle that is excluded from the seed body during development. Within this group it is most closely allied to *Tritonia* and *Ixia*, where the unusually flexible, wiry stems, ancestrally actinomorphic flowers, and basic chromosome number $x = 10$ suggest a likely sister relationship with *Ixia*, which is evidently derived in possessing 3-veined and often tricuspidate outer bracts, and pollen with a 1-banded operculum.

The flowers are pollinated by solitary bees that forage for nectar and pollen. The genus shows only modest floral variation, confined to size, colour and degree of spreading of the tepals.

Almost all the species merit horticultural attention, but few are available in the trade, where they are often misidentified as *D. pendulum*, for many years the only named species.

The taxonomy of *Dierama* is still far from adequately understood despite the monograph by Hilliard & Burtt (1991). Many of the taxa recognised at species level by Hilliard & Burtt (1991) were considered by them to have 'multiple relationships with one another', and more work is clearly required to analyse this further. As it is, species recognition in the genus is difficult, both because of the lack of critical diagnostic features and the frequent introgression between species. The following identification key serves to discriminate typical examples. The original keys to the species provided by Hilliard & Burtt (1991) should also be consulted.

Key to species

1a Foliage leaves produced on separate shoot alongside flowering stem and often not fully formed at flowering; plants flowering early spring, August to September:
2a Flowering stem lacking conspicuous basal internode and without axillary cormlets; tepals suberect, flaring distally, ± twice as long as perianth tube . . . . . 3. *D. nixonianum*

2b Flowering stem with conspicuous basal internode and with axillary cormlets in lowermost leaf axil; tepals spreading widely from near base, ± three times as long as perianth tube . . . . . 4. *D. trichorhizum*
1b Foliage leaves produced at base of flowering stem and fully formed at flowering; plants flowering in spring and summer, September to February or later:
3a Bracts with solid patch of hard tissue in lower ½–⅔, this often drying pale buff-coloured or uniform brown:
4a Plants solitary or few in small tufts, with pendulous inflorescences; leaves 2–6 mm wide; co-florescences 2 to 5; flowers funnel- or bell-shaped. . . . . 26. *D. insigne*
4b Clump-forming species with erect or suberect inflorescences; leaves 6–12 mm wide; co-florescences ± 10; flowers subrotate. . . . . 27. *D. erectum*
3b Bracts membranous or with solid patch of tissue only at extreme base:
5a Inflorescences erect and suberect; bracts whitish to orange-buff-coloured and lightly flecked all over:
6a Flowering stems 1 000–1 500 mm tall; leaves 450–1 000 mm long; lateral spikes mostly 6- to 13-flowered; perianth tube mostly 6–8 mm long; plants from central KwaZulu-Natal to Mpumalanga . . . . . 1. *D. galpinii*
6b Flowering stems 450–850 mm tall; leaves 300–600 mm long; lateral spikes mostly 4- to 7-flowered; perianth tube mostly 5–6 mm long; plants from southern KwaZulu-Natal . . . . . .2. *D. tysonii*
5b Inflorescences ± pendulous; bracts various:
7a Bracts entirely white or so lightly flecked as to appear white:
8a Flowers white to pale yellow, rarely pale pink:
9a Terminal spike 3- to 6-flowered; bracts 24–32 mm long; perianth 30–50 mm long . . . . . .34. *D. luteoalbidum*
9b Terminal spike mostly 6- to 12-flowered; bracts 14–25 mm long; perianth 13–30(–35) mm long:
10a Perianth 18–35 mm long . . . . . 33. *D. argyreum*
10b Perianth 14–18 mm long. . . . . .35. *D. pallidum*
8b Flowers pink to purple:
11a Perianth 14–18 mm long, often shorter than the bracts; anthers 5–6 mm long . . . . . .28. *D. dubium*
11b Perianth (17–)20–33 mm long, much longer than the bracts; anthers 7–10 mm long:
12a Flowering stems solitary or up to three in small tufts; leaves 3–6 mm wide . . . . . .29. *D. reynoldsii*
12b Flowering stems forming large clumps; leaves (5–)6–15 mm wide . . . . . .30. *D. latifolium*
7b Bracts ± evidently flecked with brown:
13a Flowers white to pale yellow:
14a Leaves almost needle-like, 1.0–2.5 mm wide; bracts heavily flecked and almost solidly coloured throughout except along margins . . . . . 37. *D. pumilum*
14b Leaves 3–9 mm wide; bracts moderately to heavily flecked toward base with paler shoulders:
15a Anthers 5–7 mm long; plants from KwaZulu-Natal. . . . . 36. *D. sertum*
15b Anthers 7–9 mm long; plants from Eswatini . . . . . 17. *D. elatum*
13b Flowers pink to purple or dark wine-red:
16a Flowers dark wine-red, rarely purple but then perianth less than 35 mm long:
17a Perianth 22–31 mm long:
18a Plants 1 200–2 100 mm high; terminal spike 8- to 18-flowered; plants from Mpumalanga to Northern KwaZulu-Natal . . . . . 31. *D. tyrium*
18b Plants 750–1 250 mm high; terminal spike mostly 4- to 8-flowered; plants from Eastern Cape . . . . 32. *D. atrum*
17b Perianth 15–23 mm long:
19a Bracts reddish brown with paler shoulders, with 4 or 5 main veins each side of the midvein; lateral spikes often borne on strikingly long peduncles, usually 90–230 mm long . . . . . 25. *D. mobile*
19b Bracts dark brown with sharply contrasting white shoulders, with 6 to 8 main veins each side of the midvein; lateral spikes on shorter peduncles 60–125 mm long . . . . . 24. *D. pictum*
16b Flowers pale to magenta-pink or mauve, rarely purple but then perianth 35–54 mm long:
20a Small, mostly clump-forming plants 300–600 mm tall with leaves 1–4 mm wide; terminal spike 1- to 4(5)-flowered; bracts bright rusty brown with 6 to 8 main veins each side of the midvein; flowers bright pink or reddish . . . . . .23. *D. pauciflorum*
20b Not as above:
21a Flowering stems forming large clumps; perianth 15.5–20.5 mm long with stigmas held 3.5–7.5 mm below top. . . . . 15. *D. floriferum*
21b Not as above:
22a Plants from Western and Eastern Cape, Free State or southern and central KwaZulu-Natal:
23a Perianth 28–50 mm long and plants from west of the Kei River:
24a Tips of tepals ± folded together and twisted giving them a pointed appearance . . . . . .7. *D. grandiflorum*
24b Tips of tepals not folded and twisted:
25a Flowers funnel-shaped with widely flaring tepals; plants from west of Grahamstown . . . 5. *D. pendulum*
25b Flowers ovoid in shape with suberect or weakly spreading tepals; plants from east of Grahamstown. . . . . .6. *D. pulcherrimum*
23b Perianth up to 30(–35) mm long and plants from east of the Kei River:
26a Perianth mostly 26–35 mm long with tube 8–13 mm long; anthers mostly 8–12 mm long . . 9. *D. robustum*
26b Perianth mostly 15–28 mm long with tube 5–8 mm long; anthers 5–8 mm long:
27a Main veins 6 to 9 each side of the midvein with well-developed intermediate veins, all coalescing to form a solid base . . . . . .10. *D. ambiguum*
27b Main veins 4 to 6 each side of the midvein, intermediates well developed or not but never coalescing:
28a Plants forming clumps:
29a Flowers pale mauve; perianth 25–28 mm long with tepals 8–12 mm wide. . . . . 13. *D. jucundum*



DIERAMA. D. longistylum: A, leaf and flowering stem; B, outer bract; C, half-flower. ***D. plowesii***: D, flowering plant; E, outer bract; F, half-flower.

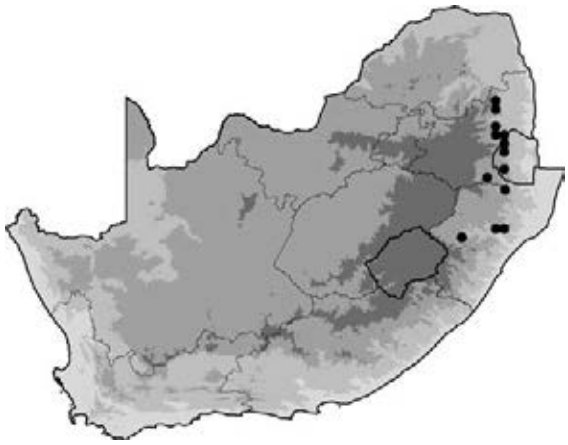
29b Flowers mostly pink to red, rarely mauve; perianth up to 23 mm long with tepals 5–8 mm wide . . . . . 14. *D. dracomontanum*
28b Plants solitary or few in tufts:
30a Bracts two internodes long, with 6 main veins on each side of the midvein, all veins closely contiguous and parallel. . . . . 12. *D. cooperi*
30b Bracts usually shorter than two internodes long, with 4 to 6 main veins on each side of the midvein, all veins not closely contiguous and parallel:
31a Flowers pale pink or almost white; bracts drab; plants coastal from Durban southward 8. *D. igneum*
31b Flowers and bracts more richly coloured; plants from Drakensberg foothills and lower slopes . . . . . .11. *D. dissimile*
22b Plants from northern KwaZulu-Natal, Gauteng, Mpumalanga, Limpopo or Eswatini:
32a Perianth 26–37 mm long with tube (6.5–)8.0–12.0 mm long; leaves (4–)6–10 mm wide . . . . 16. *D. formosum*
32b Perianth 13–25(–27) mm long with tube 4.0–7.5 mm long; leaves 1.5–5.0 mm wide:
33a Bracts with 6 to 8 main veins each side of midvein:
34a Bracts dark brown with contrasting white shoulders; perianth pink to wine-red, 15–23 mm long . . . . . 24. *D. pictum*
34b Bracts chestnut-brown with paler brown shoulders; perianth pink, 20–29 mm long . . . . .22. *D. nebrownii*
33b Bracts with 3 to 5 main veins each side of midvein:
35a Lateral spikes 6 to 8. . . . . 20 *D. adelphicum*
35b Lateral spikes mostly up to 5:
36a Bracts delicately veined, with 3 or 4 faint main veins restricted to basal half . . . . . .21. *D. gracile*
36b Bracts more strongly and heavily veined:
37a Bracts < 2 internodes long; perianth mostly 19–25 mm long; anthers mostly 6–7 mm long . . . . . .18. *D. mossii*
37b Bracts 2 internodes long or longer; perianth mostly 13–18 mm long; anthers mostly 4.5–6.0 mm long . . . . . 19. *D. medium*

1. **Dierama galpinii** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 200 (1929). Type: South Africa, [Mpumalanga], near Barberton, Saddleback Range, Sept.–Oct., *Galpin 527* (K, holo.; BOL, PRE, iso.).

Plants 1.0–1.5 m high, stems few in small tufts. *Corm* ± 25–40 mm diam. *Stem* with lowermost peduncle 35–90 mm long. *Foliage leaves* several, mostly 450–1 000 × 4–8 mm; reduced sheathing leaves 4 to 6. *Spikes* erect or suberect, terminal 6- to 14-flowered, laterals 5 to 10, suberect, (4)6- to 13-flowered; bracts lanceolate to oblanceolate, acuminate and usually with 2 lateral cusps, 10–20 × 3–5(–6) mm, 2 internodes long or longer, lightly flecked all over, midline often uniformly orange-brown, lateral veins 3 to 5 each side of main vein, 2 veins flanking midvein sometimes running almost to apex. *Flowers* funnel-shaped with tepals widely flaring, pale to bright magenta-pink, rarely white; perianth tube (5.5–)6.0–8.0 mm long; tepals 12–17 × 4–8 mm. *Anthers* (5.5–)6.0–8.0 mm long. *Stigmas* held 2.0–7.5 mm below top of perianth. *Flowering time*: mainly August to November (April).

Distribution and ecology: extending from Kaapsche Hoop in southern Mpumalanga, South Africa, through western Eswatini to Estcourt in northern KwaZulu-Natal, South Africa; in grassland, from ± 600–1 600 m elevation.

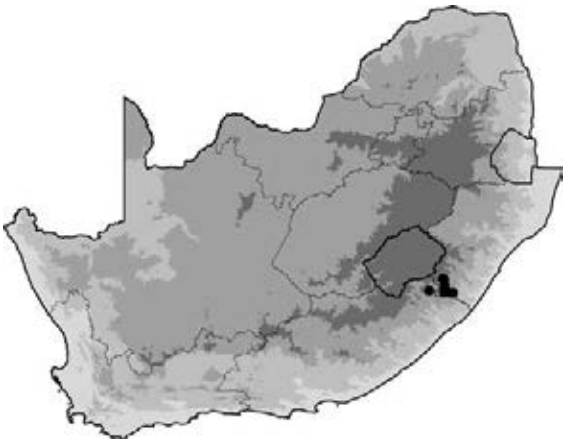
Diagnosis: a tufted species with erect inflorescences 1.0–1.5 m tall of pale to deep pink flowers with perianth 17–25 mm long, and translucent, lightly flecked bracts. *Dierama tysonii* from southern KwaZulu-Natal with similar inflorescences is more strongly clump-forming, with shorter stems up to 8.5 m tall, and fewer flowers on the lateral spikes, mostly 4 to 7.



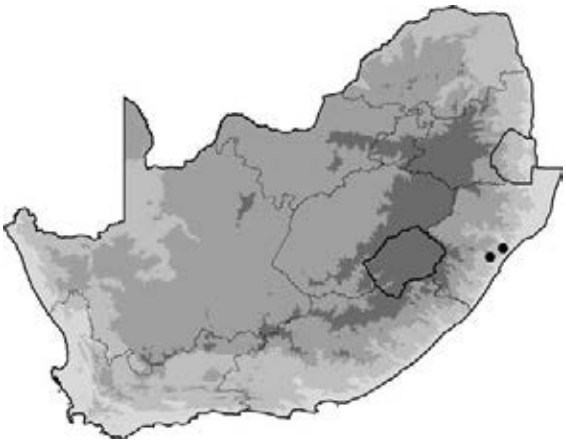
Distribution of ***Dierama galpinii***.

2. **Dierama tysonii** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 200 (1929). Type: South Africa, [KwaZulu-Natal], grassy slopes near Kokstad, *Tyson 1558* (K, holo.; BOL, iso.).

Plants ± 450–850 mm high, in small clumps. *Corm* ± 20–40 mm diam. *Stem* with lowermost peduncle 45–120 mm long. *Foliage leaves* several, 300–600 × 3.5–8.5 mm; reduced sheathing leaves 3 or 4. *Spikes* erect, terminal 6- to 9-flowered, laterals 4 to 8, 4- to 7-flowered; bracts lanceolate to oblong-lanceolate, acuminate, 14–20 × 4–6 mm, ± 2 internodes long, lightly flecked all over and midline often uniformly orange-brown, especially in upper part, secondary veins 5 or 6 each



Distribution of ***Dierama tysonii***.



Distribution of ***Dierama nixonianum***.

side of main vein. *Flowers* funnel-shaped with tepals widely flaring, pale to bright magenta-pink; perianth tube 5–6 mm long; tepals 14–18 × 4.5–7.0 mm. *Anthers* 6.5–8.5 mm long. *Stigmas* held 5–9 mm below top of perianth. *Flowering time*: September to October.

Distribution and ecology: a narrow endemic of southern KwaZulu-Natal, South Africa, between Swartberg and Ngeli, possibly extending into Eastern Cape; in open grassland, from 1 370–1 650 m elevation.

Diagnosis: a clump-forming species with erect spikes of pale to deep pink flowers with perianth 19–23 mm long, and translucent, lightly flecked bracts. *Dierama galpinii* from southern Mpumalanga and northern KwaZulu-Natal has similar spikes but longer stems 1.0–1.5 m tall in smaller tufts, and more flowers on the lateral spikes, mostly 6 to 13.

3. **Dierama nixonianum** *Hilliard* in Hilliard & Burtt, Dierama: 143 (1991). Type: South Africa, [KwaZulu-Natal], near Pietermaritzburg on Wartburg road, Bloemendal, *Nixon s.n.* (E, holo.).

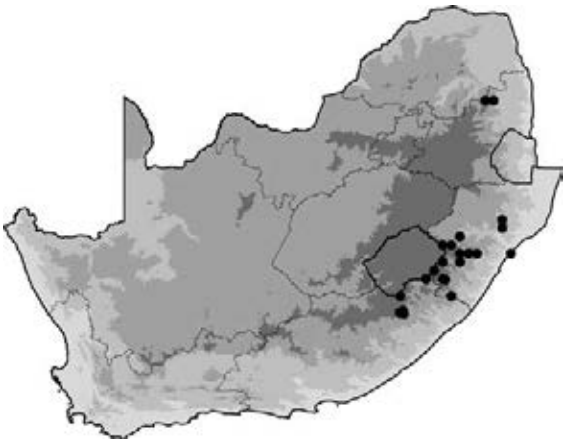
Plants 100–750 mm high, solitary or up to 15 stems tufted together. *Corm* 10–17 mm diam. *Stem* with lowermost internode (when present) 25–100 mm long. *Foliage leaves* 3 or 4, borne on a separate shoot and often not fully developed at flowering, ± 150–330 × 0.75–2.50 mm; sheathing cauline leaves 3 or 4. *Spikes* ± pendulous or suberect, terminal 1- to 8-flowered, laterals lacking or up to 5, pendulous, each 1- to 5-flowered; bracts obovate to lanceolate, acute, 8–15 × 4–6 mm, up to ± 2 internodes long or shorter, lightly flecked orange-red at base and along midline or all over, midline often ± solidly brown, secondary veins 3 or 4 each side of main vein. *Flowers* bell-shaped with tepals suberect and flaring distally, pale mauve; perianth tube 6–8 mm long; tepals 11–13 × 4.0–5.5 mm. *Anthers* 4.5–6.0 mm long. *Stigmas* held 5–8 mm below top of perianth. *Flowering time*: late August to September.

Distribution and ecology: confined to northern and south-central KwaZulu-Natal, South Africa, from Utrecht to Wartburg; in grassland over sandstone, at ± 760–1 500 m elevation.

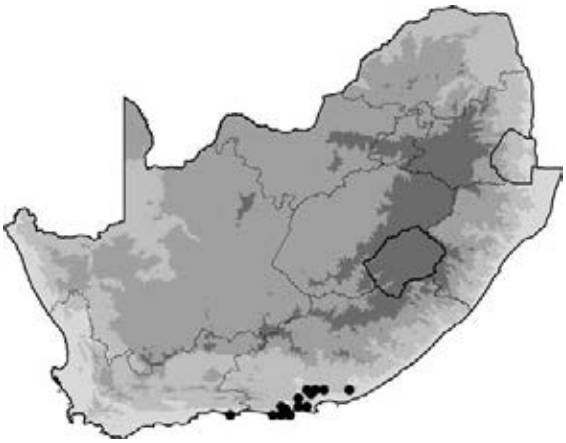
Diagnosis: a small, early-flowering species with foliage leaves produced on a separate shoot alongside the flowering stem and often not fully formed at flowering, rather closed flowers with tepals only twice as long as the perianth tube, and short bracts, 8–15 mm long. *Dierama trichorhizum* has a similar habit, with the current season's foliage leaves on a shoot alongside the flowering stem, but with a characteristic long internode between the corm and the lowest cauline leaf on the flowering stem, cormlets in the lowest leaf axil, and widely funnel-shaped flowers with spreading tepals three times as long as the perianth tube.

4. **Dierama trichorhizum** *(Baker) N.E.Br.* in Journal of the Royal Horticultural Society 54: 202 (1929). *Morphixia trichorhiza* Baker: 237 (1876). *Ixia trichorhiza* (Baker) Baker: 165 (1892). Type: South Africa, [KwaZulu-Natal], near Port Natal, *Sutherland s.n.* (K, holo.; TCD, iso.).

Plants 100–600 mm high, solitary or up to ± 3 tufted together. *Corm* ± 15 mm diam. *Stem* with basal internode 5–20 mm long, developing 1 or 2 cormlets in axil of lowest cauline leaf; lowermost peduncle (when present) 20–160 mm long. *Foliage leaves* up to 4, borne on a separate shoot and often not developed at flowering, ± 150–400 × 2.0–3.5 mm; sheathing cauline leaves 4 or 5. *Spikes* with terminal erect, 1- to 5-flowered, laterals lacking or up to 4, pendulous, each 1- to 3(5)-flowered; bracts ovate, 3-toothed with median tooth largest, 6–14 × 5–8 mm, ½ to 1½ internodes long, lightly to heavily flecked reddish brown, lateral veins 4 or 5 each side of main vein, delicate. *Flowers* funnel-shaped with tepals flaring widely, pale mauve or pink to light purple; perianth tube 4.5–5.0(–7.0) mm long; tepals 12–19 × 4–7 mm. *Anthers* 5–8 mm long. *Stigmas* held 7–12 mm below top of perianth. *Flowering time*: August to September.



Distribution of ***Dierama trichorhizum***.



Distribution of ***Dierama pendulum***.

Distribution and ecology: scattered along the eastern seaboard and interior of South Africa, from Mt Sheba in Mpumalanga through eastern Lesotho and the Drakensberg and Midlands of KwaZulu-Natal south to Umzimkhulu; often on moist or marshy grassy slopes but sometimes in drier stony areas.

Diagnosis: a small, early-flowering species with foliage leaves produced on a separate shoot alongside the flowering stem and often not fully formed at flowering, and flowers with spreading tepals three times as long as the perianth tube. The small, 3-toothed bracts, 6–14 mm long, are also diagnostic. *Dierama trichorhizum* is unique in the genus in the well-developed basal internode between the corm and the lowest cauline leaf on the flowering stem, and in producing cormlets in the lowest leaf axil. *Dierama nixonianum* has a similar habit, producing the foliage leaves on a shoot alongside the flowering stem, but lacks the pronounced basal internode and axillary cormlets, and has rather more closed flowers with tepals only twice as long as the perianth tube.

5. **Dierama pendulum** *(L.f.) Baker* in Journal of the Linnean Society, Botany 16: 99 (1877). *Ixia pendula* L.f.: 91 (1782). *Watsonia palustris* Pers.: 43 (1805), illegitimate superfluous name for *I. pendula* L.f. *Sparaxis pendula* (L.f.) Ker Gawl.: t. 1482 (1812). Type: South Africa, [Eastern Cape], Humansdorp, Kromme River, *Thunberg s.n.* (LINN58.5, holo.).

   Gladiolus pendulus Mund ex Eckl.: 16 (1827). Type: South Africa, [Eastern Cape], George [District], ex hort. Cape Town, ?*Ecklon s.n.* [S, lecto., designated by Nordenstam: 292 (1972)].

   Dierama ensifolium K.Koch & C.D.Bouché in Koch: 10 (1855). Type: South Africa, without precise locality or collector, ex hort. Berlin (type unknown, possibly B†).

Plants ± 1–2 m high, solitary or a few stems tufted in small clumps. *Corm* 25–45 mm diam. *Stem* with lowermost peduncle 40–120 mm long. *Foliage leaves* several to many, 600–900 × 6.0–8.5 mm; reduced sheathing leaves ± 5. *Spikes* pendulous, terminal densely 5- to 9-flowered, laterals 3 to 7, each 2- to 7-flowered; bracts oblanceolate to elliptic, acute to shortly acuminate, 18–30 × 8–13 mm, rarely up to 2 internodes long, flecked brownish all over but more lightly toward margins, appearing brown to eye, lateral veins 5(6) each side of main vein. *Flowers* funnel-shaped, purplish pink; perianth tube (8–)9–13 mm long; tepals (20–)22–32 × 8–12(–16) mm. *Anthers* 8–9(–10) mm long. *Stigmas* held mostly 10–20 mm below top of perianth. *Flowering time*: June to November.

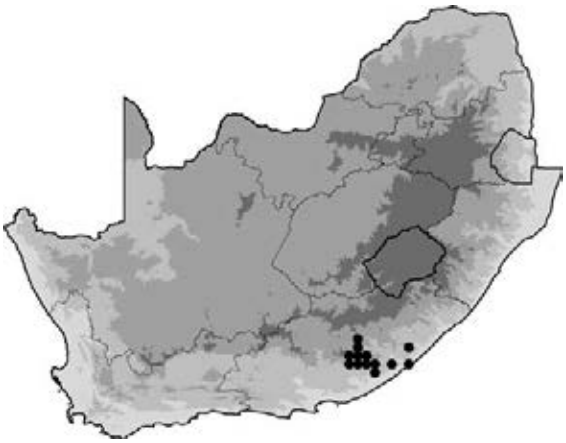
Distribution and ecology: restricted to the southern coast from Knysna in Western Cape to the Zuurberg and Grahamstown in Eastern Cape, South Africa; in stony or marshy grassland and grassy fynbos.

Diagnosis: restricted to the southern coastal and near inland areas, and occurring as solitary stems or small clumps with stems ± 1–2 m tall, leaves 6.0–8.5 mm wide, and pendulous spikes held well above the leaves, bearing moderate-sized to large, purplish pink flowers with funnel-shaped perianth 28–48(–50) mm long. *Dierama igneum* from Grahamstown eastward has narrower bracts mostly 5–8 mm wide and a mostly shorter perianth, 16–34 mm long with the tube 5–8 mm long, and spikes nodding down to reach the tips of the leaves.

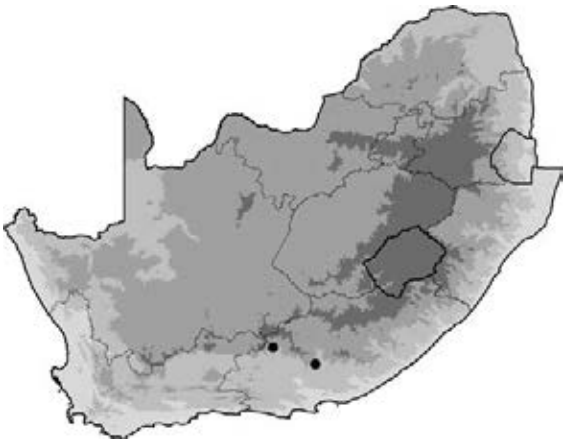
6. **Dierama pulcherrimum** *(Hook.f.) Baker* in Journal of the Linnean Society, Botany 16: 99 (1877). *Sparaxis pulcherrima* Hook.f.: t. 5555 (1866). Type: South Africa, [Eastern Cape], between the Keiskamma and Buffalo Rivers, ex hort. Backhouse, England, *Backhouse s.n.* (K, holo.).

   Dierama longiflorum G.J.Lewis: t. 541 (1934a). Type: South Africa, [Eastern Cape], Katberg, *Dyer s.n.* (BOL, holo.; PRE, iso. [fragment]).

Plants 0.9–1.8 m high, solitary or a few stems together in small tufts. *Corm* ± 30–40 mm diam. *Stem* with lowermost peduncle 45–135 mm long. *Foliage leaves* several



Distribution of ***Dierama pulcherrimum***.



Distribution of ***Dierama grandiflorum***.

to many, 500–900 × 4–9(–11) mm; reduced sheathing leaves 4 or 5. *Spikes* pendulous, terminal 4- to 8-flowered, laterals 4 to 7, each 2- to 5(6)-flowered; bracts elliptic-lanceolate to elliptic-obovate, acute, 23–34 × 10–12 mm, up to 2 internodes long, flecked brownish all over but more lightly toward margins, appearing brown, lateral veins ± 5 each side of main vein. *Flowers* ovoid, magenta-pink or deep purple-red; perianth tube mostly 10.0–14.0(–15.5) mm long; tepals 23–35(–39) × 10–19, suberect and cohering to weakly flared, not or scarcely spreading at the tips. *Anthers* (8–)10–11 mm long. *Stigmas* held 12–21 mm below top of perianth. *Flowering time*: mainly December to February.

Distribution and ecology: endemic to the Eastern Cape, South Africa, from Baziya Mt near Engcobo to the Amatole Mtns; in open grassland, from ± 900–1 700 m elevation.

Diagnosis: occurring as solitary stems or small clumps with stems 900–1 800 mm tall, leaves 4–11 mm wide, and pendulous inflorescences of moderately large, magenta to purple flowers with a rather closed perianth 35–54 mm long. The species is easily recognised in the living state by the characteristic flowers, with suberect tepals from a conical base. *Dierama pendulum*, with widely spreading tepals from a rounded base, has a more southern distribution.

Forms with dark red flowers occur in areas of sympatry with dark-flowered *Dierama atrum* (Dohne, Stutterheim, Pirie and King William's Town) and *D. reynoldsii* (Baziya-Engcobo), suggesting possible hybridisation. Hybridisation with *D. igneum* in the Hogsback area is also a possibility.

7. **Dierama grandiflorum** *G.J.Lewis* in Flowering Plants of South Africa 14: t. 542 (1934b). Type: South Africa, Eastern Cape, Somerset East, ex hort. Kirstenbosch, *Harries s.n.* Nat. Bot. Gard. 1881/29 (BOL, lecto., designated by Hilliard & Burtt: 80 (1991); PRE, isolecto.).

Plants ± 1 500 mm high, solitary or a few stems tufted together. *Corm* ± 25 mm diam. *Stem* with lowermost peduncle 55–110 mm long. *Foliage leaves* several, 600–900 × 4–8 mm; reduced sheathing leaves 3 or 4. *Spikes* pendulous, terminal 6- to 8-flowered, laterals (4)7 to 10, each 3- to 6-flowered; bracts elliptic, acute, 17–30 × 8–10 mm, less than two internodes long, flecked brownish all over but more lightly toward margins or sometimes whitish, lateral veins 5 each side of main vein. *Flowers* funnel-shaped, dark pink with purplish tube; perianth tube (8.5–)15.0–24.0 mm long; tepals (20–)33–46 × (8–)10–16 mm, ± conduplicate apically with tips recurved and twisted. *Anthers* 8.5–11.0 mm long. *Stigmas* held 11–24 mm below top of perianth. *Flowering time*: October to December.

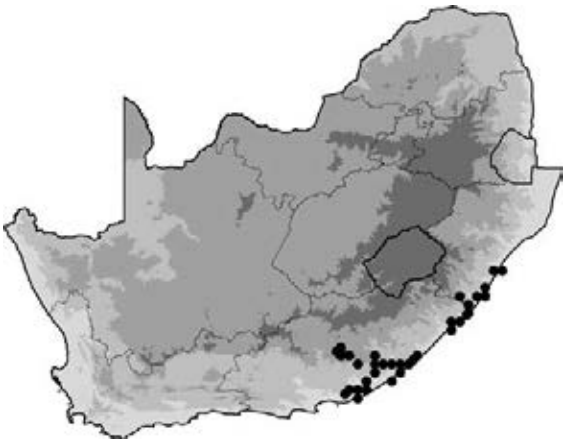
Distribution and ecology: a narrow endemic extending from the Ouberg northwest of Graaff-Reinet and the Boschberg north of Somerset East, South Africa; on grassy slopes among rocks and in scrub, from 1 200–1 300 m elevation.

Diagnosis: restricted to the mountains near Graaff-Reinet and Somerset East and occurring as solitary stems or small clumps with stems ± 1 500 mm tall, leaves 4–8 mm wide, and pendulous inflorescences of large, dark pink flowers with funnel-shaped perianth (30–)50–70 mm long, the tips of the tepals characteristically folded together, recurved and twisted.

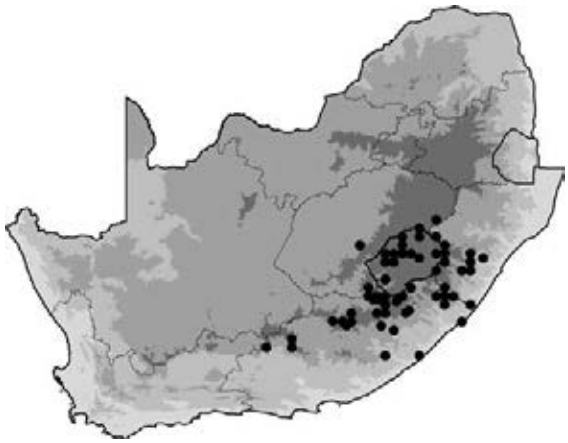
8. **Dierama igneum** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 388 (1882). Type: South Africa, [Eastern Cape], mtns between Kat and Klipplaat Rivers, *Drège 3491* (B†, holo.).

   Dierama pansum N.E.Br.: 201 (1929). Type: South Africa, without precise locality or collector, *Herbert s.n.* (CGE, holo.).

Plants 450–1 350 mm high, solitary or several stems together forming small tufts. *Corm* ± 15–30 mm diam. *Stem* with lowermost peduncle 45–180 mm long.



Distribution of ***Dierama igneum***.



Distribution of ***Dierama robustum***.

Foliage leaves several to many, 300–900 × 2.5–6.0(–9.0) mm; reduced sheathing leaves 3 or 4. *Spikes* pendulous, terminal 4- to 11-flowered, laterals (1)4 to 8, each 2- to 10-flowered; bracts lanceolate to oblong-obovate, acute to acuminate, 10–25 × 5–8 mm, rarely up to 2 internodes long, usually lightly to heavily flecked all over or with white margins and shoulders, secondary veins 4 to 6 each side of main vein. *Flowers* funnel-shaped, pale to dark pink or rarely almost white; perianth tube 5–8(–9) mm long; tepals (10–)13–20(–25) × 5–11 mm. *Anthers* (5.0–)5.5–8.0 mm long. *Stigmas* held 2.5–15.0 mm below top of perianth. *Flowering time*: (June) September to December (April).

Distribution and ecology: extending through coastal KwaZulu-Natal from Durban south to East London and inland to the Katberg in Eastern Cape, South Africa; in open grassland, from near sea-level to 1 500 m elevation.

Diagnosis: a solitary or tufted species with stems 450–1 350 mm tall and pendulous spikes of moderately-sized pink flowers with perianth 16–31(–34) mm long and tube 5–8(–9) mm long. *Dierama pendulum* has broader bracts, 8–13 mm wide and generally larger flowers with perianth tube 9–13 mm long and longer anthers 8–9 mm long. The two species co-occur at Grahamstown. *Dierama igneum* is also sympatric with *D. pulcherrimum*, which is distinguished by its mostly larger, bell-shaped perianth 35–54 mm long, and the two species appear to hybridise in the Amatole Mtns.

9. **Dierama robustum** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 201 (1929). Type: South Africa, without precise locality (as Drakensberg), *Cooper 3177* (K, holo.).

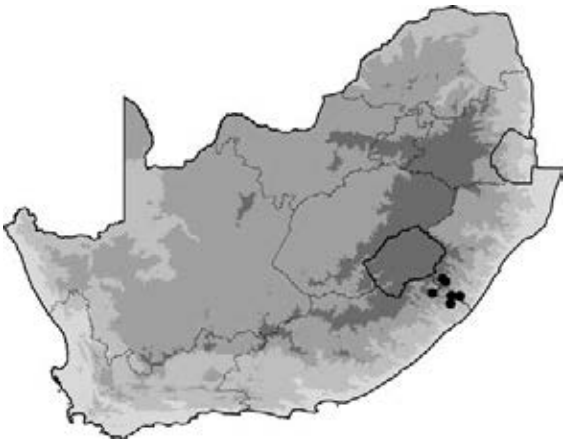
Plants (0.7–)1.0–2.0 m high, solitary or a few stems tufted together. *Corm* 25–40 mm diam. *Stem* with lowermost peduncle 45–150 mm long. *Foliage leaves* several, 400–1 200 × (3–)4–8(–10) mm; reduced sheathing leaves 4 or 5. *Spikes* pendulous, terminal (6)8- to 12-flowered, laterals 3 to 7, each (3)5- to 12-flowered; bracts obovate, acute to acuminate, (18–)20–35 × 8–14 mm, ± 2 internodes long, usually lightly to heavily flecked brownish or rarely white, lateral veins 5 each side of main vein. *Flowers* funnel-shaped, creamy white to pale pink or pale mauve; perianth tube (7–)8–12(–13) mm long; tepals (16–)18–26 × 7–10(–13) mm. *Anthers* (7–)8–10(–12) mm long. *Stigmas* held 3–12 mm below top of perianth. *Flowering time*: (October) December to January (March).

Distribution and ecology: South Africa, extending through the eastern interior, from Harrismith in the Free State along the Drakensberg through Lesotho, KwaZulu-Natal and Eastern Cape to the Stormberg, Zuurberg, Lootsberg and Koueveldberge near Murraysburg, possibly also the Camdeboo Mtns; in rocky grassland, from 1 600–2 900 m elevation.

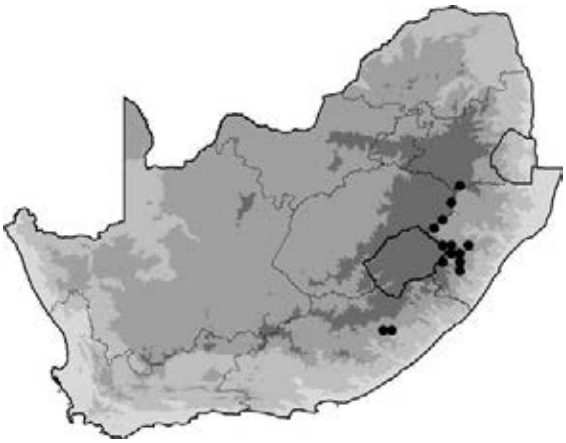
Diagnosis: a solitary-stemmed or tufted species with pendulous spikes of moderately sized, creamy white to pale pink flowers, the perianth (24–)26–35 mm long with a tube (7–)8–12(–13) mm long. *Dierama latifolium* from lower elevations forms large clumps and usually has silvery white bracts. *Dierama cooperi* is distinguished by its closely veined bracts and mostly smaller, often bright pink flowers but probably hybridises with *D. robustum* in northern Lesotho and eastern Free State.

10. **Dierama ambiguum** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 79 (1988). Type: South Africa, [KwaZulu-Natal], Zuurberg near Weza, ± 5 000 ft [1 670 m], *Hilliard & Burtt 8071* (E, holo.; K, NU, PRE, S, iso.).

Plants 900–1 200 mm high, of several stems forming a small clump. *Corm* ± 10–15 mm diam. *Stem* with lowermost peduncle 40–80 mm long. *Foliage leaves* few, 300–450 × 4.0–6.5 mm; reduced sheathing leaves 3 or 4. *Spikes* pendulous, terminal 7- to 11-flowered, laterals 2 to 6, each 5- to 9-flowered; bracts lanceolate to obovate, acute to acuminate, 15–22 × 6–8 mm, ± 2 internodes long, lightly to moderately flecked along midline and



Distribution of ***Dierama ambiguum***.



Distribution of ***Dierama dissimile***.

toward base with broad white shoulders and margins, lateral veins 6 to 9 each side of main vein with tertiary veins strongly developed, all veins coalescing to form an almost solid base. *Flowers* funnel-shaped, magenta-pink; perianth tube 6–10 mm long; tepals 11–16 × 4–6 mm. *Anthers* 4.5–6.0 mm long. *Stigmas* held 5–8 mm below top of perianth. *Flowering time*: mainly November to February.

Distribution and ecology: restricted to southern KwaZulu-Natal and adjacent Eastern Cape, South Africa, between Weza and Mt Ayliff; in open montane grassland, from 1 000–1 800 m elevation.

Diagnosis: a clump-forming species with pendulous spikes of magenta-pink flowers, characteristic bracts with 6 to 9 lateral veins each side of the main vein and with the intermediate veins strongly developed, the veins all coalescing toward the base into solid tissue. The primary spike has 7 to 11 flowers. *Dierama dracomontanum* has the veins well-spaced with thinner tissue between them, and mostly fewer flowers in the main spike, 4 to 7, with a shorter perianth tube 5–7 mm vs. 6–10 mm long. Occasional hybrids between the two species are known from the Zuurberg and Ngeli Mtns where they co-occur.

11. **Dierama dissimile** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 79 (1988). Type: South Africa, [KwaZulu-Natal], Underberg, Cobham Forest Reserve, 5 700 ft [1 740 m], *Hilliard & Burtt 13388* (E, holo.; NU, iso.).

Plants 500–700 mm high, solitary or a few stems tufted together. *Corm* ± 15–20 mm diam. *Stem* with lowermost peduncle 50–100(–140) mm long. *Foliage leaves* few, 300–600 × (1.5–)2.0–3.5(–4.0) mm; reduced sheathing leaves 3 or 4. *Spikes* pendulous, terminal 5- to 8(9)-flowered, laterals 2 to 4(6), each 3- to 5(7)-flowered; bracts obovate-elliptic, acute-apiculate, 13–20 × 6–9 mm, up to ± 2 internodes long, lightly to moderately flecked throughout or with white margins, lateral veins 5 each side of main vein. *Flowers* bell-shaped, pale to dark pink or magenta-pink; perianth tube 5–7(–8) mm long; tepals (11–)13–15(–16) × (4–)5–6 mm. *Anthers* (5.0–)5.5–6.0(–7.0) mm long. *Stigmas* held 4–8 mm below top of perianth. *Flowering time*: mainly October to November.

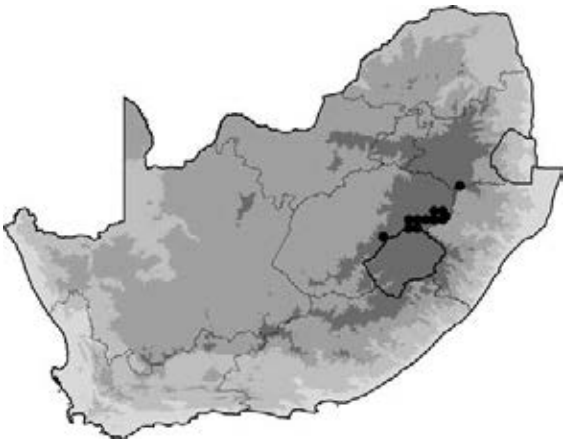
Distribution and ecology: extending through the Drakensberg foothills from Majuba Mt in KwaZulu-Natal to the mountains between Tabankulu and Engcobo in Eastern Cape, South Africa; in grassland, from 1 500–2 200 m elevation.

Diagnosis: a solitary-stemmed or tufted species with pendulous spikes of relatively small, pale to deep pink flowers, the perianth 18–22 mm long with a tube 5–7(–8) mm long. *Dierama dracomontanum*, with which it is sympatric, has a clumped habit and slightly larger flowers with perianth 19–29 mm long, and flowers slightly later, mainly November to February.

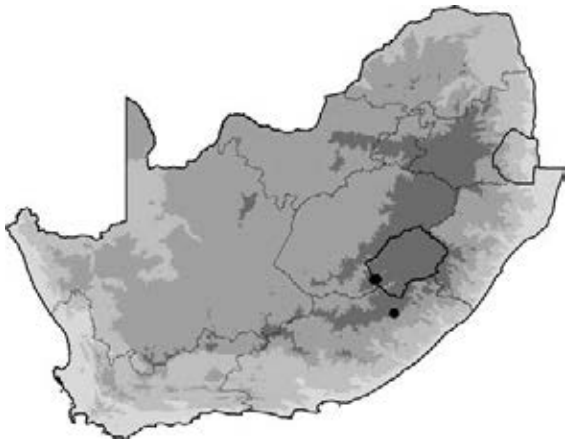
12. **Dierama cooperi** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 199 (1929). Type: South Africa, [Free State], top of the Witteberge, *Cooper 876* (K, holo.; BOL, E, iso.).

Plants 0.6–1.4(–2.0) m high, solitary or 2 or 3 stems tufted together. *Corm* ± 20 mm diam. *Stem* with lowermost peduncle 45–100 mm long. *Foliage leaves* several, 300–700 × 3–5 mm; reduced sheathing leaves 3 or 4. *Spikes* pendulous, terminal 8- to 13-flowered, laterals 3 to 7, each 5- to 10-flowered; bracts lanceolate to oblong-elliptic, acute to acuminate, 15–30 × 6–8 mm, usually ± 2 internodes long, lightly flecked throughout or with white margins, lateral veins ± 6 each side of main vein, with intermediate veins well developed, all veins very close together and parallel. *Flowers* funnel-shaped, pink; perianth tube 5.0–7.5 mm long; tepals 10.5–15.0 × 4.5–6.5 mm. *Anthers* 4.5–6.0(–7.0) mm long. *Stigmas* held 5–8 mm below top of perianth. *Flowering time*: October to February.

Distribution and ecology: centred in northeastern Free State extending into adjacent KwaZulu-Natal, South Africa, and around Leribe in Lesotho; in grassland.



Distribution of ***Dierama cooperi***.



Distribution of ***Dierama jucundum***.

Diagnosis: a solitary-stemmed or tufted species with pendulous spikes of relatively small, often bright pink flowers, the perianth 16–23 mm long with a tube 5.0–7.5 mm long and characteristic bracts with ± 6 secondary veins each side of the main vein and well-developed intermediate veins, the veins all parallel and so close together that the base of the bract appears almost solid. The primary spike has 8 to 13 flowers. *Dierama robustum* has the bract veins further apart and mostly paler, slightly larger flowers, the tepals 17–26 × 7–12 mm and the tube 7–12 mm long. The two species probably hybridise in northern Lesotho and neighbouring Free State.

13. **Dierama jucundum** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 81 (1988). Type: South Africa, [Eastern Cape], Barkly East, Fetcani Pass, ex hort. RBG Edinburgh, *Hilliard & Burtt 13140* (E, holo.; NU, iso.).

Plants 800–950 mm high, forming clumps. *Corm* ± 30 mm diam. *Stem* with lowermost peduncle 70–85 mm long. *Foliage leaves* several, 450–650 × 4.5–7.0 mm; reduced sheathing leaves ± 4. *Spikes* pendulous, terminal 6- to 10-flowered, laterals 3 to 5, each 4- to 6-flowered; bracts obovate, acute, 15–19 × 8–11 mm, < 2 internodes long, lightly to heavily flecked along midline with broad white shoulders, lateral veins 5 to 7 each side of main vein. *Flowers* widely funnel-shaped, pale mauve with nectar guides visible; perianth tube 6–9 mm long; tepals 18–23 × 8–12 mm. *Anthers* 6.0–8.5 mm long. *Stigmas* held 8–13 mm below top of perianth. *Flowering time*: October.

Distribution and ecology: a local endemic from Fetcani Pass near Barkly East in Eastern Cape, South Africa, and the Mohale's Hoek–Mafeteng area of southern Lesotho; on rocky slopes.

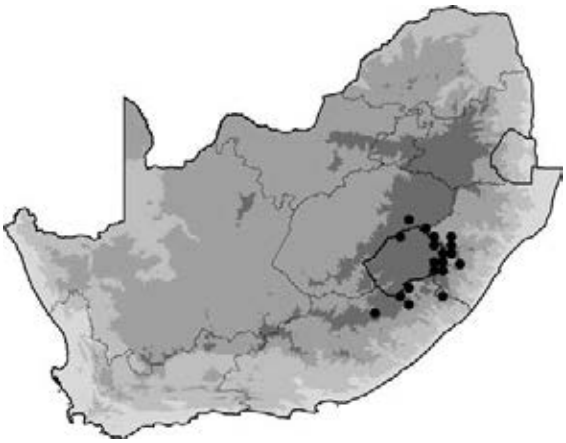
Diagnosis: a clump-forming species with pendulous spikes of moderately large, widely funnel-shaped, pale lilac flowers with perianth 25–28 mm long and broad tepals 8–12 mm wide. *Dierama dracomontanum* has slightly smaller, pink to almost red flowers with perianth 19–25 mm long and tepals 5–8 mm wide.

14. **Dierama dracomontanum** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 79 (1988). Type: South Africa, [KwaZulu-Natal], Mpendhle, Highmoor Forest Reserve, ridge SE of Giant's Castle, 7 800 ft [2 380 m], 6 Jan. 1983, *Hilliard & Burtt 16269* (E, holo.; NU, iso.).

Plants 300–1 050 mm high, forming clumps. *Corm* 10–20 mm diam. *Stem* with lowermost peduncle 30–65(–100) mm long. *Foliage leaves* several, 300–650 × 3.5–6.5 mm; reduced sheathing leaves 3 or 4. *Spikes* pendulous (rarely suberect), terminal 4- to 7-flowered, laterals 2 to 5, each (1)2- to 6-flowered; bracts obovate, obtuse to acute, mostly 13–20 × 6–12 mm, up to 2 internodes long, lightly to heavily flecked along midline and toward base with broad white shoulders, lateral veins ± 5 each side of main vein. *Flowers* widely funnel-shaped, mostly pale to dark rose-pink or coral-pink to red, rarely mauve; perianth tube 5–7 mm long; tepals 13–20 × 5–8 mm. *Anthers* 5.0–6.5 mm long. *Stigmas* held 7–12 mm below top of perianth. *Flowering time*: November to February.

Distribution and ecology: confined to the Drakensberg from northeastern Free State through Lesotho and KwaZulu-Natal to Saalboom Neck near Clifford in Eastern Cape, South Africa; on grassy slopes, from 1 525–2 800 m elevation, sometimes dominating entire mountainsides.

Diagnosis: a clump-forming species with pendulous (or rarely suberect) spikes of moderate-sized, mostly rose–coral-pink flowers with perianth 19–25(–29) mm long, the primary spike with 4 to 7 flowers. *Dierama dissimile* has the stems solitary or a few in small tufts, narrower leaves mostly 2.0–3.5 mm wide and smaller flowers with perianth 18–22 mm long, and flowers mainly August to October. *Dierama floriferum* has the clumped habit of



Distribution of ***Dierama dracomontanum***.

D. dracomontanum but mostly smaller flowers with perianth 15.5–20.5 mm long, and 4 to 9 lateral spikes per stem with 4 to 9 flowers each.

15. **Dierama floriferum** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 80 (1988). Type: South Africa, [KwaZulu-Natal], Lions River, Curry's Post to Nottingham Road, 18 Nov. 1980, *Hilliard & Burtt 13482* (E, holo.; NU, iso.).

Plants 400–750 mm high, forming clumps. *Corm* 10–20 mm diam. *Stem* with lowermost peduncle 33–80(–120) mm long. *Foliage leaves* several, 380–700 × 2.5–5.0 mm; reduced sheathing leaves usually 4. *Spikes* pendulous, terminal 5- to 9-flowered, laterals (3)4 to 9, each (2)4- to 8-flowered; bracts obovate-lanceolate, acute to acuminate, 10–17 × 5–8 mm, ± 2 internodes long, usually flecked in lower ½ and along midline leaving broad white shoulders, sometimes flecked all over or without flecks, lateral veins mostly 4 to 6 each side of main vein. *Flowers* funnel-shaped, pale pink to purplish pink; perianth tube (4.0)5.0–6.5 mm long; tepals 10.0–14.5 × 4–6 mm. *Anthers* 4.5–6.0 mm long. *Stigmas* held 3.5–7.5 mm below top of perianth. *Flowering time*: August to November.

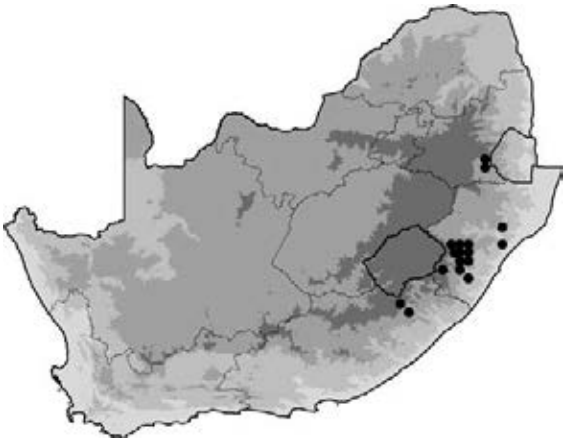
Distribution and ecology: extending from Piet Retief and Amsterdam in southern Mpumalanga through the KwaZulu-Natal Midlands to Ixopo and reaching to Ugie in Eastern Cape, South Africa; often in massed colonies in moist grassland, from 800–1 675 m elevation.

Diagnosis: a short, strongly clump-forming species with stems 400–750 mm high barely exceeding the leavers and spikes of relatively small, pale pink to purplish flowers with perianth 15.5–20.0 mm long. Flower colour varies within a single colony and there is also significant variation in the flecking of the bracts among populations, some with lightly flecked to almost pure white bracts. *Dierama dracomontanum* from mostly higher altitudes has larger flowers 19–29 mm long and generally fewer lateral spikes with fewer flowers in each, mostly 2 to 5.

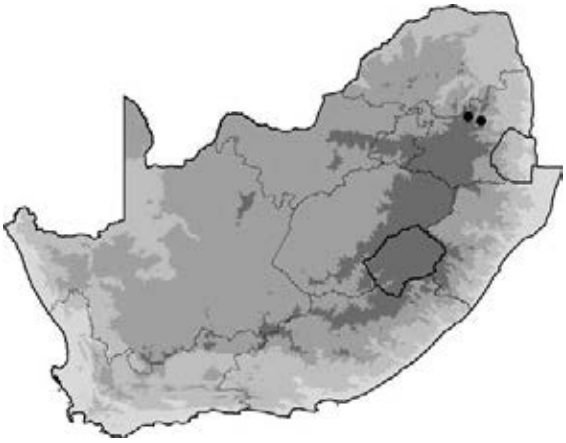
16. **Dierama formosum** *Hilliard* in Hilliard & Burtt Notes from the Royal Botanic Garden, Edinburgh 45: 80 (1988). Type: Zimbabwe, summit, Inyangani Mt., ± 8 500 ft [2 590 m], *Plowes 2268* (K, holo.; PRE, iso.).

Plants 0.75–1.65 m high, forming large clumps. *Corm* 30–35 mm diam. *Stem* with lowermost peduncle 75–165 mm long. *Foliage leaves* several, 300–750 × (4–)6–10 mm; reduced sheathing leaves 5. *Spikes* pendulous, terminal 6- to 10-flowered, laterals 3 to 5 or more by compounding, each 3- to 9-flowered; bracts lanceolate to obovate, acute to acuminate, 20–25 × 6–10 mm, ± 2 internodes long, heavily or almost solidly reddish brown, rarely more lightly flecked, lateral veins 5 each side of main vein. *Flowers* funnel-shaped, pale lilac-pink to bright cerise-pink; perianth tube (6.5–)8.0–12.0 mm long; tepals (17–)19–26 × 6–11 mm. *Anthers* 7–9 mm long. *Stigmas* held 2.5–14.0 mm below top of perianth. *Flowering time*: November to January.

Distribution and ecology: extending through the eastern highlands, from near Dullstroom in Mpumalanga,



Distribution of ***Dierama floriferum***.



Distribution of ***Dierama formosum***.

South Africa, and farther north on Gorongosa Mt in Mozambique, eastern Zimbabwe, and Mulanje and Zomba Mt. in Malawi; in high altitude grassland, from 1 900–2 000 m elevation.

Diagnosis: a clump-forming species with stems 750–1 650 mm tall, leaves mostly 6–10 mm wide, and large flowers with the perianth 26–37 mm long. The bracts are 20–25 mm long and usually heavily flecked reddish brown, with the veins often very closely set in the lower part. Other species from the Mpumalanga Escarpment are mostly solitary-stemmed or form small tufts, with shorter bracts and smaller flowers. *Dierama tyrium*, usually with darker purple flowers, typically has more flowers in the terminal spike and more numerous coflorescences, 8 to 11, narrower bracts 5–8 mm wide, and a shorter perianth tube 6–8 mm long.

17. **Dierama elatum** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 199 (1929). Type: Swaziland [Eswatini], Hlatikulu, *Stewart 10* (K, holo.; SAM, iso.).

Plants ± 1.5 m high, probably solitary or in small tufts. *Corm* unknown. *Stem* with lowermost peduncle 70–110 mm long. *Foliage leaves* not seen, probably few; reduced sheathing leaves ± 5 mm wide. *Spikes* pendulous, terminal 6- to 9-flowered, laterals possibly 4, each 6- to 8-flowered; bracts elliptic-lanceolate, acute to acuminate, 18–20 × 9 mm, ± 2 internodes long, heavily or almost solidly dark brown in lower part and up midline with paler shoulders and margins, lateral veins 5 each side of main vein. *Flowers* bell-shaped with tepals suberect and flaring slightly apically, white; perianth tube 5.5–7.5 mm long; tepals 17–19 × 8–12 mm. *Anthers* 7–9 mm long. *Stigmas* held ± 8 mm below top of perianth. *Flowering time*: unknown.

Distribution and ecology: only known from the Hlatikulu area of Eswatini.

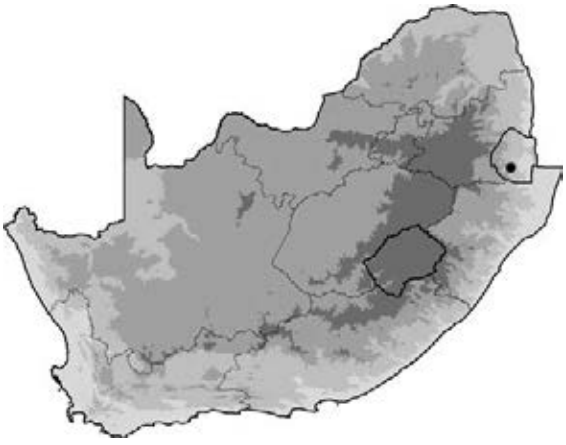
Diagnosis: an incompletely known species recognised on the basis of its moderate-sized, white flowers with perianth tube 5.5–7.5 mm long and tepals 17–19 mm long. Possibly allied to *Dierama formosum*.

18. **Dierama mossii** *(N.E.Br.) Hilliard* in Hilliard & Burtt, Notes from the Royal Botanic Garden, Edinburgh 45: 82 (1988). *D. medium* var. *mossii* N.E.Br.: 202 (1929). Type: South Africa, [Gauteng], Premier Mine, 13 Oct. 1917, *Moss 4313* (J, K, syn.).

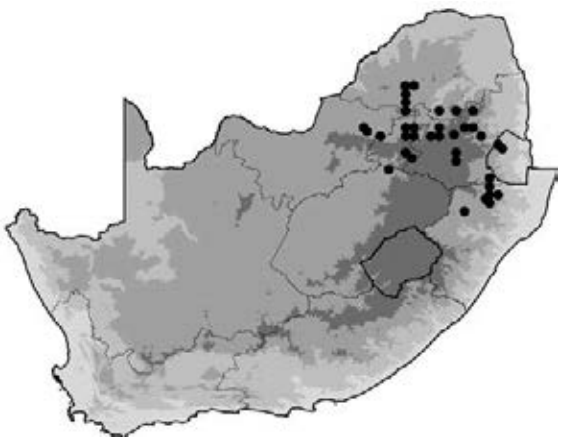
Plants 0.5–1.0 m high, with few to several stems in tufts. *Corm* ± 15–20 mm diam. *Stem* with lowermost peduncle 35–95(–160) mm long. *Foliage leaves* few, 300–650 × 1.5–3.5(–4.5) mm; reduced sheathing leaves 3 to 5. *Spikes* pendulous, terminal 3- to 6(9)-flowered, laterals 1 to 4(8), each 1- to 5(7)-flowered; bracts very delicate, oblong to lanceolate, acute to acuminate, 10–18 × 4–8 mm, < 2 internodes long, usually lightly or more heavily flecked along midline but sometimes pure white, lateral veins ± 5 each side of main vein, fading out in lower ½. *Flowers* funnel-shaped, mauve to magenta-pink; perianth tube 5–7 mm long; tepals 13–18(–20) × 4–6 mm. *Anthers* (5–)6–7(–8) mm long. *Stigmas* held 5–7(–12) mm below top of perianth. *Flowering time*: September to December.

Distribution and ecology: extending in an arc from the Waterberg in Northwest south to Heidelberg in Gauteng thence eastward to Ermelo in southern Mpumalanga, South Africa, Forbes Reef in adjacent Eswatini and to Paulpietersburg, Dannhauser and Dundee in northern KwaZulu-Natal, South Africa; forming large colonies in marshes and along streams.

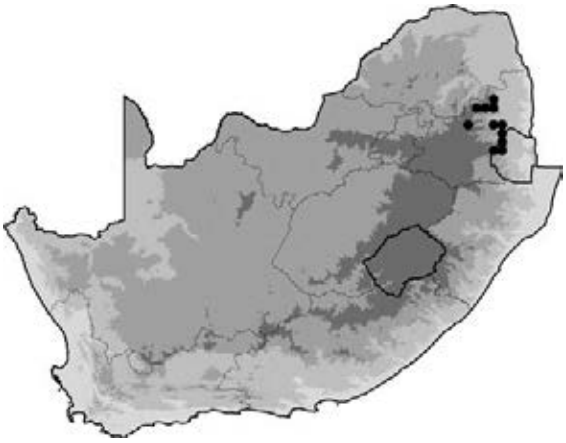
Diagnosis: a tufted species with stems up to 1 000 mm tall and leaves 1.5–4.5 mm wide, and relatively lax spikes of mauve to magenta-pink flowers with perianth 18–25 mm long. The bracts are very delicate and usually speckled but sometimes pure white. *Dierama medium*, which is sympatric with *D. mossii* in southeastern Mpumalanga and Eswatini, has more crowded spikes of mostly smaller flowers, the perianth mostly 13–18 mm long with anthers 4.5–6.0 mm long.



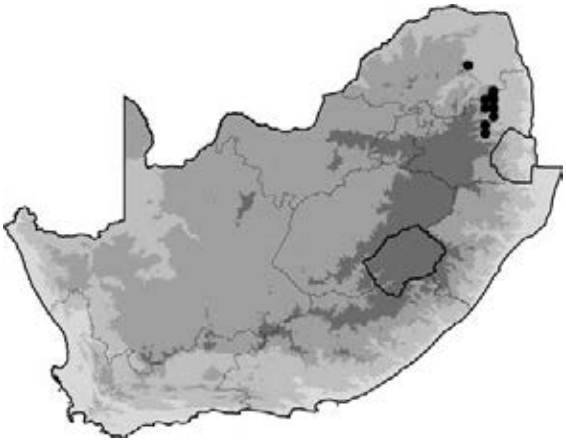
Distribution of ***Dierama elatum***.



Distribution of ***Dierama mossii***.



Distribution of ***Dierama medium***.



Distribution of ***Dierama adelphicum***.

19. **Dierama medium** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 201 (1929). Type: South Africa, [Mpumalanga], grassy slopes, without precise locality, *Mudd s.n.* (K, holo.).

Plants 300–750 mm high, solitary or a few stems in tufts. *Corm* ± 15–20 mm diam. *Stem* with lowermost peduncle 35–140 mm long. *Foliage leaves* few, 250–600 × 1.5–3.0(–4.0) mm; reduced sheathing leaves 3 to 5. *Spikes* pendulous, terminal densely (4)6- to 10-flowered, laterals 2 or 3(4), each 2- to 6(9)-flowered; bracts elliptic to lanceolate, acute to acuminate, (10–)14–16 × 4–6(–7) mm, 2 internodes long or longer, lightly to heavily flecked, then almost uniformly brown below with unmarked whitish margins, lateral veins ± 5 each side of main vein. *Flowers* funnel-shaped, pale mauve to magenta-pink; perianth tube 4.5–6.0 mm long; tepals (8–)10–15 × 4–6 mm. *Anthers* 4.5–6.0 mm long. *Stigmas* held 2.0–6.5 mm below top of perianth. *Flowering time*: mainly September to October.

Distribution and ecology: confined to the northeastern escarpment in Mpumalanga, South Africa, and adjacent Eswatini, from Graskop to Mbabane, but possibly extending into northern KwaZulu-Natal, South Africa, near Louwsberg; in seasonally wet or marshy grassland, from 1 350–1 980 m elevation.

Diagnosis: a dainty species 300–750 mm tall with leaves 1–4 mm wide and short, dense spikes of small, mauve to magenta flowers, the perianth 13–18(–20) mm long. The short bracts, (10–)14–16 mm long, are lightly to densely flecked but always with whitish margins. *Dierama floriferum* differs in its clumped habit and more numerous coflorescences (mostly 4 to 9 vs. 2 or 3).

20. **Dierama adelphicum** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 78 (1988). Type: South Africa, [Mpumalanga], MacMac Forest Station, 23 Oct. 1985, *Hilliard & Burtt 18440* (E, holo.; NU, iso.).

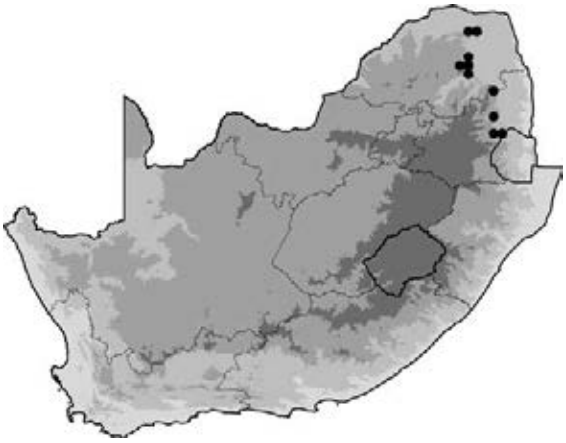
Plants 0.6–1.2 mm high, solitary or in small tufts. *Corm* ± 20–30 mm diam. *Stem* with lowermost peduncle 50–135(–175) mm long. *Foliage leaves* few, 350–600 × (2.5–)3.0–5.0 mm; reduced sheathing leaves 3 to 5. *Spikes* pendulous, terminal 8- to 11-flowered, laterals 5 to 7, each 5- to 9-flowered; bracts elliptic to lanceolate, acute, 10–18 × 4–6 mm, up to 2 internodes long, lightly flecked or more densely along midline and base, lateral veins ± 5 each side of main vein, fading out in lower part. *Flowers* funnel-shaped, pale mauve to magenta-pink; perianth tube (4–)5–6 mm long; tepals 11–16 × 4.5–6.5 mm. *Anthers* 5.0–6.5 mm long. *Stigmas* held 2–6 mm below top of perianth. *Flowering time*: September to early November.

Distribution and ecology: restricted to northeastern southern Africa, from Magoebaskloof in Limpopo to Ermelo in southern Mpumalanga and adjacent Eswatini; on open grassy slopes and flats.

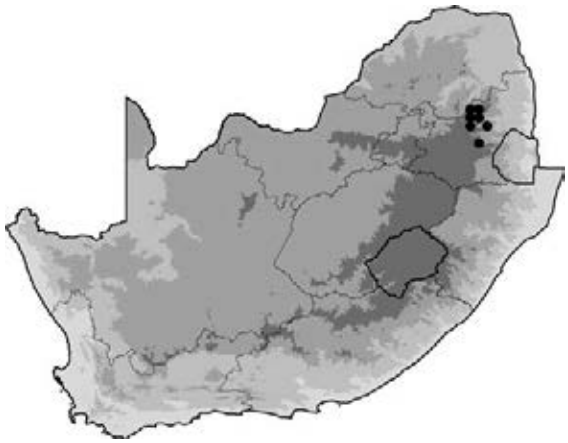
Diagnosis: a solitary-stemmed or tufted species with stems up to 1.2 m high, leaves mostly 3–5 mm wide, and 8- to 10-flowered terminal spikes with 5 to 7 lateral spikes, and mauve to magenta flowers with perianth 15–21 mm long. *Dierama gracile* is a clump-forming species with generally shorter stems, 300–750 mm tall, with fewer lateral spikes, 1 to 5 per stem, and delicately veined bracts with just 3 or 4 lateral veins each side of the main vein.

21. **Dierama gracile** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 202 (1929). Type: South Africa, [Limpopo], Woodbush Mtns, grassveld, *Moss 15438* (K, holo.; BOL, J, PRE, iso.).

Plants 300–750 mm high, clump-forming. *Corm* ± 20 mm diam. *Stem* with lowermost peduncle 35–95 mm long. *Foliage leaves* several, 250–600 × 2.5–5.0 mm; reduced sheathing leaves 3. *Spikes* pendulous, terminal 5- to 10-flowered, laterals 1 to 6, each 3- to 8-flowered; bracts broadly elliptic to lanceolate-elliptic, acute, 10–15 × 4–6 mm, ± 2 internodes long, lightly to heavily flecked all over or margins pale, delicately



Distribution of ***Dierama gracile***.



Distribution of ***Dierama nebrownii***.

veined with 3 or 4 lateral veins each side of main vein, extending < halfway up bract. *Flowers* funnel-shaped, pale to deep mauve or magenta-pink; perianth tube 4–6(–8) mm long; tepals 7–14 × 4–6(–8) mm. *Anthers* 4–6(–8) mm long. *Stigmas* held 3–6 mm below top of perianth. *Flowering time*: August to November.

Distribution and ecology: endemic to the northeastern escarpment, from the Soutpansberg in Limpopo to Nelshoogte southwest of Barberton in Mpumalanga, South Africa; in open grassland, from 1 200 to 1 600 m elevation.

Diagnosis: a clump-forming species with relatively short stems 300–750 mm tall and short, delicately veined bracts with just 3 or 4 lateral veins each side of the main vein.

22. **Dierama nebrownii** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 82 (1988). Type: South Africa, [Mpumalanga], 6 miles [10 km] NE of Dullstroom, 6 800 ft [1 790 m], 2 Nov. 1949, *Codd 5640* (PRE, holo.; K, iso.).

Plants 0.8–1.0 m high, solitary or a few stems tufted together. *Corm* 20–25 mm diam. *Stem* with lowermost peduncle 55–130 mm long. *Foliage leaves* few, 450–550 × 2.5–4.0 mm; reduced sheathing leaves 4 or 5. *Spikes* pendulous, terminal 6- to 11-flowered, laterals 2 to 5(7), each 4- to 9-flowered; bracts obovate, obtuse or cuspidate, 12–18 × 5–9 mm, mostly 2 internodes long, solidly to heavily flecked or paler on shoulders, lateral veins 6 to 8 each side of main vein. *Flowers* funnel-shaped, pale to deep mauve-pink; perianth tube 5.5–7.5 mm long; tepals 14–23 × 5.0–7.5 mm. *Anthers* 5.5–7.0(–8.0) mm long. *Stigmas* held (7–)8–12 mm below top of perianth. *Flowering time*: October to November.

Distribution and ecology: locally endemic to the high-lying parts of Mpumalanga, South Africa, recorded mainly between Belfast and Lydenburg, and also near Kaapsche Hoop; in stony grassland, from 1 750–2 000 m elevations.

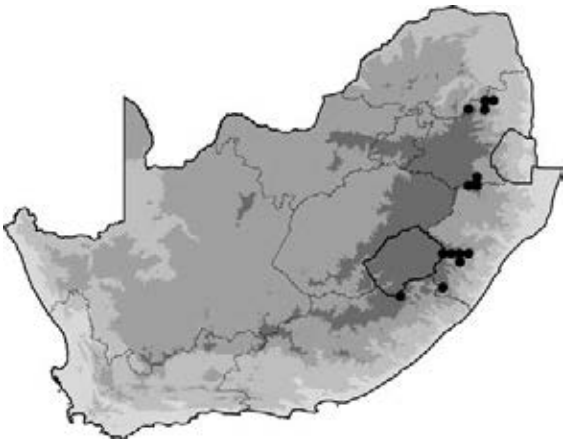
Diagnosis: a solitary-stemmed or tufted species, 800–1 000 mm tall, with diagnostic obovate bracts, 12–18 × 5–9 mm, solidly to heavily flecked brown and with 6 to 8 lateral veins each side of the main vein. *Dierama pictum*, which flowers from November to February, has similar bracts with more sharply contrasting white shoulders, and slightly smaller flowers with a perianth 15–23 mm long (vs. 20–29 mm long).

23. **Dierama pauciflorum** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 200 (1929). Type South Africa, [Free State], near Harrismith, 7 000 ft [2 134 m], Nov. 1944, *Sankey 290* (K, holo.).

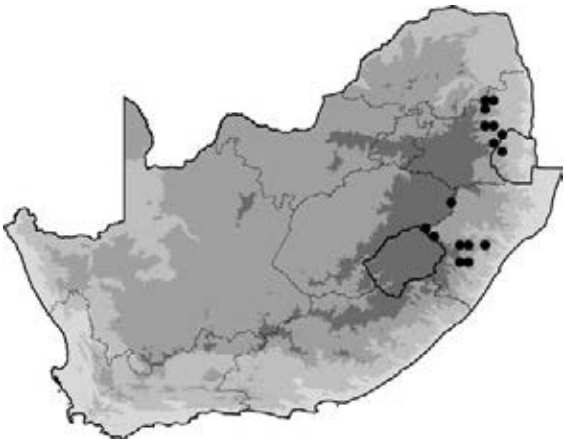
Plants 300–600 mm high, usually forming dense clumps but sometimes solitary. *Corm* ± 15 mm diam. *Stem* with lowermost peduncle 25–45(–75) mm long. *Foliage leaves* several, 100–400 × 1–4 mm; reduced sheathing leaves ± 3. *Spikes* pendulous, terminal 1- to 4(5)-flowered, laterals up to 5, each 1- to 3(4)-flowered; bracts broadly obovate-elliptic to lanceolate-elliptic, 12–18 × 7–10 mm, usually 1.5 internodes long, bright rusty brown and flecked as well, lateral veins 6 to 8 each side of main vein. *Flowers* funnel-shaped with tepals flaring, bright pink or reddish; perianth tube 5–7 mm long; tepals 14–22 × 4.5–8.5 mm. *Anthers* 5–7 mm long. *Stigmas* held (6–)9–15 mm below top of perianth. *Flowering time*: mainly November to December.

Distribution and ecology: widespread along the eastern escarpment, from Naude's Nek in Eastern Cape, South Africa, along the KwaZulu-Natal Drakensberg and foothills to Harrismith and north to Mt Sheba in Mpumalanga, also in Inyanga in Zimbabwe; forming dense tussocks in marshes, from 1 500–2 400 m elevation.

Diagnosis: a small, clump-forming species 300–600 mm tall, with narrow leaves 1–4 mm wide and delicate, few-flowered spikes of funnel-shaped, pink to reddish flowers with characteristic small, rusty red bracts 12–18 mm long, with 6 to 8 veins each side of the main vein. The perianth is 20–28 mm long, with narrow



Distribution of ***Dierama pauciflorum***.



Distribution of ***Dierama pictum***.

tepals 4.5–8.5 mm wide. *Dierama nebrownii*, also with brown bracts with 6 to 8 veins each side of the main vein, is a taller species with mostly solitary stems 800–1 000 mm tall.

24. **Dierama pictum** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 198 (1929). Type: South Africa, [Mpumalanga], Pilgrims Rest, *Reynolds 14936* (K, holo.; PRE, iso.).

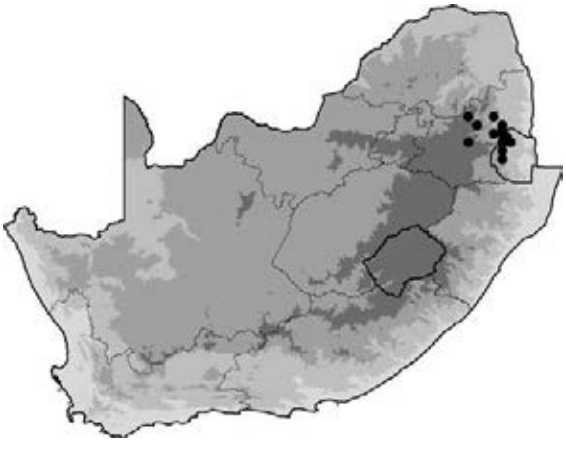
Plants 0.60–1.05 m high, solitary or up to 15 in small tufts. *Corm* ± 25 mm diam. *Stem* with lowermost peduncle 60–110(–125) mm long. *Foliage leaves* few, 550–750 × (3.0–)3.5–5.5(–7.0) mm; reduced sheathing leaves 4 or 5. *Spikes* pendulous, terminal (7)9- to 12(17)-flowered, laterals (1)3 to 6, each 5- to 11-flowered; bracts obovate or sometimes lanceolate, acute to acuminate, 14–23 × (5–)7–11 mm, usually > 2 internodes, heavily or almost solidly dark brown in lower part with broad white or lightly flecked shoulders, lateral veins 6 to 8 each side of main vein. *Flowers* bell-shaped with tepals suberect and flaring slightly apically, pale to deep mauve-pink, magenta or deep wine-red; perianth tube 5–8 mm long; tepals (9–)10–15 × (4–)5–7(–8) mm. *Anthers* 5.0–6.0(–7.5) mm long. *Stigmas* held 2.5–6.0 mm below top of perianth. *Flowering time*: November to January.

Distribution and ecology: relatively widespread along the eastern escarpment, from Pilgrim's Rest in Mpumalanga, South Africa, through western Eswatini and eastern Free State to Greytown in northern KwaZulu-Natal, South Africa; in rocky grassland, from ± 1 350–2 200 m elevation.

Diagnosis: occurring either as solitary plants or small tufts, the stems rarely more than 1 000 m tall, with relatively small, pale to magenta-pink or deep wine-red flowers, the perianth 15–23 mm long, with characteristic bracts, with dark brown base and sharply contrasting white shoulders, rather closely veined with 6 to 8 lateral veins each side of the main vein. The species may hybridise with *Dierama mobile* in Eswatini.

25. **Dierama mobile** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 81 (1988). Type: South Africa, [Mpumalanga], Barberton, Fairview Mine, Russell's Beacon, *Mauve & Scheepers 1* (PRE, holo.; K, iso.).

Plants 0.75–1.5 m high, solitary or a few in small tufts. *Corm* ± 20 mm diam. *Stem* with lowermost peduncle (70–)90–230 mm long. *Foliage leaves* few, 450–750 × 2.5–3.5 mm; reduced sheathing leaves 4 or 5. *Spikes* pendulous, terminal 8- to 14-flowered, laterals 3 to 5, each 5- to 14-flowered; bracts obovate to elliptic-lanceolate, acute to acuminate, 14–19 × 6–10 mm, ± 2 internodes long, heavily flecked reddish brown toward base, thinning toward shoulders and paler or whitish, lateral veins 4 or 5 each side of main vein. *Flowers* bell-shaped with tepals suberect and flaring slightly apically, magenta-pink to deep wine-red; perianth tube 5–8 mm long; tepals 8–12(–14) × 4–5 mm. *Anthers* 5–6(–7) mm long. *Stigmas* held 2–7 mm below top of perianth. *Flowering time*: mainly August to November, to January in Eswatini.



Distribution of ***Dierama mobile***.

Distribution and ecology: restricted to the eastern escarpment, from Mt Sheba, Dullstroom and Carolina in Mpumalanga, South Africa, to Forbes Reef and Mbabane in Eswatini; in rocky grassland.

Diagnosis: endemic to Mpumalanga and Eswatini, occurring as solitary plants or small tufts up to 1 500 mm tall, with relatively small, magenta-pink to deep wine-red flowers, the perianth 16–20 mm long, and lateral spikes borne on strikingly long peduncles, usually 90–230 mm long. The bracts have 4 or 5 veins each side of the main vein. *Dierama pictum* has similar flowers but the plants are mostly shorter, usually barely up to 1 000 mm tall, with shorter peduncles 60–125 mm long, and dark brown bracts with sharply contrasting white shoulders and 6 to 8 veins each side of the main vein. The two species may hybridise in Eswatini (Hilliard & Burtt, 1991).

26. **Dierama insigne** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 198 (1929). Type: South Africa, [Mpumalanga], Rayton, Jan. 1914, *Rogers 12931* (K, holo.; PRE, SRGH, iso.).

Dierama davyi N.E.Br.: 198 (1929). Type: South Africa, [Mpumalanga], Oshoek, *Burtt Davy 2719* (K, PRE, syn.).

Dierama rupestre N.E.Br.: 198 (1929). Type: South Africa, [Mpumalanga], Berlin, Godwan River, *Hofmeyer & Davison 82* (K, PRE, syn.).

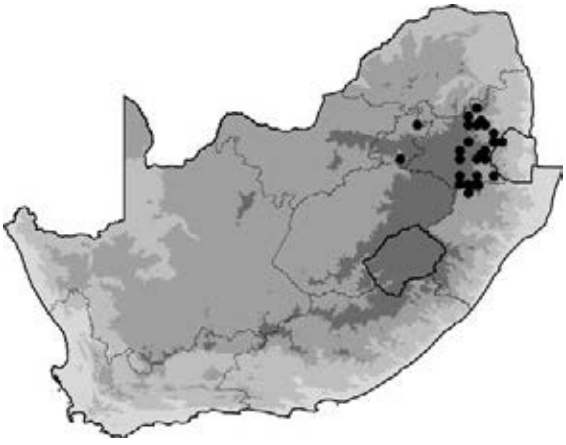
Plants 0.65–1.5 m high, either solitary or in small tufts. *Corm* 20–30 mm diam. *Stem* with lowermost peduncle 35–120(–170) mm long. *Foliage leaves* several, 350–700 × 2.0–4.5(–6.0) mm; reduced sheathing leaves 3 or 4. *Spikes* pendulous, terminal densely (4)6- to 12-flowered, laterals 2 to 4(5), each 3- to 12-flowered; bracts elliptic-lanceolate, acuminate, (16–)20–30 × 6.5–10.0 mm, 2 or more internodes long, basal ⅓–⅔ herbaceous and green drying buff-coloured to brown, rest of bract scarious and almost pure white to sparsely to heavily flecked or almost entirely brown, veins many, coalescing below in solid patch. *Flowers* funnel–bell-shaped, pale pink to magenta-pink; perianth tube 7–16 mm long; tepals (12–)15–20 × (4.5–)6.0–11.0 mm. *Anthers* 5.5–7.5(–9.0) mm long. *Stigmas* held 1.0–8.5 mm below top of perianth. *Flowering time*: mainly October to November (February).

Distribution and ecology: restricted to the eastern escarpment, from Lydenburg in Mpumalanga westward to Pretoria and Johannesburg in Gauteng, South Africa, and southward through western Eswatini to Majuba and Groenvlei south of Wakkerstroom in northern KwaZulu-Natal, South Africa; in montane grassland, often among rocks.

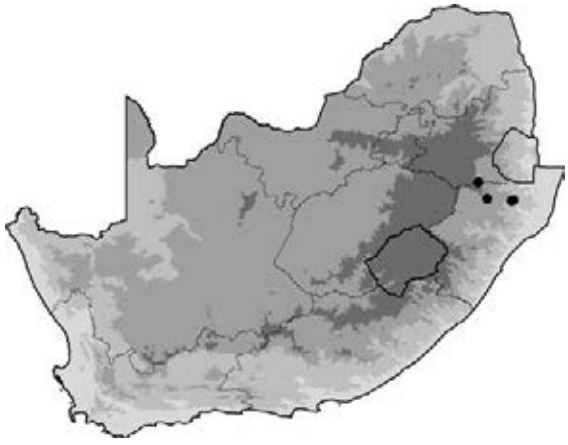
Diagnosis: growing as solitary plants or in small tufts with stems mostly less than 1.5 m tall, leaves 2–6 mm wide, and pendulous spikes with partly or mostly solid bracts. The flowers are bell-shaped and pale to magenta-pink. *Dierama erectum* from Ngome, also with partly solid bracts, is a clump-forming species with taller stems 1.50–1.65 m tall, leaves 6–12 mm wide, and erect inflorescences with more numerous coflorescences, and subrotate flowers with conspicuous red and yellow markings at the base of the tepals.

27. **Dierama erectum** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 80 (1988). Type: South Africa, [KwaZulu-Natal], Ngome, ± 3 500 ft [1 067 m], *Hilliard & Burtt 9901* (E, holo.; NU, iso.).

Plants 1.50–1.65 m high, forming clumps. *Corm* ± 30 mm diam. *Stem* with lowermost peduncle 45–90 mm long. *Foliage leaves* several, 800–900 × 6–12 mm; reduced sheathing leaves ± 5. *Spikes* erect, terminal densely 11- to 13-flowered, laterals ± 10, each 5- to 10-flowered; bracts lanceolate to elliptic, acuminate, 14–20 × 8 mm, 2 or more internodes long, basal ⅓–½ green drying brown, often flecked brownish, rest of bract membranous and whitish very sparsely flecked reddish brown or ochre-coloured with midline reddish brown to ochre-coloured, veins many, coalescing below in solid patch. *Flowers* subrotate, pale magenta-pink with conspicuous red and yellow diamonds at base of tepals; perianth tube (5–)7–8 mm long; tepals 18–19 × 7.0–8.5 mm.



Distribution of ***Dierama insigne***.



Distribution of ***Dierama erectum***.

Anthers 6–7 mm long. *Stigmas* held 7–9 mm below top of perianth. *Flowering time*: January to April.

Distribution and ecology: restricted to northern KwaZulu-Natal, known only from Ngome east of Vryheid, South Africa; forming clumps in montane grassland, sometimes along streams.

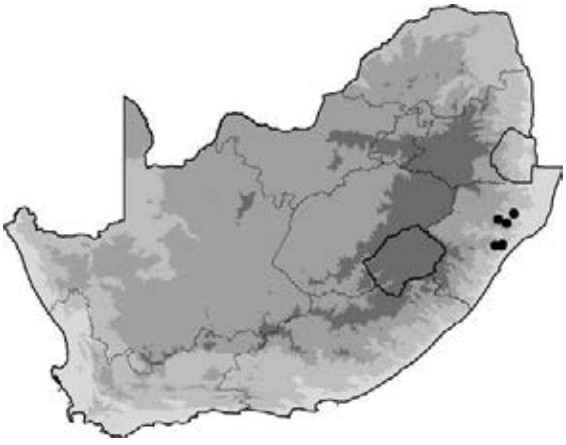
Diagnosis: a clump-forming species with stems more than 1.5 m tall, leaves 6–12 mm wide, and erect spikes with partly solid bracts. The flowers are subrotate with a well-marked red and yellow eye at the base of each tepal. *Dierama insigne*, also with partly solid bracts, has the stems solitary or a few in small tufts, narrower leaves 2–6 mm wide, and pendulous spikes with fewer laterals, mostly 2 to 4.

28. **Dierama dubium** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 202 (1929). Type: South Africa, [KwaZulu-Natal], without precise locality, *Buchanan s.n.* (K, holo.).

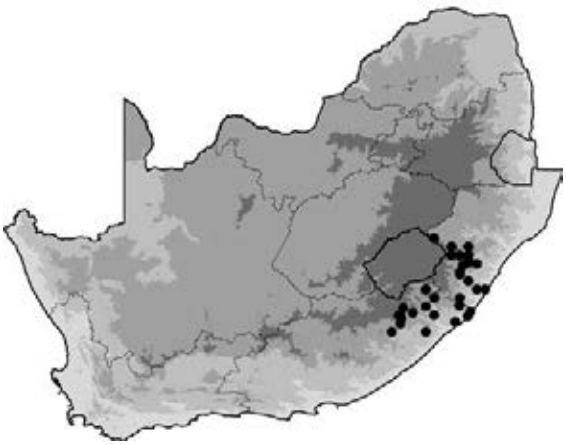
Plants 0.75–1.5 m high, solitary. *Corm* ± 15–30 mm diam. *Stem* with lowermost peduncle ± 80–180 mm long. *Foliage leaves* several, 400–850 × 3–5 mm; reduced sheathing leaves 4. *Spike* pendulous, densely 8- to 14-flowered, coflorescences 3 to 7(9), each 6- to 11-flowered; bracts obovate to lanceolate, acuminate, (13–)16–24 × 5–8 mm, longer than two internodes, white or lightly flecked all over, main veins 4 or 5 each side of midvein. *Flowers* bell-shaped with tepals suberect or flaring apically, dark purple-red; perianth tube (5.5–)6.0–7.0 mm long; tepals 8.0–11.5 × 3–5 mm. *Anthers* 5–6 mm long. *Stigmas* held at top of perianth or up to 4 mm below. *Flowering time*: August to January.

Distribution and ecology: a local endemic of the eastern midlands of northern KwaZulu-Natal, South Africa, from near Ulundi to Stanger, in grassland, from 1 200–1 500 m elevations.

Diagnosis: occurring as solitary stems with white or lightly flecked bracts, and remarkable for its very small, dark purple-red flowers often shorter than the bracts, the perianth 14–18 mm long.



Distribution of ***Dierama dubium***.



Distribution of ***Dierama reynoldsii***.

29. **Dierama reynoldsii** *I.Verd.* in Flowering Plants of South Africa 21: t. 836 (1941). Type: South Africa, [Eastern Cape], 5 miles [8 km] N of Engcobo, ex hort. Johannesburg, *Reynolds 3153* (PRE, holo.; BOL, SAM, iso.).

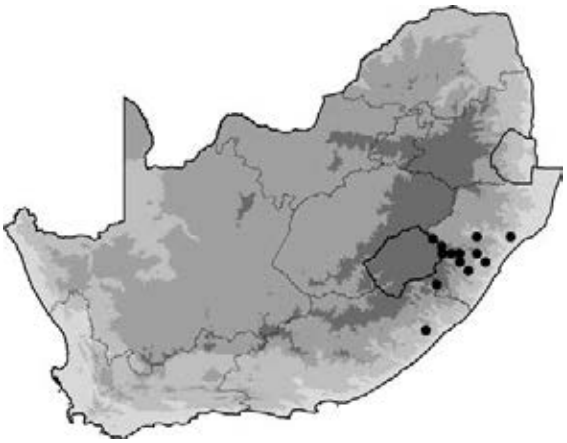
Plants 1–2 m high, solitary or 2 or 3 in small tufts. *Corm* ± 30 mm diam. *Stem* with lowermost peduncle 55–160 mm long. *Foliage leaves* few, 450–900 × (3–)4–6 mm; reduced sheathing leaves ± 5. *Spikes* pendulous, terminal 6- to 12-flowered, laterals 3 to 8, each 3- to 11-flowered; bracts obovate-elliptic to elliptic-lanceolate, acute to acuminate, 18–32 × 7–10 mm, ± 2 internodes long, white or very lightly flecked all over but appearing white, lateral veins ± 6 each side of main vein. *Flowers* funnel–bell-shaped, dark wine-red; perianth tube 6–12 mm long; tepals (10–)13–20 × (5–)6–9 mm. *Anthers* 7.0–10.5 mm long. *Stigmas* held at top of perianth or up to 5 mm below. *Flowering time*: mainly November to February.

Distribution and ecology: relatively widespread, from Muden in central KwaZulu-Natal south to Maclear in Eastern Cape, South Africa; in stony grassland, from ± 600–1 550 m elevation.

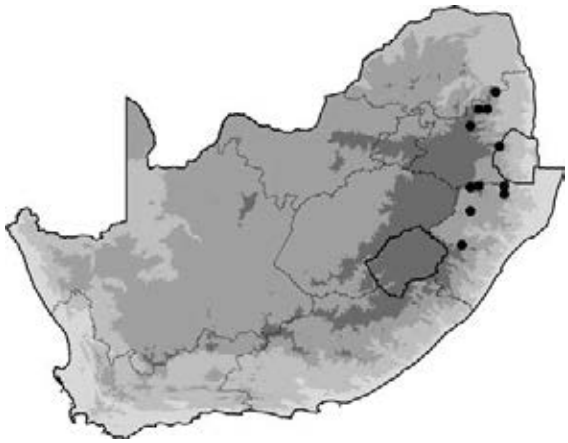
Diagnosis: occurring as solitary stems or up to three in small tufts, with pure white or lightly flecked bracts appearing silvery white, and dark wine-red flowers with perianth 17–30 mm long. *Dierama dubium* has much smaller flowers usually shorter than the bracts, the perianth 14–18 mm long. Purple-flowered forms of *D. latifolium* are distinguished by the markedly clumped habit and often broader leaves, 5–15 mm.

30. **Dierama latifolium** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 199 (1929). Type: South Africa, [KwaZulu-Natal], Inanda, *Wood 1005* (K, holo.; NU, iso.).

?*Dierama palustre* N.E.Br.: 199 (1929). Type: Zimbabwe, Mashonaland, without precise locality, *Appleton 38* (K, holo.). [Locality probably incorrect and real source uncertain].



Distribution of ***Dierama latifolium***.



Distribution of ***Dierama tyrium***.

Plants 1.1–2.7 m high, forming large clumps. *Corm* 35–40 mm diam. *Stem* with lowermost peduncle 45–100(–140) mm long. *Foliage leaves* many, 550–1 500 × 5–15 mm; reduced sheathing leaves ± 5. *Spikes* pendulous or sometimes suberect, terminal 7- to 16-flowered, laterals 6 to 11 or more by compounding, each 5- to 16-flowered; bracts elliptic to elliptic-lanceolate, acute to acuminate, (13–)18–27 × 7–10 mm, ± 2 internodes long, white or very lightly flecked but appearing white, lateral veins 4 or 5 each side of main vein. *Flowers* funnel–bell-shaped, pale to deep pink or rarely dark wine-red; perianth tube (5–)8–10 mm long; tepals (12–)14–23 × (5–)6–10 mm. *Anthers* (7–)8–10 mm long. *Stigmas* held 2–10 mm below top of perianth. *Flowering time*: October to May.

Distribution and ecology: extending from central KwaZulu-Natal to Umtata in Eastern Cape, South Africa; in open grassland, from ± 600–2 100 m elevation.

Diagnosis: characterised by the conspicuously clumped habit, typically broad leaves, 5–15 mm wide, and pink or rarely dark wine-red flowers with white or faintly speckled bracts. Dark-flowered plants are sympatric with *Dierama reynoldsii* but that species grows as solitary stems or in small tufts of up to three stems, with narrower leaves 3–6 mm wide.

31. **Dierama tyrium** *Hilliard* in Hilliard & Burtt in Notes from the Royal Botanic Garden, Edinburgh 45: 82 (1988). Type: South Africa, [KwaZulu-Natal], Louwsberg, Itala Nature Reserve, ± 1 300 m, *Hilliard & Burtt 17723* (E, holo.; NU, iso.).

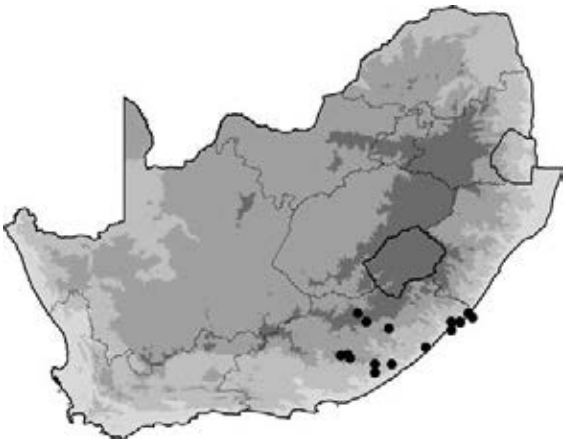
Plants 1.2–2.1 m high, solitary or up to 20 in small tufts. *Corm* ± 30 mm diam. *Stem* with lowermost peduncle 45–120 mm long. *Foliage leaves* few, 450–1 350 × (4–)5–10 mm; reduced sheathing leaves 4 or 5. *Spikes* pendulous, terminal 8- to 18-flowered, laterals 5 to 11 or more by compounding, each (4)6- to 13-flowered; bracts elliptic-lanceolate, acuminate, 18–25(–40) × 5–8 mm, ± 2 internodes long, almost solidly coloured to lightly flecked red-brown at base and along midline, paler and more lightly flecked on shoulders, lateral veins 5 or 6 each side of main vein. *Flowers* funnel- or bell-shaped, rich magenta-pink to dark reddish magenta or deep purple; perianth tube 6–11 mm long; tepals 15–23 × 5–10 mm. *Anthers* 6.5–9.0 mm long. *Stigmas* held 2–9 mm below top of perianth. *Flowering time*: mainly December to March.

Distribution and ecology: South Africa, from Mariepskop in Mpumalanga to Estcourt in northern KwaZulu-Natal; in open, rocky grassland, often wedged in crevices, from ± 1 200–2 100 m elevation.

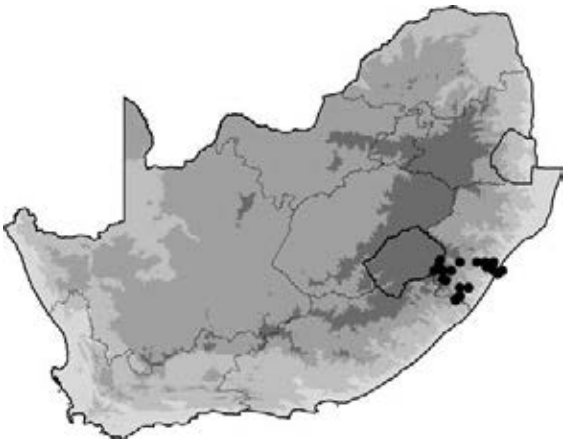
Diagnosis: occurring as solitary stems or small tufts, 1 200–2 100 mm tall, with moderately sized, dark magenta to purple flowers, perianth 22–31 mm long, and bracts partly or ± entirely flecked with reddish brown. *Dierama mobile* and *D. pictum*, also from Mpumalanga and KwaZulu-Natal have similar coloured but smaller flowers, with perianth 15–23 mm long. *Dierama atrum* from Eastern Cape is a shorter plant, 750–1 250 mm tall, with fewer, darker maroon flowers in the terminal spike, mostly 4 to 8, and slightly broader bracts, 8–11 mm wide.

32. **Dierama atrum** *N.E.Br.* in Journal of the Royal Horticultural Society 54: 198 (1929). Type: South Africa, [Eastern Cape], Lusikisiki, 10 Jan. 1928, *Blenkiron sub Moss 16033* (PRE, holo.; BOL, J, K, iso.).

Plants 0.75–1.25 m high, solitary or a few in small tufts. *Corm* ± 25–30 mm diam. *Stem* with lowermost peduncle (55–)90–130 mm long. *Foliage leaves* few, 300–750 × 3.0–6.5 mm; reduced sheathing leaves 4 or 5. *Spikes* pendulous, terminal 4- to 8(13)-flowered, laterals 1 to 5(6), each 2- to 7(10)-flowered; bracts elliptic-lanceolate, acute to acuminate, 17–26 × 8–11 mm, < or up to 2 internodes long, lightly to heavily flecked all over but more lightly on shoulders, appearing pale brown, lateral veins 5 or 6 each side of main vein. *Flowers* bell-shaped with tepals suberect and flaring slightly apically,



Distribution of ***Dierama atrum***.



Distribution of ***Dierama argyreum***.

dark maroon to purple-black, rarely paler; perianth tube 8–12 mm long; tepals 15–22 × 5–9 mm. *Anthers* 6–9 mm long. *Stigmas* held 1–5 mm below top of perianth. *Flowering time*: November to February.

Distribution and ecology: restricted to Eastern Cape, South Africa, from the Great Winterberg and Stormberg to Lusikisiki; in open grassland, from ± 600–1 800 m elevation.

Diagnosis: endemic to Eastern Cape, occurring as solitary stems or small tufts, 750–1 250 mm tall, with moderately sized, dark maroon to purple-black (rarely light purple) flowers, the perianth 21–32 mm long, and bracts flecked all over and appearing pale brown to the eye.

33. **Dierama argyreum** *L.Bolus* in Annals of the Bolus Herbarium 4: 42 (1926). Type: South Africa, [KwaZulu-Natal], without precise locality, ex hort. Kirstenbosch, *Williams s.n.* (BOL, holo.).

Dierama argyreum var. *majus* N.E.Br.: 202 (1929). Type: South Africa, [KwaZulu-Natal], Kranzkloof, *Rogers 24627* (K, holo.).

Plants (0.40–)0.65–1.35 m high, solitary or up to ± 5 in small tufts. *Corm* 25–30 mm diam. *Stem* with lowermost peduncle 45–110(–135) mm long. *Foliage leaves* few, (300–)500–750(–1 000) × (2.5–)3.5–6.5 mm; reduced sheathing leaves mostly 4 or 5. *Spikes* pendulous, terminal (4)6- to 11-flowered, laterals (2)3 to 7, each (3)4- to 9-flowered; bracts elliptic to oblong, acute to obtuse, 14–24 × 7–10 mm, < or up to 2 internodes long, membranous, pure white or rarely with a few flecks, lateral veins usually 6 or 7 each side of main vein. *Flowers* funnel- or bell-shaped, white or ivory-coloured, sometimes tinged pink at base or rarely wholly mauve-pink; perianth tube (4–)6–12 mm long; tepals (14–)16–20(–25) × (5.0–)6.5–10.0(–14.0) mm. *Anthers* 6–10 mm long. *Stigmas* held level with top of perianth or up to 10 mm below. *Flowering time*: mainly October to December.

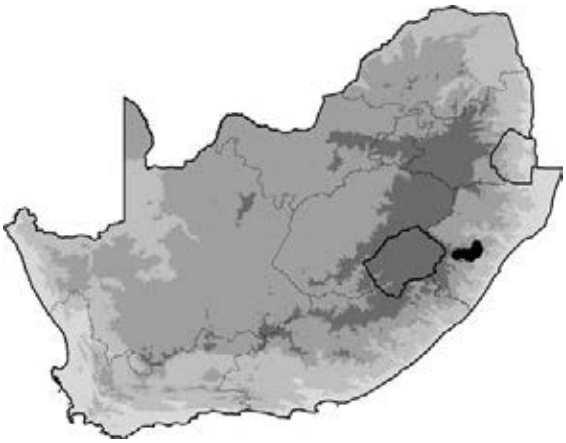
Distribution and ecology: confined to southern KwaZulu-Natal and adjacent Eastern Cape, South Africa, from Umlaas Road south of Pietermaritzburg and Krantzkloof to Weza in the south; in grassland, from 400–1 700 m elevation.

Diagnosis: occurring as solitary stems or small tufts with rather blunt, pure white bracts, rarely with a few flecks, and bell-shaped, mostly white or ivory-coloured (rarely mauve-pink) flowers with a perianth 18–30(–35) mm long. Populations from lower elevations up to ± 900 m have smaller flowers, the perianth mostly 18–25 mm long with tube 4–6(–7) mm long, and those at higher elevations larger flowers, the perianth mostly 25–35 mm long with a longer tube ± 7–12 mm long. *Dierama pallidum* from between Pietermaritzburg and Durban, also with creamy white to pale yellow flowers sometimes tinged pinkish, has acuminate bracts and smaller, more closed flowers, 15–18 mm long.

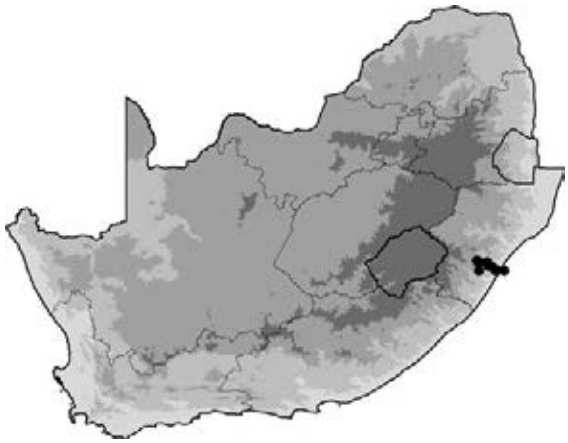
34. **Dierama luteoalbidum** *I.Verd.* in Flowering Plants of South Africa 22: t. 845 (1942). Type: South Africa, [KwaZulu-Natal], Nottingham Road, 15 Nov. 1940, *Reynolds 3723* (PRE, holo.; BOL, NBG, iso.).

Plants 0.65–1.1 m high, solitary or 2 or 3 in small tufts. *Corm* 15–20 mm diam. *Stem* with lowermost peduncle 65–95 mm long. *Foliage leaves* few, 350–650 × 3–4 mm; reduced sheathing leaves 4 or 5. *Spikes* pendulous, terminal 3- to 6-flowered, laterals 1 to 3, each 1- to 5-flowered; bracts elliptic to obovate, acute, 24–32 × 12–16 mm, < or up to 2 internodes long, membranous, pure white or lightly flecked all over, veins 10 to 12 each side of main vein due to strongly developed intermediate veins. *Flowers* bell-shaped with tepals suberect or scarcely flaring apically, white to pale creamy yellow; perianth tube 10–13 mm long; tepals 20–35 × 9–18 mm. *Anthers* 8–11 mm long. *Stigmas* held (6–)12–19 mm below top of perianth. *Flowering time*: October to December.

Distribution and ecology: a local endemic of central KwaZulu-Natal, South Africa, around Nottingham Road



Distribution of ***Dierama luteoalbidum***.



Distribution of ***Dierama pallidum***.

and Dargle and in the Karkloof; in open grassland, from ± 1 100–1 700 m elevation.

Diagnosis: occurring as solitary stems or small tufts with large, translucent bracts, 24–32 mm long, and 3- to 6-flowered spikes of large, rather closed, white to creamy yellow flowers, the perianth 30–50 mm long with the anthers and style deeply included. *Dierama argyreum* has mostly 6- to 9-flowered spikes of smaller, widely flared flowers with perianth 18–30(–35) mm long.

35. **Dierama pallidum** *Hilliard* in Hilliard & Burtt, Dierama: 143 (1991). Type: South Africa, [KwaZulu-Natal], Inchanga Hill, ± 600 m, 5 Mar. 1971, *Hilliard & Burtt 6777* (E, holo.; NU, iso.).

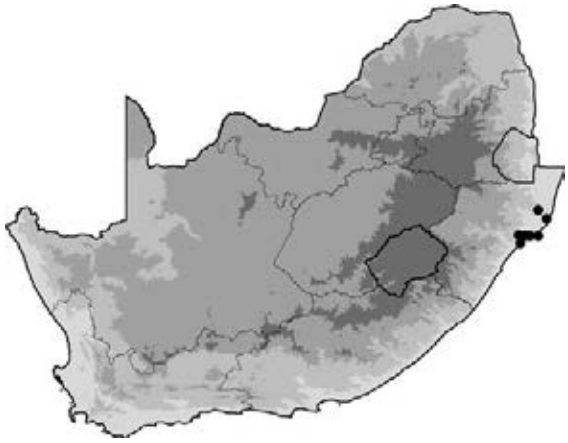
Plants 0.50–1.05 m high, solitary or few in small tufts. *Corm* ± 20 mm diam. *Stem* with lowermost peduncle (70–)100–230 mm long. *Foliage leaves* few, 350–650 × 3.0–4.5 mm; reduced sheathing leaves ± 4. *Spikes* pendulous, terminal 7- to 12-flowered, laterals 2 to 5, each 4- to 9-flowered; bracts elliptic-lanceolate, acuminate, 15–25 × 6–9 mm, ± 2 internodes long, membranous, pure white or with a few flecks along main vein, lateral veins ± 5 each side of main vein. *Flowers* bell-shaped with tepals suberect or scarcely flaring apically, creamy white to pale yellow, rarely tinged pink or lilac; perianth tube (4.5–)5.0–6.0(–)7.0 mm long; tepals 9–12 × 4–5 mm. *Anthers* 5–6 mm long. *Stigmas* held 3–6 mm below top of perianth. *Flowering time*: October to March.

Distribution and ecology: a local endemic of south-central KwaZulu-Natal, South Africa, between Pietermaritzburg and Mt. Vernon near Durban; in stony and sandy grassland, from 300–900 m elevations.

Diagnosis: occurring as solitary stems or small tufts with acuminate, pure white bracts, and small, rather closed, creamy white to pale yellow (rarely tinged pink or mauve) flowers, the perianth 14–18 mm long. *Dierama sertum* from northern coastal KwaZulu-Natal has similar flowers but bracts well flecked in the lower part and along the midline. *Dierama argyreum*, also with white bracts, has larger, bell-shaped white or ivory-coloured flowers, and the perianth 18–35 mm long with flaring tepals.

36. **Dierama sertum** *Hilliard* in Hilliard & Burtt, Dierama: 143 (1991). Type: South Africa, [KwaZulu-Natal], Mtunzini, Farm Twinstreams, 16 Jan. 1956, *Hilliard & Burtt 19070* (E, holo.; NU, iso.).

Plants 0.70–1.25 m high, solitary or few in small tufts. *Corm* ± 15 mm diam. *Stem* with lowermost peduncle 45–110 mm long. *Foliage leaves* few, 550–850 × 3–5(–9) mm; reduced sheathing leaves ± 4. *Spikes* pendulous, terminal 6- to 12-flowered, laterals 2 to 5, sometimes compounded, each 4- to 10-flowered; bracts elliptic-lanceolate, acuminate, 15–18(–23) × 5–8 mm, < or up to 2 internodes long, membranous, pale reddish brown and well flecked in lower part and along midline, margins and shoulders white, lateral veins ± 5 each side of main vein. *Flowers* bell-shaped with tepals suberect or scarcely flaring apically, creamy white to pale yellow, rarely pale pink; perianth tube 6–8 mm long; tepals 9–12 ×



Distribution of ***Dierama sertum***.

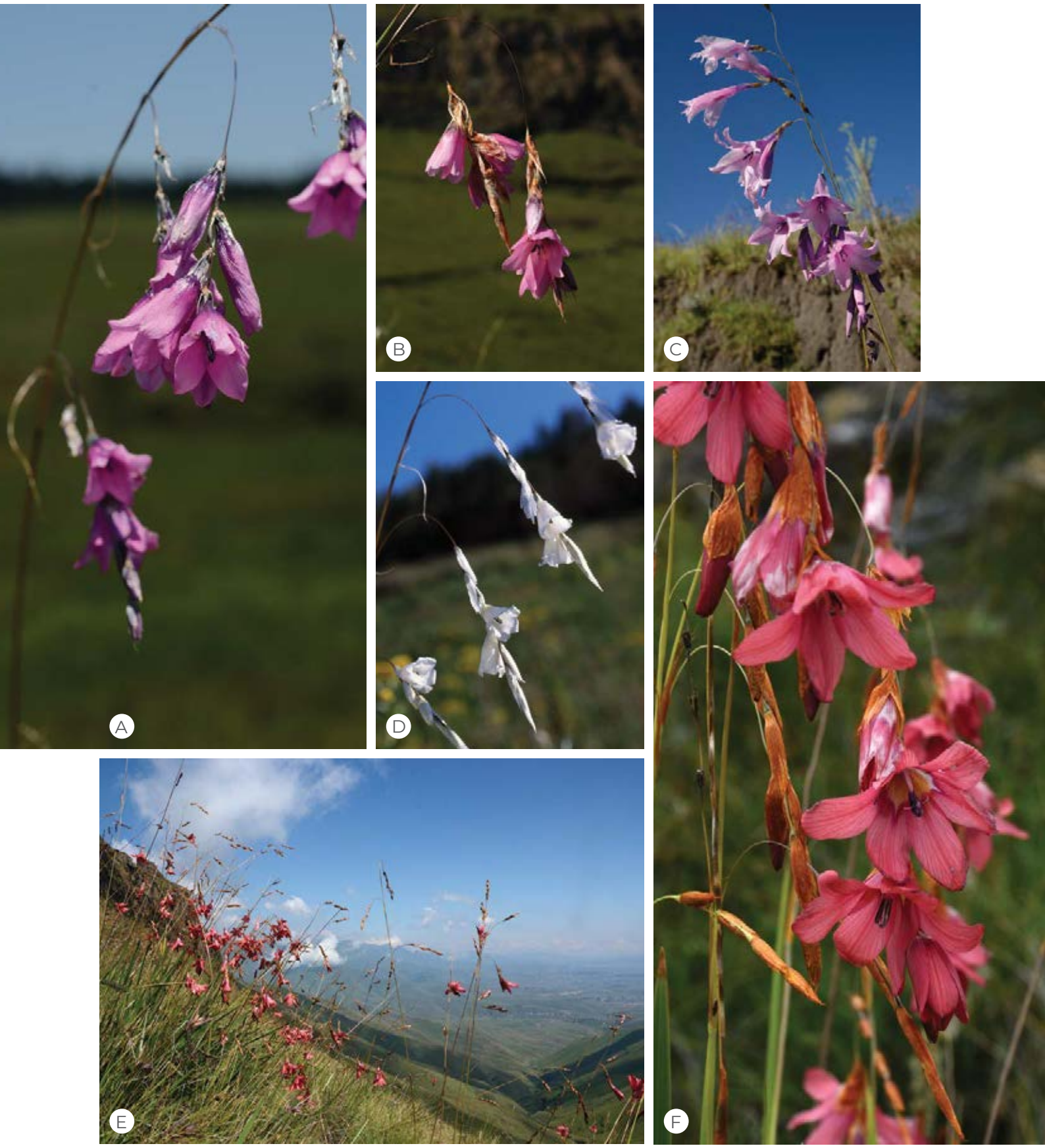


Plate 55. A, ***Dierama adelphicum***, Sabie, MP; B, ***D. cooperi***, Witsieshoek, FS; C, ***D. grandiflorum***, Somerset East, EC; D, ***D. pallidum***, Inchanga, KZN; E & F, ***D. dracomomtanum***, Witsieshoek, FS.

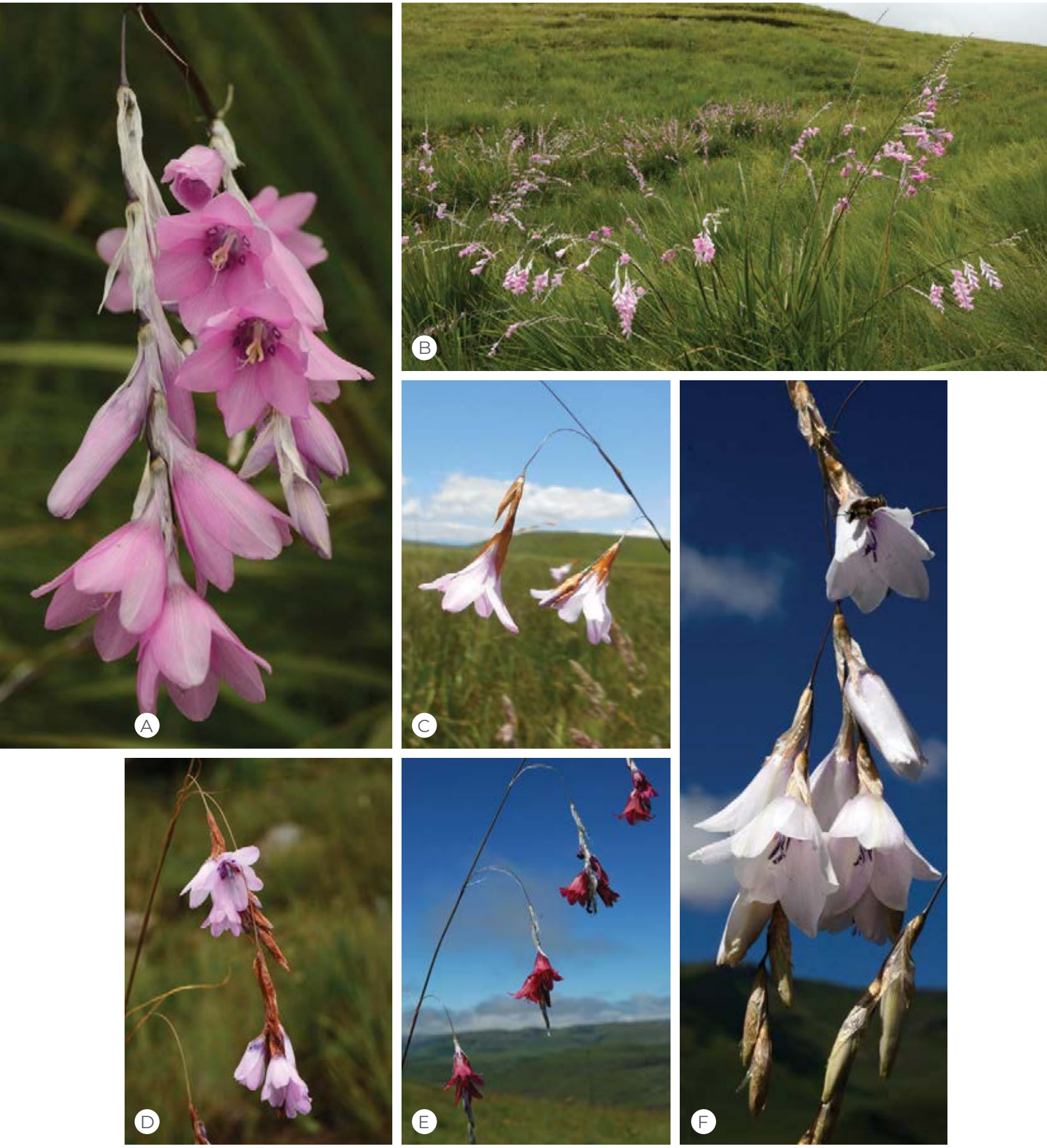


Plate 56. A & B, ***Dierama latifolium***, Karkloof, KZN; C, ***D. pauciflorum***, Dargle, KZN (photograph: C. Carbutt); D, ***D. pictum***, Lydenburg, MP; E, ***D. reynoldsii***, Maclear, EC; F, ***D. robustum***, Rhodes, EC.

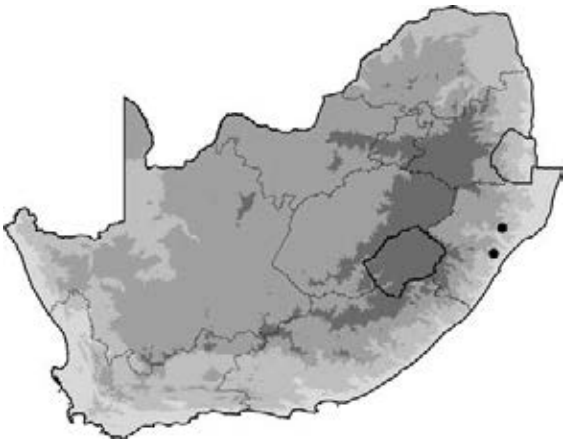
4–6(–7) mm. *Anthers* 5–7 mm long. *Stigmas* held 3–4(–9) mm below top of perianth. *Flowering time*: probably mainly May to January.

Distribution and ecology: restricted to coastal and near-interior northern KwaZulu-Natal, South Africa, from Umhlatuzi to Stanger inland to the Noodsberg and Ngoye; in grassland between forest patches.

Diagnosis: occurring as solitary stems or small tufts with brown-flecked bracts, and small to moderately sized, rather closed, creamy white to pale yellow (rarely pale pink) flowers, the perianth 16–19(–25) mm long. *Dierama pallidum* from south-central KwaZulu-Natal between Pietermaritzburg and Durban has similar flowers but pure white bracts. *Dierama argyreum*, also with white bracts, has larger, bell-shaped white or ivory-coloured flowers, the perianth 18–35 mm long with flaring tepals.

37. **Dierama pumilum** *(Baker) N.E.Br.* in Journal of the Royal Horticultural Society 54: 199 (1929). *D. pendulum* var. *pumilum* Baker: 160 (1892). Type: South Africa, [KwaZulu-Natal], without precise locality, *Buchanan s.n.* (K, holo.).

Plants 0.65–1.35 m high, solitary. *Corm* ± 10 mm diam. *Stem* with lowermost peduncle 100–220 mm long. *Foliage leaves* 2 or 3, 300–750 × 1.0–2.5 mm; reduced sheathing leaves 2 or 3. *Spikes* pendulous, terminal densely 5- to 13-flowered, laterals 1 to 5, each 4- to 11-flowered; bracts obovate-elliptic, acute, 13–24 × 8–9 mm, 2 internodes long or longer, solidly coloured or heavily flecked dark reddish brown, paler toward margins, lateral veins ± 7 each side of main vein. *Flowers* bell-shaped with tepals suberect or scarcely flaring apically, pale creamy yellow; perianth tube 6.5–8.0 mm long; tepals 9–11 × 4–6 mm. *Anthers* 5–6 mm long. *Stigmas* held 4.0–6.5 mm below top of perianth. *Flowering time*: December to February.



Distribution of ***Dierama pumilum***.

Distribution and ecology: a local endemic of northern KwaZulu-Natal, South Africa, known with certainty from the Noodsberg and the Mlabathini–Melmoth–Nkandla areas; in rocky grassland.

Diagnosis: occurring as solitary stems, with very narrow, almost needle-like leaves, 1.0–2.5 mm wide, solid brown or heavily flecked bracts, and small, pale creamy yellow, rather closed flowers, the perianth 13–19 mm long.

REFERENCES

BAKER, J.G. 1876. New species of Ixeae. *Journal of Botany, British and foreign* 14: 236–239.

BAKER, J.G. 1877. Systema Iridacearum. *Journal of the Linnean Society, Botany* 16: 61–104.

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell and Co., London.

BOLUS, L. 1926. Novitates africanae. *Annals of the Bolus Herbarium* 4: 37–55.

BROWN, N.E. 1929. The genus *Dierama* K.Koch & Bouché. *Journal of the Royal Horticultural Society* 54: 193–202.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.

HILLIARD, O.M. 1988. Iridaceae. In O.M. Hilliard & B.L. Burtt, Notes on some plants from southern Africa chiefly from Natal XIV. *Notes from the Royal Botanic Garden, Edinburgh* 45: 75–94.

HILLIARD, O.M. & BURTT, B.L. 1991. *Dierama: The Hairbells of Africa*. Acorn Books, Johannesburg and London.

HOOKER, J.D. 1866. *Sparaxis pulcherrima*. *Curtis's Botanical Magazine* 92: t. 5555.

KER GAWLER, J.B. 1812. *Sparaxis tricolor*. *Curtis's Botanical Magazine* 35: t. 1482.

KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.

KOCH, K. 1855. *Index Seminum Hortus Berolinensis* 1854, Appendix 10.

LEWIS, G.J. 1934a. *Dierama longiflorum*. *Flowering Plants of South Africa* 14: t. 541.

LEWIS, G.J. 1934b. *Dierama grandiflorum*. *Flowering Plants of South Africa* 14: t. 542.

LINNAEUS, C. fil. 1782 ['1781']. *Supplementarum plantarum*. Orphanotropheus, Brunswick.

NORDENSTAM, B. 1972. Types of Ecklon's 'Topographisches Verzeichniss' in the Swedish Museum of Natural History in Stockholm. *Journal of South African Botany* 38: 277–298.

PERSOON, H. 1805. *Synopsis plantarum*, vol. 1. Cramer, Paris.

VERDOORN, I.C. 1941. *Dierama reynoldsii*. *Flowering Plants of South Africa* 21: t. 836.

VERDOORN, I.C. 1942. *Dierama luteo-albidum*. *Flowering Plants of South Africa* 22: t. 845.

27. **Tritonia**

Tritonia *Ker Gawl.* in Curtis's Botanical Magazine 16: t. 581 (1802a). Type: *T. squalida* (Aiton) Ker Gawl.

Waitzia Rchb.: 60 (1828), illegitimate superfluous name for *Tritonia* Ker Gawl. Type species: not designated.

Montbretia DC.: 251 (1803). Type species: *M. securigera* ([Soland. in] Aiton) DC. = *Tritonia securigera* ([Soland. in] Aiton) Ker Gawl.

Bellendenia [as *Belendenia*] Raf.: 245 (1832), illegitimate superfluous name for *Tritonia*.

Tritonixia Klatt: 355 (1882), illegitimate superfluous name for *Tritonia* Ker Gawl.

Montbretiopsis L.Bolus: 215 (1929a). Type species: *M. florentiae* Marloth = *Tritonia florentiae* (Marloth) Goldblatt

[*Freesea* Eckl.: 30 (1827), invalid name without description.]

Revisionary accounts: De Vos: 105–163 (1982); De Vos: 347–422 (1983); De Vos: 89–127 (1999).

From the Latin, *triton,* a weathervane, for the variable orientation of the stamens in some species.

Deciduous geophytes, with pale membranous cataphylls. *Corm* globose to obconic, axial in origin, tunics of finely to coarsely netted fibres. *Stem* mostly well developed, sometimes contracted, ± subterranean in 1 species. *Leaves* several, mostly basal, forming a 2-ranked fan, blade usually plane, linear to falcate with a definite main vein, rarely round to elliptic in section, occasionally margins undulate to crisped, inrolled, or winged, blades thus H-shaped in section, cauline leaves few and reduced; margin usually without vascular bundle and epidermal cells columnar and thickened, rarely with marginal bundle and epidermal cells unspecialised. *Inflorescence* a spike, rarely flowers solitary and terminal on axes, often secund; bracts relatively small, green and firm, or membranous to dry, outer usually 3-toothed, inner smaller than outer and 2-toothed or notched apically. *Flowers* usually zygomorphic, rarely radially symmetric, long-lived, bilabiate to salver-shaped or rotate, often orange to yellow, or red, pink, cream-coloured or white, often with darker veins, lower tepals often bearing bright yellow median tooth (callus) or raised ridge, occasionally sweetly scented, with nectar from septal nectaries; perianth tube funnel-shaped or cylindric, short or long; tepals subequal or unequal with dorsal largest and lower 3 forming a lip. *Stamens* unilateral, arcuate or diverging, rarely symmetrically disposed and erect; filaments included or exserted. *Ovary* globose; style filiform, unilateral or central, 3-branched distally, branches slender, curved, rarely shorter and expanded apically. *Capsules* cartilaginous, globose to ellipsoid. *Seeds* globose, flattened at chalazal end, smooth or rarely rugose, shiny, surface cells obscured by thick cuticle, ovular vascular trace excluded. *Pollen* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number x* = 11.

Species 30, mainly southern Africa, also tropical Africa, centred in the winter-rainfall zone, with just 2 species occurring north of South Africa: *Tritonia moggii* Oberm. so far known from southern Mozambique is included in this account for completeness; *T. laxifolia* has an unusual disjunct distribution in southeastern South Africa and Malawi, Tanzania and Zimbabwe.

Originally limited to a small group of species with relatively large, short-tubed flowers with radially symmetric perianth, *Tritonia* now also includes species with short- to long-tubed, zygomorphic flowers. It forms part of a small clade of genera including *Dierama*, *Duthiastrum, Ixia* and *Sparaxis* defined by netted corm tunics, mostly radially symmetric flowers, more-or-less dry and papery or membranous bracts, and specialised, subglobose seeds with a smooth, glossy testa and a raphal vascular bundle excluded from the seed body during ripening (Goldblatt et al. 2006). *Tritonia* is immediately related to *Dierama* and *Ixia*, the latter also often with 3-toothed bracts. *Tritonia* is separated from these two genera by its more sturdy and firm (not wiry) stem, leaves usually with specialised margins lacking a vascular bundle and having instead columnar epidermal cells with thickened walls, and possibly ancestrally zygomorphic flowers, often with the main vein on some or all lower tepals thickened or raised in a fleshy or bony callus or tooth. Similar teeth are developed elsewhere only in some species of *Lapeirousia* and *Afrosolen* (tribe Watsonieae). In several species the perianth is thin-textured with prominent, dark veins. Most species have a basic chromosome number of *x* = 11 (exceptionally *x* = 10).

Four species are anomalous in the genus in their leaf anatomy, possessing a marginal vascular trace with associated sclerenchyma cap and lacking the specialised, thickened epidermal cells that are characteristic of the other species of *Tritonia* (see De Vos, 1982). These are the two Richtersveld endemics, *T. delpierrei* and *T. marlothii*, with narrow, leathery or subsucculent leaves, and two that have narrow, essentially centric leaves, *T. bakeri*, with stiffly linear, compressed elliptical or subterete leaves; and *T. kamisbergensis* with wiry, terete and fibrous leaves.

Pollination in the genus has been little studied, but the diversity of flower types in *Tritonia* signals a

corresponding range of pollination systems. The ancestral system, as found in the species with colourful, funnel-shaped flowers, appears to be pollination by long-tongued anthophorine bees, which visit flowers to forage for nectar. This system occurs almost throughout the range of the genus but is overshadowed by two derived pollination systems in the southern African winter-rainfall zone. Here, species with pale, long-tubed flowers are adapted for pollination by long-proboscid horseflies (Tabanidae) and tangle-winged flies (Nemestrinidae), and species with a short-tubed, radially symmetric perianth, mostly with transparent patches or large dark markings, are adapted for pollination by hopliine scarab beetles.

Relationships among the species have not been tested using molecular sequences. We assume that the genus is ancestrally zygomorphic by analogy with other genera of Crocoideae, containing species with both actinomorphic and zygomorphic flowers. In light of its close relationship with *Dierama* and *Ixia*, both of which have ancestrally radially symmetrical flowers, this assumption remains to be confirmed.

De Vos (1982, 1983) initially grouped the species into five sections, referring the majority to sect. *Montbretia*, defined by zygomorphic flowers with one or all of the lower tepals bearing a well-developed, tooth- or axe-like crest or callus on the midline near the base. Previously segregated at generic rank, this section is widely distributed from southern to south tropical Africa, and comprises three distinct groups of species identified by De Vos as possible subsections. The largest included nine species with orange to yellow or pink to red, strongly bilabiate flowers with large, axe-like calluses on the lower tepals. A second group included two species from the Richtersveld with subsucculent leaves without thickened marginal epidermis and pale, salver-shaped flowers, *T. delpierrei* and *T. marlothii*. The remaining two species, *T. florentiae* and *T. karooica* from the western central karroid zones of South Africa, were considered taxonomically distantly related by De Vos, but both share similar long, crest-like calluses on the lower tepals and unusually large capsules.

Sect. *Tritonia* included four species with short-tubed, bowl-shaped, orange or pink flowers with a radially symmetrical perianth lacking well-developed calluses on the lower tepals, and with central or loosely unilateral stamens. One of the species included here, *T. dubia*, is almost certainly misplaced, differing from the other species in its ± rotate flowers with erect, symmetrically disposed stamens inserted near the top of the perianth tube, and larger, ellipsoid capsules. Similar capsules are found in *T. laxifolia* and *T. moggii* (sect. *Montbretia*), suggesting an alliance with those species. All members of sect. *Tritonia* are local endemics of southwestern South Africa.

The remaining species in the genus have zygomorphic flowers, usually without tepal calluses. The monotypic sect. *Teretifoliae* included just *Tritonia kamisbergensis* from Namaqualand, distinguished by its fibrous, subterete leaves, small, subherbaceous bracts and red flowers. Sect. *Pectinatae* included four species with a dense, almost horizontal spike of pale pink to cream-coloured or white flowers with an elongate perianth tube. Three are fynbos endemics with uniquely modified leaves that develop longitudinal, flange-like outgrowths from the adaxial surface and margins. The fourth, *T. tugwelliae* from the western Great Karoo, has conventional plane leaves and small, uniformly pale bracts without dark upper margins and is thus evidently misplaced here. The residue of the species were accommodated in sect. *Subcallosae*, which was poorly and essentially negatively diagnosed as lacking the distinctive features of the other sections. The distinction between sect. *Subcallosae* and sect. *Montbretia* is, however, blurred by *T. pallida*, which sometimes has large, axe-like calluses on the lower tepals, and the two sections were combined by De Vos (1999). The species in sect. *Subcallosae* fall into two distinct groups based on flower shape: one with pale, long-tubed flowers restricted to the winter-rainfall region of South Africa, and a second with yellow or orange to red, funnel-shaped flowers, mainly from the eastern seaboard and near-interior. The long-tubed *T. bakeri* is anomalous in the section in its centric, terete or compressed leaves without true margins and its association with the other long-tubed species in the group may be mistaken.

Morphological evidence suggests that at least some of the species are currently misplaced in the existing sections but additional phylogenetic data are required to resolve relationships in the genus. Provisionally, we have rearranged some of the existing sections by removing anomalous taxa and have split others into smaller, morphologically homogeneous sections. This arrangement serves to isolate the species clusters that we have been able to identify.

Key to species

1a Perianth actinomorphic, ± rotate with spreading tepals longer than tube; stamens either erect and central or weakly unilateral and diverging:
2a Flowering spike erect; flowers perfectly actinomorphic with stamens erect and inserted near top of tube; perianth tube only slightly shorter than tepals; capsules elliptic, longer than bracts. . . . . 14. *T. dubia*
2b Flowering spike inclined; flowers slightly zygomorphic with the stamens arcuate and slightly spreading, inserted in lower half of tube; perianth tube half as long as tepals or less; capsules subglobose, shorter than bracts [sect. *Tritonia*]:
3a Tepal claws without wide hyaline margins; tepals unmarked or outer tepals with dark blotch at base of limb; perianth tube yellow with prominent star-shaped yellow patch outlined with red in throat . . . . . 15. *T. deusta*

3b Tepal claws with wide hyaline margins; tepals unmarked; perianth tube with hardly any yellow colouring in throat:
4a Perianth bright orange-red to vermilion . . . . . 16. *T. crocata*
4b Perianth pale to bright mauve-pink. . . . . 17. *T. squalida*
1b Perianth more-or-less zygomorphic, usually with posterior tepal larger, rarely subactinomorphic but then tepals much shorter than tube; stamens arcuate and unilateral with anthers ± contiguous:
5a Spike strongly deflexed and almost horizontal, ± pectinate-secund, closely flowered; flowers long-tubed, white to pink with red streaks on lower tepals; leaves with margins crisped-undulate or inrolled or winged:
6a Leaves distichous, falcate, margins crisped or undulate; bracts 3–8 mm long, pale without conspicuous dark upper margins; tepals 7–9 × 2–4 mm long [sect. *Pseudopectinatae*]: . . . . . 23. T. *tugwelliae*
6b Leaves not clearly distichous, more-or-less narrowed below and pseudopetiolate, margins inrolled and straight or undulate crisped; bracts 5–15 mm long, with conspicuous dark reddish brown, crisped upper margins; tepals 12–25 × 3–13 mm [sect. *Pectinatae*]:
7a Flowers almost salver-shaped, lower tepals with two short red lines near base; perianth tube straight, (17–)20–25 mm long; leaves often narrowed between base and sheath into slender petiolar portion, blade linear-lanceolate with margins in rolled; plants from Piketberg . . . . . 25. *T. lancea*
7b Flowers bilabiate, lower tepals with lozenge-shaped red markings; perianth tube slightly curved, (20–)40–60(–85) mm long; leaves otherwise; plants not from Piketberg:
8a Leaf blade weakly involute with crisped or undulate margins. . . . . 26. *T. undulata*
8b Leaf blade X- or H-shaped with straight margins . . . . . 24. *T. cooperi*
5b Spike suberect and not as above; leaves plane or subterete but margins not variously elaborated:
9a Leaves wiry, centric and terete or compressed-cylindric in section, striate with several translucent veins, 1–3 mm diam.:
10a Flowers obliquely funnel-shaped, ruby-red; stamens inserted in lower half of tube; bracts ± green and leathery with membranous margins; plants from Namaqualand [sect. *Teretifoliae*]. . . . . 30. *T. kamisbergensis*
10b Flowers salver-shaped with long, slender tube; stamens inserted near mouth of tube; bracts papery or membranous throughout; plants from Little Karoo [sect. *Subteretifoliae*]. . . . . 27. *T. bakeri*
9b Leaves plane and linear to lanceolate or falcate, with evident midrib:
11a Flowers ± salver-shaped with subcylindric perianth tube widening slightly in upper ½ to ± 2 mm diam. at mouth; bracts green and leathery in lower half; lower tepals puberulous on upper surface; leaves slightly succulent with one or two veins evident but not raised; plants from Richtersveld and Bushmanland [sect. *Deserticola*]:
12a Flowers pale creamy yellow; perianth tube 12–22 mm long. . . . . 28. *T. delpierrei*
12b Flowers pale mauve to purple; perianth tube 28–42 mm long . . . . . 29. *T. marlothii*
11b Flowers with funnel-shaped or cylindric perianth tube widening conspicuously above to ± 5–10 mm diam. at mouth; bracts membranous or papery throughout; lower tepals not puberulous on upper surface; leaves not subsucculent, always with midrib evident and raised; plant not from Richtersveld:
13a Stems contracted or plants acaulescent; leaves falcate, leathery; calluses long and crest-like, crisped or undulate and much longer than high [sect. *Montbretiopsis*]:
14a Plants shortly caulescent; inflorescence a spike of one or more flowers; flowers pale or dull orange with dark veins; perianth tube sharply curved, about twice as long as tepals; plants flowering in spring, in August and September . . . . . 18. *T. karooica*
14b Plants acaulescent; inflorescence of one or more 1-flowered units; flowers bright yellow; perianth tube almost straight, about as long as tepals; plants flowering in winter in May and June . . . . . 19. *T. florentiae*
13b Stems well developed; leaves suberect or spreading; calluses reduced to low ridges or axe-like but never crisped or undulate:
15a Flowers white to pink; perianth tube longer than tepals, narrow and cylindric, widening only near mouth; leaves never with prominent submarginal vein [sect. *Pallidae*]:
16a Leaves linear, 1–3 mm wide, as long as flowering stem or longer; plants flowering in December. . . . . 21. *T. linearifolia*
16b Leaves lanceolate, 4–15 mm wide, shorter than flowering stem; plants flowering September to November:
17a Leaves stiffly erect, attenuate, mostly 4–10 mm wide; bracts attenuate-aristate, with outer mostly 15–40 mm long, much exceeding inner in lower part of spike; plants from southern coastal mountain ranges. . . . . 22. *T. flabellifolia*
17b Leaves softer and suberect or spreading, acute to acuminate, mostly 10–15 mm wide; bracts ± 3-toothed, acute or acuminate, outer mostly 7–10(–15) mm long, always only slightly longer than inner; plants from Little Karroo and S slopes of the western Langeberg. . . . . 20. *T. pallida*
15b Flowers creamy yellow, orange or red; perianth tube shorter or longer than tepals, usually funnel-shaped and widening in upper half; leaves with or without prominent submarginal vein:
18a Calluses on lower tepals reduced to low, thickened median ridge or rarely triangular and about as high as long; leaves always with prominent submarginal vein: [sect. *Subcallosae*]
19a Leaves linear, 1.5–4.0 mm wide; flowers with prominent, triangular calluses on lower tepals. . . . . 3. *T. drakensbergensis*
19b Leaves narrowly lanceolate, 5–20 mm wide; flowers without calluses on lower tepals:
20a Flowers cream, straw-coloured or pale yellow, sometimes with apricot or pale orange tints toward tip of perianth or on reverse, usually with dark veining; flowering August to November (rarely December) . . . . . 1. *T. gladiolaris*
20b Flowers red, orange-red or pink, rarely with dark veining; flowering (December) January to April 2. *T. disticha*
18b Calluses on lower tepals axe-like, higher than long, rarely lacking, but then leaves without prominent submarginal vein [sect. *Montbretia*]:



TRITONIA. T. watermeyeri: A, flowering plant; B, half-flower. ***T. karrooica***: C, dehisced capsule; D, seed. ***T. deusta*** subsp. ***miniata***: E, outer bract (right) and inner bract (left); F, flower front view; G, half-flower. ***T. pallida***: H, flower front view (left) and side view (right). ***T. bakeri***: I, flower side view (left) and front view (right).

21a Leaves linear, flaccid, mostly 1.5–2.0 mm wide; flowers without calluses on lower tepals; filaments short, 4–5 mm long, included in perianth tube; plants from Cederberg in Western Cape . . . . 7. *T. cedarmontana*
21b Leaves various, usually wider; flowers always with calluses on median or all lower tepals; filaments 6–18 mm long, shortly or well exserted from perianth tube; plants not from Cederberg:
22a Perianth tube (18–)20–40 mm long and about twice as long as the dorsal tepal:
23a Plants not stoloniferous; leaves without prominent submarginal vein; flowers pale to bright yellow, sometimes flushed with apricot; all 3 lower tepals with well-developed calluses; plants of Western and Eastern Cape . . . . . 13. *T. chrysantha*
23b Plants stoloniferous; leaves with prominent submarginal vein; flowers orange-pink or salmon-pink; lower median tepal with well-developed callus; plants of southern Mozambique . . . . . 12. *T. moggii*
22b Flowers orange to red, rarely yellowish; perianth tube (6–)10–15(–20) mm long, about as long as the dorsal tepal or rarely up to one and a half times as long:
24a Leaves linear, (1–)2–6 mm wide, stiffly erect, closely several-veined and striate when dry; plants mostly 300–600 mm tall:
25a Flowers dark red drying blackish purple; leaves with main and submarginal veins prominent; plants from Eastern Cape near Butterworth. . . . . 9. *T. atrorubens*
25b Flowers orange, not darkening when dry; leaves with all veins equally prominent; plants from northern provinces of South Africa and Botswana. . . . . 10. *T. nelsonii*
24b Leaves various but not as above, always with a prominent main and sometimes submarginal vein but other veins inconspicuous; plants mostly less than 300 mm tall; from southeastern South Africa (also subtropical Africa):
26a Plants flowering in late summer and autumn, (January) March to May; corms often with stolons bearing a small cormlet; capsules ellipsoid, (12–)15–22 mm long, erect and pressed against the rachis . . . . . 11. *T. laxifolia*
26b Plants flowering in winter and spring, August to November (December); corms without stolons; capsules ovoid to ellipsoid, 6–10 mm long, not pressed against the rachis:
27a Leaves with thickened submarginal vein more prominent than midrib . . . . . 8. *T. strictifolia*
27b Leaves with submarginal vein unthickened or less prominent than main vein:
28a Leaves ± spirally twisted and margins usually undulate or crisped; plants from Montagu and Barrydale to Anysberg in Western Cape. . . . . 5. *T. watermeyeri*
28b Leaves not spirally twisted or crisped-undulate; plants from east of Anysberg in Western and Eastern Cape:
29a Leaves linear, mostly, 1–2(–3) mm wide, sometimes as long as stem . . . . . 6. *T. parvula*
29b Leaves lanceolate, (4–)6–10(–12) mm wide, ± ½ as long as stem . . . . . 4. *T. securigera*

Sect. 1. **Subcallosae** *M.P.de Vos* in Journal of South African Botany 49: 351 (1983). Type: *Tritonia lineata* (Salisb.) Ker Gawl. = *T. gladiolaris* (Lam.) Goldblatt & J.C.Manning

Leaves shorter than inflorescence, narrowly lanceolate, firm-textured, plane with thickened midrib and a prominent submarginal vein along edge. *Spike* erect or weakly inclined, moderately dense; bracts papery and translucent speckled and flecked brown distally. *Flowers* zygomorphic, pale yellow to red or pink; perianth tube obliquely funnel-shaped, ± as long as tepals or very slightly longer; lower tepals either without calluses or with triangular calluses. *Stamens* arcuate, unilateral, inserted near middle of tube; anthers apiculate. *Capsules* subglobose or obovoid, 8–10 mm long.

Species 3: summer-rainfall southern Africa.

A group of three closely allied species from the summer-rainfall grasslands of the eastern seaboard and near interior of South Africa and Lesotho, distinguished by their firm-textured leaves with a prominent submarginal vein just inside the edge, and suberect spikes of similar, obliquely funnel-shaped, pale yellow to orange, red or pink flowers, either without calluses or (*Tritonia drakensbergensis*) with a triangular callus at the base of the lower tepals. The separation from sect. *Montbretia* is possibly arbitrary, and the shared development of a well-developed submarginal vein in the leaves in both sections points to a close relationship.

1. **Tritonia gladiolaris** *(Lam.) Goldblatt & J.C.Manning* in Bothalia 36: 57 (2006). *Ixia gladiolaris* Lam.: 341 (1789). Type: South Africa, Cape of Good Hope, cultivated in Paris, flowering March and April, collector unknown (P–Herb. Lamarck, holo.).

Ixia striata Vahl: 65 (1805). Type: South Africa, without precise locality or collector (C–Herb. Vahl, holo.).

Ixia squalida var. *stricta* Aiton: 61 (1789). *Gladiolus lineatus* Salisb.: 40 (1796). *Tritonia lineata* (Salisb.) Ker Gawl.: 228 (1804b). *T. catenularis* Salisb.: 319 (1812), illegitimate superfluous name for *G. lineatus* Salisb. *Montbretia lineata* (Salisb.) Voigt: 610 (1845). *Tritonixia lineata* (Salisb.) Klatt: 357 (1882). Type: South Africa, without precise locality, *Masson s.n.* ex hort. Kew in 1781 [BM, lecto., designated by De Vos: 371 (1983)].

Gladiolus venosus Willd.: 58 (1809). *Ixia venosa* (Willd.) Link: 51 (1821). Type: South Africa, without

precise locality or collector (B–Herb. Willdenow 929, holo.).

Ixia reticulata Thunb.: 60 (1823). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB 989, holo.).

Tritonia tristis Dehnh.: 24 (1832). Type: unnumbered plate '*Tritonia tristis* Dehnh.' at Botanical Garden of Naples, neo., designated by Del Guacchio et al.: 1413 (2016).

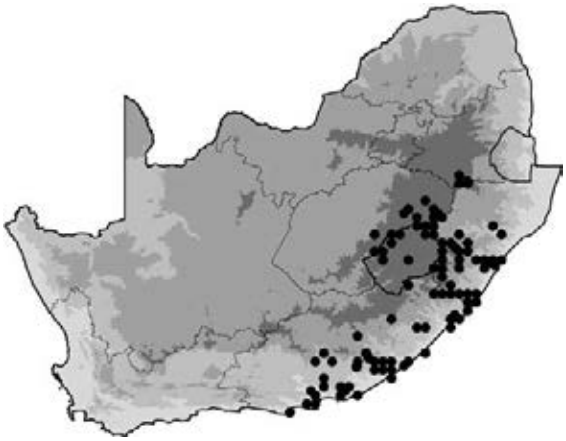
Tritonia kraussii Baker: 194 (1892). Type: South Africa, [KwaZulu-Natal], summit Table Mt., *Krauss 200* [K, lecto., designated by De Vos: 368 (1983)].

Tritonia flavida Schltr.: 91 (1907). Type: South Africa, [KwaZulu-Natal], Alexandra County, Jolivet, near Fairfield, *Rudatis 91* (B, holo.).

Tritonia lineata var. *parvifolia* M.P.de Vos: 374 (1983). Type: South Africa, [Eastern Cape], Jeffrey's Bay, *Fourcade 3345* (NBG, holo.; K, MO, PRE, iso.).

Plants (150–)200–500(–800) mm high. *Corm* subglobose to depressed-globose, 10–20 mm diam.; tunics of fine-textured fibres, sometimes extended into a fibrous or papery collar. *Stem* erect or flexed outward above upper leaf and inclined, simple or with 1(2) suberect branches from upper ½. *Leaves* 5 to 8, suberect, firm-textured, narrowly lanceolate or rarely falcate, (40–)150–300(–500) × (5–)7–10(–18) mm, acute or acuminate, with raised main vein and strong submarginal vein ± 1 mm from margin, usually not reaching base of spike, cauline leaves ± overlapping in lower ½ of stem, uppermost dry and clasping, bract-like. *Spike* suberect or inclined, nearly 2-ranked, moderately dense or lax, 4- to 12(–15)-flowered; bracts dry, papery, brown or pale-translucent below, densely speckled and flecked with dark brown in upper ½, outer 7–10(–12) mm long, ± 3- to 5-toothed with middle tooth reduced or irregularly toothed, inner slightly shorter, bifid. *Flowers* slightly zygomorphic, cream-coloured to pale yellow, straw or flushed with pale apricot near tips or on reverse, usually with dark veins, unscented; perianth tube obliquely funnel-shaped, 10–15 mm long with basal 2–4 mm narrow, curved outward, widening up to 8–10 mm diam.; tepals subequal in length, oblong to obovate, (15–)18–20(–23) mm long, obtuse, spreading, dorsal slightly wider, 8–10(–14) mm wide, others 5–8(–10) mm wide, lower median tepal sometimes with low thickened basal ridge. *Filaments* unilateral, arcuate, 7–12 mm long, included; anthers 5–9 mm long, curved, apiculate, pink or yellow. *Style* dividing near apex of anthers or beyond, branches 3–5 mm long. *Capsules* subglobose or obovoid, ± 8 mm long. *Flowering time*: August to November (December).

Distribution and ecology: extending through south-eastern and eastern South Africa from Humansdorp in Eastern Cape through KwaZulu-Natal, eastern Free State and Lesotho to Wakkerstroom in Mpumalanga; in stony grassland; from near sea level to the high Drakensberg, typically on dolerite or sandstone soils.



Distribution of ***Tritonia gladiolaris***.

Diagnosis: recognised by its lanceolate leaves (5–)7–10(–18) mm wide, with a prominent submarginal vein, and funnel-shaped, cream- or straw-coloured to pale yellow or pale apricot-flushed flowers usually with dark veins and lacking well-developed calluses. Flowering is from spring to early summer, mainly August to November, rarely into December. *Tritonia gladiolaris* is closely allied to and largely sympatric with *T. disticha*, which flowers in mid- to late summer, mainly December to February or March, rarely earlier in November, and has red, orange-red or pink flowers, the lower tepals, especially the median, marked at the base with a small yellow blotch outlined with red.

2. **Tritonia disticha** *(Klatt) Baker*, Handbook of the Irideae: 193 (1892). *Tritonixia disticha* Klatt: 356 (1882). Type: South Africa, [Eastern Cape], heights above Umsamvubo [Mzimvubu] River, *Drège 4549* (B– Herb. Lubeck, holo.; P, S, iso.).

Tritonia coccinea L.Bolus: 27 (1925), illegitimate homonym, not *T. coccinea* Eckl. (1827). Type: South Africa, [Eastern Cape], Pondoland, Port St Johns, *MacNair s.n. NBG89/23* (BOL, holo.).

Tritonia rubrolucens R.C.Foster: 46 (1936), as a replacement name for *T. rosea* Klatt: 760 (1863), illegitimate homonym, not *T. rosea* (Jacq.) Aiton (1810). *Montbretia rosea* Baker: 169 (1877), as replacement name for *T. rosea* Klatt, illegitimate homonym. *T. disticha* subsp. *rubrolucens* (R.C. Foster) M.P.de Vos: 378 (1983), new synonym. Type: South Africa, [Eastern Cape], Katberg, *Ecklon & Zeyher Irid. 98* (S, lecto., designated by De Vos: 378 (1983); G, SAM, isolecto.).

Plants (200–)300–500(–800) mm high. *Corm* subglobose to depressed-globose, 10–30 mm diam.; tunics of fine fibres, sometimes extending in a fibrous or papery collar. *Stem* erect or flexed outward above upper leaf and slightly inclined, simple or with up to 2(3) suberect branches from upper ½. *Leaves* 5 to 8, suberect, firm-textured, narrowly lanceolate, (100–)150–300(–500) ×

(5–)8–12(–20) mm, acute or acuminate, with raised main vein and strong submarginal vein ± 1 mm from margin, often reaching base of spike, usually forming a pseudostem at base, cauline leaves ± overlapping in lower ½ of stem, uppermost dry and clasping, bract-like. *Spike* suberect or inclined, ± 2-ranked, moderately dense or lax, 4- to 12(–15)-flowered; bracts dry and papery, pale translucent or straw-coloured below, densely speckled and flecked with dark brown above or at tips, often striate with brown veins, (8–)10–15(–18) mm long, acute to acuminate, obtuse, or minutely ± 3-toothed with middle tooth reduced, inner slightly shorter, bifid. *Flowers* slightly zygomorphic, bright red, orange red or pink, lower tepals with a small yellow blotch sometimes outlined with red, sometimes smaller on laterals, tepals sometimes prominently dark-veined, unscented; perianth tube obliquely funnel-shaped, (8–)12–16 mm long with basal 2–3 mm narrow, curved outward, widening up to 8–10 mm diam.; tepals oblong to obovate, (10–)15–18(–20) mm long, obtuse, spreading, dorsal slightly wider, 8–10 mm wide, others 5–8 mm wide, lower median sometimes with a low thickened basal ridge. *Filaments* unilateral, arcuate, 7–12 mm long, included or exserted up to 3 mm; anthers 5–7 mm long, curved, apiculate, pink or yellow. *Style* dividing between middle and apex of anthers or sometimes beyond, branches 2–4 mm long. *Capsules* subglobose or obovoid, ± 10 mm long. *Flowering time*: (November) December to February (March).

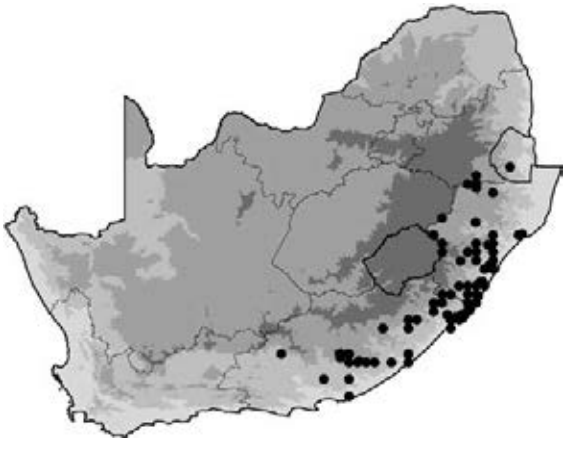
Distribution and ecology: extending along the eastern seaboard and interior of South Africa, from Port Elizabeth in Eastern Cape through KwaZulu-Natal and north-eastern Free State to Wakkerstroom in Mpumalanga, also in southern Eswatini; in stony grassland, from near sea level inland to the foothills of the Drakensberg, typically on dolerite or sandstone soils.

Diagnosis: *Tritonia disticha* is recognised by its lanceolate leaves (5–)8–12(–20) mm wide with a prominent submarginal vein and funnel-shaped, red, orange-red or pink flowers, sometimes darkly veined, lacking well-developed calluses. The lower tepals, especially the median, are marked at the base with a small yellow blotch outlined with red. It is closely allied to and largely sympatric with *T. gladiolaris*, which blooms earlier, mainly August to November (rarely into December), and has cream- to straw-coloured or pale yellow flowers, sometimes flushed pale apricot-coloured, usually with prominent dark veins.

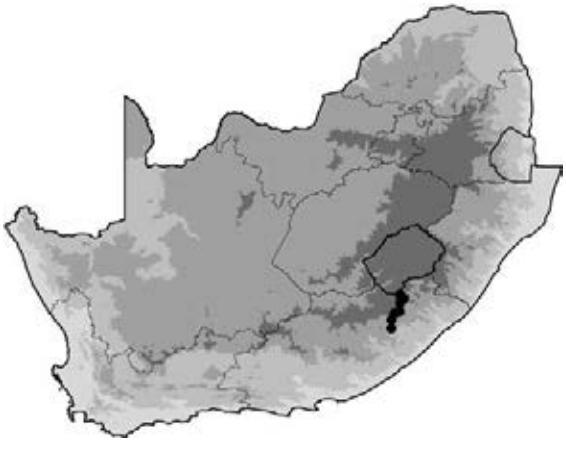
Plants with ± 3-toothed or irregularly toothed bracts, the lower bracts sometimes acute, were separated as subsp. *rubrolucens* from typical *T. disticha* with obtuse to acuminate or sometimes 3-toothed bracts, recorded mainly from the coastal Eastern Cape and KwaZulu-Natal. The distinction between the two variants is not at all clear and we do not admit subsp. *rubrolucens*.

3. **Tritonia drakensbergensis** *M.P.de Vos* in Journal of South African Botany 49: 397 (1983). Type: South Africa, [Eastern Cape], Transkei, Little Bush, Cala, *Pegler 1699* (BOL, holo.).

Plants 180–300 mm high. *Corm* subglobose, 10 mm diam.; tunics of fine-textured fibres. *Stem* erect, simple. *Leaves* 5 to 8, suberect, firm-textured, linear, (50–)70–180(–200) × 1.5–3.0(–4.0) mm, acute or acuminate, with raised main vein and strong submarginal vein ± 0.5 mm from each edge, not reaching base of spike, cauline leaves ± overlapping in lower ½ of stem, uppermost dry, clasping, bract-like. *Spike* inclined, ± 2-ranked, moderately dense, 2- to 7(8)-flowered; bracts dry and papery, pale translucent below, densely speckled and flecked with dark brown in above or at tips, often striate with brown veins, 7–11 mm long, obtuse or minutely ± 3-toothed to irregularly toothed, inner slightly shorter, bifid. *Flowers* slightly zygomorphic, bright red or pinkish red, lower tepals with small, spade-shaped yellow blotch outlined with red, smaller on laterals, and 3 small yellow spots on lower inside of tube, tepals not notably dark-veined, unscented; perianth tube widely funnel-shaped, 8–10 mm long, basal 2–3 mm narrow, curved outward, widening up to 8–10 mm diam. above; tepals subequal in length, oblong to obovate, (13–)15–20 mm long, obtuse,



Distribution of ***Tritonia disticha***.



Distribution of ***Tritonia drakensbergensis***.

spreading, dorsal slightly wider, 8–10 mm wide, others 6–8 mm wide, lower each with a small triangular yellow callus at base 1.5 mm high. *Filaments* unilateral, arcuate, 9–12 mm long, shortly exserted; anthers 5–6 mm long, curved, apiculate, pink or yellow. *Style* dividing opposite or shortly beyond anther tips, branches ± 2.5 mm long. *Flowering time*: January to early March.

Distribution and ecology: a montane species of the southern Drakensberg in Eastern Cape, South Africa, recorded from Cala and Barkly Pass to Maclear; in high altitude grassland on steep, seasonally moist or wet slopes on basalt, between 1 000 and 2 300 m elevation.

Diagnosis: a slender species distinguished by its narrow, linear leaves, 1.5–3.0(–4.0) mm wide with a prominent submarginal vein, and widely funnel-shaped, red to deep pink flowers with a yellow blotch at the base of the lower tepals, these surrounding small, triangular calluses 1.0–1.5 mm high. *Tritonia drakensbergensis* can be confused in the dried state with narrow-leaved forms of *T. disticha*, which has similarly shaped and coloured flowers, also with a yellow spot at the base of the lower tepals, but that species lacks calluses (represented at most by a low, ridge-like thickening) and the leaves are narrowly lanceolate and (5–)8–12(–20) mm wide. *Tritonia disticha* typically occurs at lower altitudes in drier grassland on dolerite or sandstone.

Sect. 2. **Montbretia** *(DC.) Pax* in Engler & Prantl, Die natürlichen Pflanzenfamilien, edn. 2, 5: 155 (1888). *Montbretia* DC.: 151 (1803). *Tritonia* subg. *Montbretia* (DC.) Baker: 190 (1892). Type species: *M. securigera* (Aiton) DC. = *T. securigera* (Ait.) Ker Gawl.

Leaves shorter than or as long as inflorescence, linear to lanceolate, usually plane with thickened midrib and sometimes a prominent submarginal vein along edge, or all veins ± equally thickened and leaves striate, rarely margins undulate or crisped. *Spike* erect or weakly inclined, moderately dense or dense; bracts papery and translucent speckled and flecked brown distally. *Flowers* zygomorphic, pale yellow, orange or red to dark red; perianth tube obliquely funnel-shaped, ± as long as tepals or up to twice as long; lower tepals usually with prominent quadrangular or axe-shaped calluses, rarely without calluses. *Stamens* arcuate, unilateral, inserted near middle or top tube; anthers apiculate. *Capsules* subglobose to ovoid, 8–22 mm long.

Species 11: subtropical and South Africa.

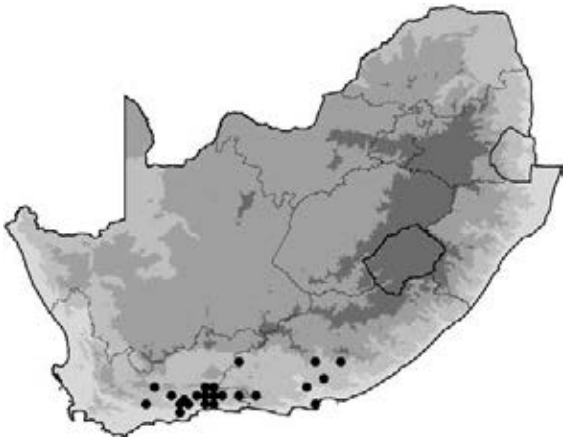
A group of florally similar species from the winter- and summer-rainfall parts of South Africa and subtropical Africa, distinguished by their obliquely funnel-shaped, pale yellow to orange or red flowers, usually with a quadrate callus on the lower tepals. We provisionally include *Tritonia cedarmontana* here although it lacks calluses on the lower tepals. Flowers lacking calluses are characteristic of sect. *Subcallosae*, but the soft-textured leaves lacking a prominent submarginal vein of *T. cedarmontana* are anomalous there. The separation of sect. *Montbretia* from sect. *Subcallosae* is possibly arbitrary, and the shared development of a well-developed submarginal vein in the leaves in both sections points to a likely close relationship.

4. **Tritonia securigera** *(Aiton) Ker Gawl.* in König & Sims, Annals of Botany 1: 228 (1804b). *Gladiolus securiger* [Soland. in] Aiton: 65 (1789). *Montbretia securigera* (Aiton) DC. in Redouté: t. 53 (1804a). Type: South Africa, without precise locality or date, ex hort. Chelsea in 1778, *F. Masson s.n.* [BM, lecto., designated by De Vos: 384 (1983)].

Ixia thunbergii Roem. & Schult.: 391 (1817), as a replacement name for *I. squalida* Thunb. (1803), illegitimate homonym, not *I. squalida* Aiton (1789). Type: South Africa, Cape of Good Hope, without precise locality, *Thunberg s.n.* (UPS–THUNB 996, holo.).

Ixia flabellularis Vahl: 67 (1805). Type: South Africa, without precise locality or collector (C–ex Herb Royen, holo.).

Plants (100–)150–250(–350) mm high. *Corm* subglobose, 10–20 mm diam.; tunics of fine-textured or wiry fibres, sometimes thickened into flattened claws at base. *Stem* suberect or flexed outward above uppermost sheath, usually unbranched, rarely with 1 branch from near base. *Leaves* 4 to 8, linear-lanceolate to lanceolate, suberect or spreading in a 2-ranked fan, usually ± ½ as long as stem, (40–)80–200(–250) × (4–)6–10(–12) mm wide, acute to acuminate, main vein moderately thickened, margins slightly thickened, uppermost cauline leaf membranous, bract-like, sheathing, sometimes concealed by uppermost foliage leaf. *Spike* suberect, moderately lax, subsecund, 2- to 15-flowered; bracts dry-membranous, translucent flushed brown and speckled in upper half, 7–10(–12) mm long, minutely 3- or irregularly toothed, inner ± as long, shortly bifid. *Flowers* zygomorphic, orange or apricot-coloured with yellow throat and yellow spot on lower tepals surrounding callus; perianth tube obliquely funnel-shaped, (10–)12–15(–20) mm long, lower cylindric portion 3–6(–15) mm long, widening up to 6–8 mm diam.; tepals unequal, obovate, dorsal larger, slightly hooded over anthers, often paler inside, upper laterals spreading, lower tepals deflexed, upper tepals 10–15(–20) × 7–15 mm, lower (10–)12–15 × 5–8 mm, each with a quadrate yellow callus 2–4 mm high near base. *Filaments* unilateral, arcuate, 9–12(–15) mm long, exserted up to 6 mm; anthers (4–)5–6 mm long, often curved, violet. *Style* dividing opposite or beyond anthers, branches 4–6 mm long. *Capsules* ellipsoid, 7–10 mm long. *Flowering time*: late August to October or November.



Distribution of ***Tritonia securigera***.

Distribution and ecology: extending through southern Western Cape near Ladysmith and Mossel Bay eastward through the Little Karoo and southern Cape to Adelaide and Somerset East in Eastern Cape, South Africa; on stony flats in renosterveld and karroid shrubland.

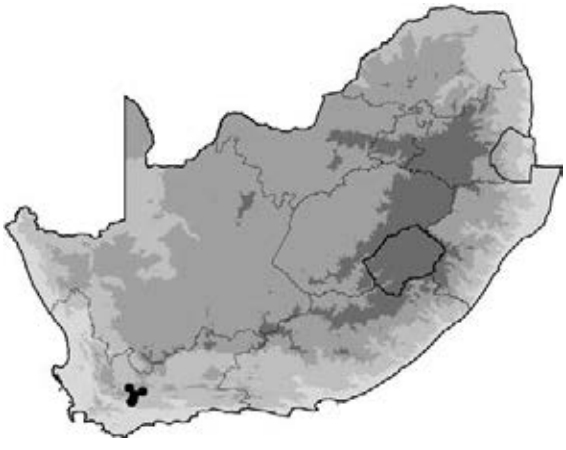
Diagnosis: the central species in a taxonomically difficult group that is characterised by similar two-lipped, orange flowers with an obliquely funnel-shaped tube conspicuously yellow in the throat and about as long as the tepals (sometimes slightly longer), the lower tepals each with a yellow blotch near the base bearing a quadrate or axe-like callus 1–4 mm high. Within this group, *Tritonia securigera* is applied to plants with plane, lanceolate or linear-lanceolate leaves, usually forming an erect fan up to half as long as the stem, the main vein raised and the margins thickened and without a prominent submarginal vein. The perianth tube is usually 10–15 mm long, with the narrow basal portion 3–6 mm long. Plants from Kommadagga are variable in tube length, the tube in some individuals up to ± 20 mm long with the narrow basal portion 15 mm long. Introgression with *T. chrysantha* may be indicated here.

Tritonia nelsonii from Gauteng, Limpopo and Northwest is usually taller with narrow, stiffly erect leaves with numerous prominent veins; *T. strictifolia* from interior Eastern Cape around Grahamstown, is distinguished by the prominent submarginally veined leaves; and *T. laxifolia* from Eastern Cape and subtropical Africa, flowers in late summer and autumn and has larger capsules 12–15 mm long closely appressed to the stem. Two other taxa are less clearly separated: *T. parvula* from the central and eastern Little Karoo, is a mostly smaller plant with linear leaves, mostly 1–2(–3) mm wide; and *T. watermeyeri* from the western Little Karroo, has more-or-less spirally twisted leaves with the margins often undulate or crisped.

5. **Tritonia watermeyeri** *L.Bolus* in Annals of the Bolus Herbarium 4: 44 (1926). *Montbretia watermeyeri* (L.Bolus) Sealy: t. 428 (1963). *T. securigera* subsp. *watermeyeri* (L.Bolus) Goldblatt & J.C. Manning: 60 (2006). Type: South Africa, [Western Cape], allegedly from Vanrhynsdorp, Kareebergen, flowered at Kirstenbosch Gardens, Sept. 1907, *Watermeyer s.n. BOL18050* (BOL, holo.).

Plants (50–)60–150(–200) mm high. *Corm* conical-globose, 7–15 mm diam.; tunics of moderately fine-textured or wiry fibres forming flattened claws at base, extending in a papery or fibrous neck. *Stem* ± strongly deflexed above uppermost sheath, usually unbranched, rarely with 1 branch from near base. *Leaves* 4 to 8, linear-lanceolate, suberect or trailing, usually ± as long as stem, blade 50–100 × 1.5–4.0(–5.0) mm wide, acute to acuminate, loosely or tightly spirally twisted, margins plane or closely undulate or crisped, main vein moderately thickened, margins slightly thickened, cauline leaf membranous, bract-like, sheathing, concealed by uppermost foliage leaf. *Spike* inclined, moderately lax, 2- to 6-flowered; bracts dry-membranous, translucent flushed brown and speckled in upper ½, outer 6–9 mm long, minutely 3-toothed or irregularly toothed, inner ± as long, shortly bifid. *Flowers* zygomorphic, orange to reddish orange with yellow throat and yellow spot on lower tepals surrounding callus; perianth tube obliquely funnel-shaped, 10–16 mm long, lower cylindric portion 3–7 mm long, widening up to ± 8 mm diam.; tepals obovate, dorsal larger and slightly hooded over anthers, often paler inside, upper laterals spreading and lower tepals deflexed, upper tepals 15–10(–22) × (7–)8–12(–15) mm, lower tepals 11–14 × 5–9 mm, each with a quadrate or truncate yellow callus 3–4 mm high near base. *Filaments* unilateral, arcuate, 12–18 mm long, exserted up to 6 mm; anthers 4–5 mm long, often curved, exserted, violet. *Style* dividing opposite base to middle of anthers, branches 3–4 mm long. *Capsules* obovoid, ± 10 mm long. *Flowering time*: August to October.

Distribution and ecology: a local endemic of the western Little Karoo in Western Cape, South Africa, from Montagu and Barrydale to Anysberg; on stony clay flats and banks in renosterveld and karroid shrubland.



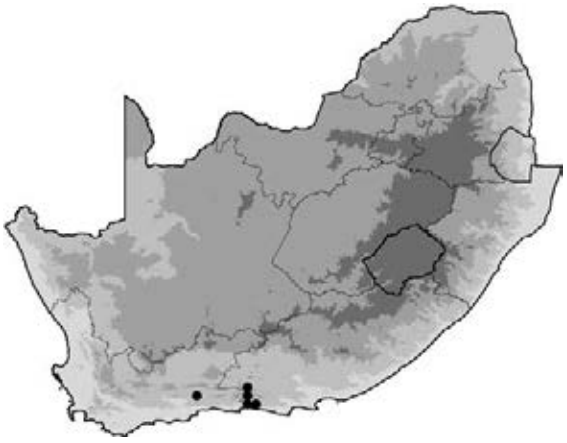
Distribution of ***Tritonia watermeyeri***.

Diagnosis: a small plant with relatively large flowers, *Tritonia watermeyeri* is distinguished from *T. securigera* by the narrow, more-or-less spirally twisted leaves, 1.5–4.0(–5.0) mm wide, with the margins often tightly undulate or crisped. The corm tunics are always wiry with the fibres thickened at the base into flattened claws. *Tritonia watermeyeri* occurs west and northwest of the range of *T. securigera*. Populations between Montagu and Barrydale are readily recognised by their tightly twisted and crisped leaves but populations from the Anysberg are less distinctive, with plane, only loosely twisted leaves. These plants can scarcely be separated from narrow-leaved forms of *T. securigera* and the taxon was treated as a subspecies by us (Goldblatt & Manning, 2006). It is, however, no less distinct from typical *T. securigera* than is *T. parvula*. The status of these taxa in relation to *T. securigera* remains unclear but we treat them here as separate species.

6. **Tritonia parvula** *N.E.Br.* in Bulletin of Miscellaneous Information, Kew 1931: 452 (1931). Type: South Africa, [Western Cape], near Oudtshoorn, *Muir 4724* (K, holo.).

Plants (50–)80–150(–200) mm high. *Corm* conical-globose, 5–10 mm diam.; tunics of fine-textured fibres, extending in a papery or fibrous neck. *Stem* suberect or deflexed above uppermost sheath, usually unbranched, rarely with 1 branch from near base. *Leaves* 4 to 8, linear, flaccid, suberect or spreading to trailing, usually ± as long as stem or longer, 50–150(–200) × (0.5)1.0–2.0(–3.0) mm wide, acute to acuminate, main vein moderately thickened, margins slightly thickened, cauline leaf membranous, bract-like, sheathing, concealed by uppermost foliage leaf. *Spike* inclined, moderately lax, 2- to 6-flowered; bracts dry-membranous, translucent flushed brown and speckled in upper ½, 5–9 mm long, minutely 3-toothed, inner shortly bifid. *Flowers* zygomorphic, reddish orange to salmon-orange with yellow throat and yellow spot on lower tepals surrounding callus; perianth tube obliquely funnel-shaped, 6–10(–13) mm long, lower cylindric portion 3–6 mm long, widening above to 6–8 mm diam.; tepals obovate, dorsal larger and slightly hooded over anthers, often paler inside, upper laterals spreading, lower tepals deflexed, upper tepals 11–15 × 6–10(–12) mm, lower tepals 8–10 × 4–6 mm, each with a quadrate yellow callus 1–2 mm diam. near base, calluses on laterals sometimes smaller than median. *Filaments* unilateral, arcuate or sometimes slightly divergent, 6–10 mm long, exserted up to 4 mm; anthers 4–5 mm long, often curved, violet to red-purple. *Style* dividing opposite middle to tips of anthers, branches 2–3 mm long. *Capsules* shortly ellipsoid, ± 6 mm long. *Flowering time*: late September to October (December).

Distribution and ecology: endemic to the Little Karoo between Ladismith in Western Cape and the Long Kloof from Uniondale to Joubertina in Eastern Cape, South Africa; on stony clay or loamy flats and banks in renosterveld and karroid shrubland, also crevices in sandstone cliffs.



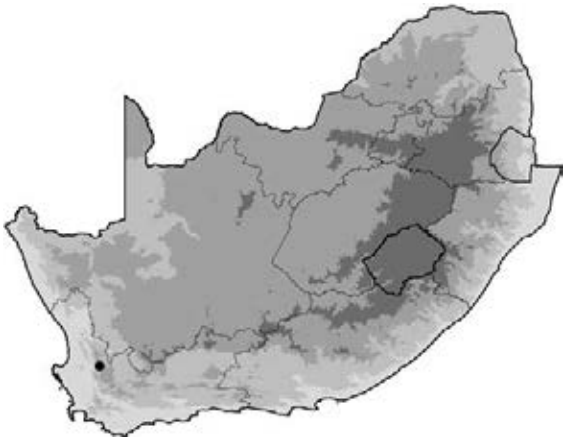
Distribution of ***Tritonia parvula***.

Diagnosis: a relatively small plant, *Tritonia parvula* is distinguished from *T. securigera* by the narrower, linear leaves mostly 1–2(–3) mm wide, sometimes as long as the flowering stem. Some individuals are difficult to place, notably those growing in crevices in sandstone cliffs and with trailing leaves. *Tritonia parvula* most closely resembles *T. cedarmontana* from the Cederberg in habit but that species lacks calluses on the lower tepals and has shorter filaments 4–5 mm long with the anthers half-included in the perianth tube.

7. **Tritonia cedarmontana** *Goldblatt & J.C.Manning* in Bothalia 41: 171 (2011). Type: South Africa, [Western Cape], southern Cederberg, Krom River Kloof, 4 000 ft [1 220 m], 13 Dec. 1950, *Esterhuysen 18009* (BOL, holo.; NBG, PRE, iso.).

Plants (50–)150–300 mm high. *Corm* conical-globose, 7–10 mm diam.; tunics of fine-textured fibres, extending in a papery or fibrous neck. *Stem* ± erect, usually unbranched, rarely with 1 short branch. *Leaves* 4 to 6, linear, flaccid, usually ± as long as stem or longer, mostly 100–200 × 1.5–2.0 mm, acute to acuminate, main vein moderately thickened, margins slightly thickened and hyaline, cauline leaf membranous, bract-like, sheathing, concealed by uppermost foliage leaf. *Spike* inclined, moderately lax, 2- to 5-flowered; bracts dry-membranous, translucent with sparse brown speckling apically on teeth, 4–6 mm long, shallowly 3-toothed, inner ± as long, shortly bifid. *Flowers* zygomorphic, salmon-orange; perianth tube obliquely funnel-shaped, 9–10 mm long, lower cylindric portion 4–5 mm long, widening up to 6–8 mm diam.; tepals slightly unequal, dorsal ovate, 13–14 × 7.0–7.5 mm, other tepals elliptic, ± 13 × 5.5–6.5 mm, lower lacking calluses. *Filaments* unilateral, arcuate, 4–5 mm long, included; anthers 3.5–4.0 mm long, partially included in upper part of tube, yellow. *Style* dividing opposite anther tips, branches ± 3 mm long. *Immature capsules* subglobose or obovoid, ± 4.5 mm diam. *Flowering time*: December.

Distribution and ecology: known only from the type collection from Krom River Kloof in the southern



Distribution of ***Tritonia cedarmontana***.

Cederberg in Western Cape, South Africa; on ledges and steep sandstone slopes along streams.

Diagnosis: a diminutive species with rather flaccid, linear leaves mostly 1.5–2.0 mm wide and a moderately lax spike of two to five, small, salmon-orange flowers without evident calluses on the lower tepals. The filaments are short, 4–5 mm long, with the anthers half-included in the funnel-shaped tube 9–10 mm long. The species most closely resembles *T. parvula* from the Little Karoo but that species has the lower tepals flexed downward, with prominent, ± oblong calluses at the bases, and slightly longer filaments, 6–10 mm long with the anthers shortly exserted from the perianth tube.

The relationships of *Tritonia cedarmontana* remain puzzling. The funnel-shaped flowers without calluses suggest a relationship with sect. *Subcallosae* from the summer-rainfall grasslands, but the relatively soft-textured leaves without a prominent submarginal vein are inconsistent with this. We provisionally include the species in sect. *Montbretia* on the basis of its general resemblance to *T. parvula*.

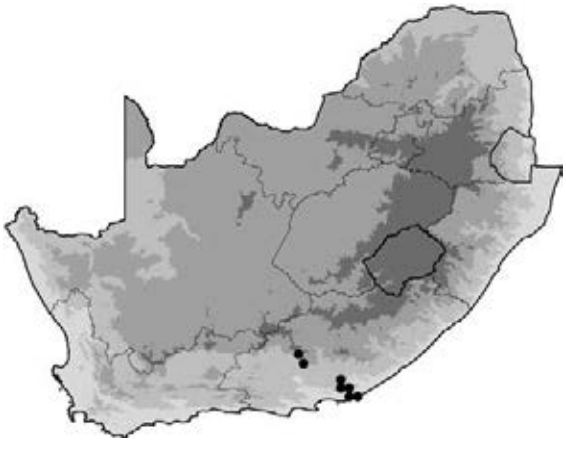
8. **Tritonia strictifolia** (*Klatt*) *Benth. & Hook.f. ex B.D.Jacks.* in Index Kewensis 2: 1129 (1895). *Montbretia strictifolia* Klatt: 753 (1863). *T. laxifolia* var. *strictifolia* (Klatt) Baker: 195 (1892). Type: South Africa, [Eastern Cape], Uitenhage, Kalkhoogte between the Swartkops and Sundays Rivers, *Ecklon & Zeyher 100* (B, lecto., designated by De Vos: 118 (1999); G, S, SAM, Z, isolecto.).

Tritonia parviflora Baker: 865 (1901). Type: South Africa, [Eastern Cape], without precise locality, *Ecklon & Zeyher 100* (Z, holo.; B, G, S, SAM, iso.).

Plants mostly 150–250 mm high. *Corm* subglobose, 10–20(–30) mm diam.; tunics of fine-textured fibres. *Stem* suberect or flexed outward above uppermost sheath, usually unbranched, rarely with 1 branch from near base. *Leaves* 4 to 8, linear-lanceolate, suberect or spreading in a fan, usually ± ½ as long as stem, (30–)50–150(–200) × (2–)3–6 mm, acute to acuminate, main vein moderately thickened, with prominently thickened submarginal vein just inside margins, uppermost cauline leaf membranous and sheathing, bract-like, exserted or concealed by uppermost foliage leaf. *Spike* suberect, moderately lax, subsecund, 3- to 8(10)-flowered; bracts dry-membranous, translucent flushed brown and speckled above, outer 7–10 mm long, minutely 3-toothed or irregularly toothed, inner ± as long, shortly bifid. *Flowers* zygomorphic, reddish orange or apricot-coloured with yellow throat and yellow spot on lower tepals surrounding callus; perianth tube obliquely funnel-shaped, 10–15 mm long, lower cylindric portion 3–6 mm long, widening above up to 6–8 mm diam.; tepals unequal, obovate, dorsal larger, slightly hooded over anthers, often paler inside, upper laterals spreading and lower tepals deflexed, upper tepals 13–18 × 5–10(–15) mm, lower 10–15 × 5–8 mm, each with quadrate yellow callus 2–4 mm high near base. *Filaments* unilateral, arcuate, 7–12 mm long, exserted up to 6 mm; anthers 4–5 mm long, often curved, violet. *Style* dividing opposite upper ½ of anthers, branches 3–5 mm long. *Flowering time*: September to November (December).

Distribution and ecology: originally thought to be restricted to the immediate vicinity of Grahamstown but now known to range somewhat more widely, from Pearston to Bathurst, South Africa; in stony or rocky grassland.

Diagnosis: distinguished from *Tritonia securigera* and its allies with similar short-tubed, orange flowers by the presence of a conspicuously thickened submarginal vein within 0.5 mm of the leaf margins. These are typically more prominent than the lightly thickened midrib. Similar leaves are characteristic of sect. *Subcallosae* but these species lack the quadrate calluses and conspicuous yellow mouth to the perianth tube characteristic of *T. securigera* and its allies.



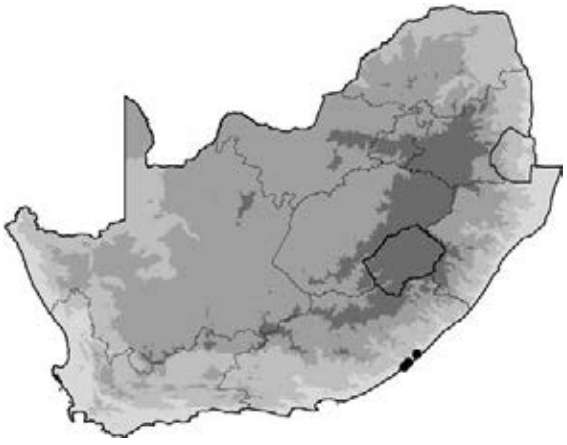
Distribution of ***Tritonia strictifolia***.

9. **Tritonia atrorubens** *(N.E.Br.) L.Bolus* in Journal of Botany, British and foreign 67: 133 (1927). *Gladiolus atrorubens* N.E.Br.: 135 (1914). Type: South Africa, [Eastern Cape], Transkei, Kentani, near Manubi, *Saxton 13* (K, holo.).

Tritonia flanaganii L.Bolus: 161 (1918). Type: South Africa, [Eastern Cape], Transkei, near Impetu, between Komgha and Kei Mouth, *Flanagan 55* [BOL, lecto., designated by De Vos: 400 (1983)].

Plants 300–600 mm high. *Corm* subglobose, 10–15 mm diam.; tunics of fine-textured fibres, sometimes with a papery neck. *Stem* inclined outward above uppermost sheath, usually unbranched or rarely with 1 branch from near middle. *Leaves* 4 to 8, linear, suberect in basal fan, ± ½ as long to as long as stem, 80–200 × (1–)2–5 mm wide, acuminate, striate with main vein and submarginal vein thickened, intervening secondary vein slightly thickened, cauline leaves smaller and sheathing, uppermost often concealed by upper foliage leaf. *Spike* inclined, moderately dense or dense, secund, 2- to 10-flowered; bracts dry-membranous, translucent or straw, flushed dark reddish brown, speckled in upper half, outer 8 to 10, acute or 3-toothed, inner ± as long or shorter, bifid. *Flowers* zygomorphic, dark red drying to blackish purple; perianth tube obliquely funnel-shaped, 15–17 mm long, lower cylindric portion 3–6 mm long, widening above to 6–8 mm diam.; tepals obovate, dorsal larger, slightly hooded over anthers, often paler inside, upper laterals spreading, lower deflexed, upper tepals 10–14 × 5–10 mm, lower tepals 8–14 × 4–8 mm, each with quadrate callus near base, with median 2–4 mm high and yellow, laterals smaller. *Filaments* unilateral, arcuate, 10–12 mm long, shortly exserted; anthers 5–7 mm long, often curved, dark. *Style* dividing opposite anthers, branches 3–4 mm long. *Flowering time*: December to January.

Distribution and ecology: a local endemic from east of Butterworth in Eastern Cape, South Africa, known from a few records between Kentani and Willowvale; in grassland.



Distribution of ***Tritonia atrorubens***.

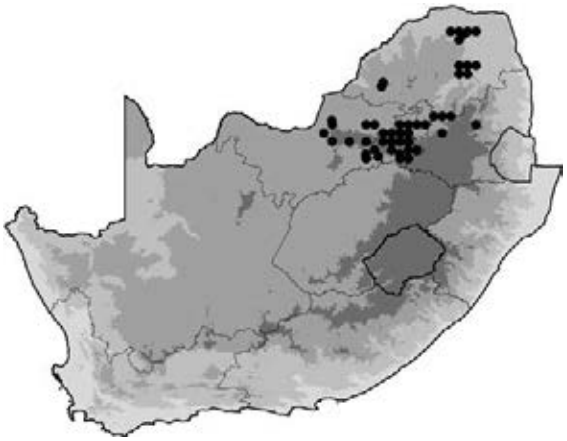
Diagnosis: readily recognised by its stiff, linear leaves (1–)2–5 mm wide with the main vein, submarginal and intervening veins moderately thickened, the blades thus striate, and the dark red flowers drying blackish purple. The lower median tepals bear a yellow, axe-shaped callus and evidently smaller, dark calluses on the lower lateral tepals. It has a superficial resemblance to *Tritonia disticha* but this species has broader leaves, (5–)8–12(–20) mm wide, and orange to red flowers without evident calluses on the lower tepals. It is more likely to be confused with *T. drakensbergensis*, which has similarly narrow (but not striate) leaves and red flowers with yellow calluses on the lower tepals, but this is a high altitude species from basalt soils and the calluses are lower and triangular in shape.

10. **Tritonia nelsonii** *Baker*, Handbook of the Ideae: 195 (1892). Type: South Africa, [Limpopo], Houtbosberg, summit, *Nelson 440* (K, holo.; PRE, iso.).

Tritonia petrophila Baker: 1004 (1904). Type: South Africa, [Gauteng], granite rocks at Modderfontein, *Conrath 585* (Z, holo.; K, iso.).

Plants (200–)300–600(–800) mm high. *Corm* subglobose, 15–30 mm diam., sometimes deep-seated; tunics of fine-textured fibres, sometimes with a papery neck. *Stem* erect or inclined outward above, usually unbranched or 1- or 2-branched from near middle. *Leaves* 4 to 8, linear, suberect in a loose fan, weakly twisted toward tips, as long as stem or slightly longer, (50–)100–300(–450) × (1–)2–4(–6) mm, acute to acuminate, striate with main vein moderately thickened and with 3 or 4 other vein pairs also slightly thickened, without prominently thickened submarginal vein, cauline leaves smaller and sheathing, uppermost sometimes concealed by upper foliage leaf. *Spike* suberect, moderately lax, subsecund, 5- to 12-flowered; bracts dry-membranous, translucent or purplish, flushed dark reddish brown, speckled in upper ⅓ or at tips, outer (6–)8–12(–15) mm long, acute or 3-toothed, inner ± as long or shorter, bifid. *Flowers* zygomorphic, reddish orange to bright red with pale yellowish throat and yellow spot on lower tepals surrounding callus; perianth tube obliquely funnel-shaped, 10–15 mm long, lower cylindric part 3–6 mm long, widening up to 6–8 mm diam.; tepals unequal, obovate, dorsal larger and slightly hooded over anthers, often paler inside, upper laterals spreading and lower tepals deflexed, upper tepals 13–18 × 5–10(–15) mm, lower tepals 10–15 × 5–8 mm, each with a quadrate yellow callus 2–4 mm high near base. *Filaments* unilateral, arcuate, 12–14 mm long, shortly exserted up to 6 mm; anthers 5–6 mm long, often curved, cream-coloured to violet. *Style* dividing opposite upper ½ of anthers, branches 2–3 mm long. *Capsules* subglobose to shortly ellipsoid, 7–10 mm long. *Flowering time*: (December) February to March (June).

Distribution and ecology: restricted to northern South Africa, from Heidelberg in Gauteng north to Soutpansberg in Limpopo and west to Zeerust in Northwest, and as far east as Waterval Boven in Mpumalanga, possibly



Distribution of ***Tritonia nelsonii***.

also Botswana; in rocky grassland and savanna, often in quartzite, with the corms wedged in rock crevices.

Diagnosis: distinguished from *Tritonia securigera* and its allies including *T. laxifolia* with similar short-tubed, orange flowers by its taller, more upright habit, the plants mostly 300–600 mm tall, and the stiffly erect, linear-striate leaves, (1–)2–4(–6) wide, with the main vein and 3 or 4 secondary vein pairs ± equally prominent. Other members of the group have the midrib and sometimes submarginal vein thickened and prominent but not the intervening secondary veins, the blades thus not conspicuously striate.

11. **Tritonia laxifolia** *(Klatt) Baker*, Handbook of the Irideae: 195 (1892). *Montbretia laxifolia* Klatt: 754 (1863). Type: South Africa, [Eastern Cape], without precise locality, *Drège 3489a* (K, lecto., designated by De Vos: 392 (1983); G, L, MO, S, SAM, iso.).

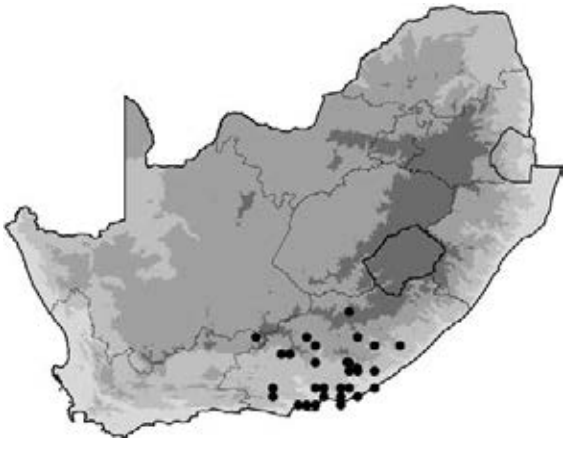
Tritonia bakeri Klatt: 203 (1894), illegitimate homonym, not *T. bakeri* Klatt (1882), replacement name for *Montbretia laxifolia* Baker: 155 (1875), illegitimate homonym, not *M. laxifolia* Klatt (1863). Type: Tanzania [as German East Africa], *Speke & Grant s.n.* (K, holo.).

Tritonia clusiana Worsley: 269 (1905). *T. bracteata* Worsley: 2 (1906), illegitimate superfluous name for *T. clusiana* Worsley, based on the same type. Type: South Africa, [KwaZulu-Natal], Greytown District, *Worsley s.n.* (K, holo.).

Plants (100–)200–450(–600) mm high. *Corm* subglobose, 10–15 mm diam., with short or long stolons with terminal cormlet; tunics of fine-textured fibres. *Stem* suberect, unbranched or 1- or 2-branched from near base or middle. *Leaves* 4 to 8, lanceolate or narrowly lanceolate, suberect or sometimes spreading in a fan, ± ½ as long to as long as stem, (40–)80–150(–200) × 5–10(–12) mm, acute to acuminate, main vein moderately thickened, sometimes with slightly thickened submarginal vein ± 1 mm from edge, uppermost cauline leaf sheathing, leaf-like or membranous and bract-like, exserted or concealed by upper foliage leaf. *Spike* stiffly erect, moderately lax, subsecund, 6- to 15-flowered; bracts dry-membranous, translucent flushed brown and speckled in upper ½, outer 6–12(–18) mm long, 3-toothed or rarely 5-toothed or acute, inner ± as long as or slightly shorter, bifid. *Flowers* zygomorphic, salmon-pink, reddish orange or apricot-coloured with yellow throat and yellow spot on lower tepals surrounding callus; perianth tube obliquely funnel-shaped, 12–16 mm long, lower cylindric part 3–6 mm long, widening up to 6–8 mm diam.; tepals obovate, dorsal larger, slightly hooded over anthers, often paler inside, upper laterals spreading, lower tepals deflexed, upper tepals 10–15 × 8–12 mm, lower tepals 10–15 × 5–8 mm, each with a quadrate yellow callus 2–4 mm high near base. *Filaments* unilateral, arcuate, 12–15 mm long, exserted up to 6 mm; anthers 4–6 mm long, often curved, exserted, mauve. *Style* dividing opposite or beyond anthers, branches 2–4 mm long. *Capsules* ellipsoid, (12–)15–22 mm long, erect and appressed to axis. *Flowering time*: (January) March to May (to July in tropical Africa).

Distribution and ecology: with an unusual disjunct distribution in South and tropical East Africa, recorded from Port Elizabeth to Queenstown and Keiskamma in Eastern Cape, and also in Mozambique, Malawi, Tanzania and Zambia; in woodland and grassland.

Diagnosis: *Tritonia laxifolia* is distinguished from spring-flowering *T. securigera* and its allies with similar short-tubed, orange flowers by its later flowering, from late (rarely mid-) summer to early winter, and by its characteristic capsules, ellipsoid and much larger than in other species of the genus, (12–)15–22 mm long and appressed to the axis. The stiffly erect, often elongate spike is distinctive, and the species often (?always) produces short or long stolons terminating in a solitary cormlet. In other species the cormlets are subsessile. *Tritonia laxifolia* is replaced in the northern provinces of South Africa by *T. nelsonii*, a generally taller and more slender plant with narrower, linear-striate leaves (1–)2–4(–6) wide, and shorter, subglobose capsules 7–10 mm long. Both species bloom from midsummer to early winter.



Distribution of ***Tritonia laxifolia***.

12. **Tritonia moggii** *Oberm.* in Kirkia 3: 24 (1963). Type: Mozambique, Inhaca Island, SW of Saco Bay, *Mogg 27315* (PRE, holo.; J, SRGH, iso.).

Plants 200–450 mm high. *Corm* subglobose, 10–15 mm diam., with short or long stolons with solitary cormlet; tunics of fine-textured fibres. *Stem* suberect, unbranched or up to 3-branched from near base or in lower ½. *Leaves* 4 to 8, lanceolate or narrowly lanceolate, suberect or sometimes spreading in a fan, ± ½ as long as to as long as stem, (50–)70–150(–200) × 4–8(–12) mm, acute to acuminate, main vein moderately thickened and submarginal vein evident ± 0.5 mm from edge, soft-textured, uppermost cauline leaf sheathing leaf-like or membranous and bract-like, shortly exserted or concealed by upper foliage leaf. *Spike* stiffly erect, moderately lax, subsecund, 6- to 15-flowered; bracts dry-membranous, translucent flushed brown and speckled in upper ½, 6–12(–15) mm long, acute or 3-toothed, inner ± as long or slightly shorter, shortly bifid. *Flowers* zygomorphic, orange-red or salmon-pink, yellow throat and yellow spot on lower tepals; perianth tube subcylindric widening distally and funnel-shaped, (18–)25–35(–40) mm long, lower cylindric part 20–25 mm long, widening above to 6–8 mm diam.; tepals unequal, oblanceolate to elliptic, dorsal larger and slightly hooded over anthers, upper laterals spreading and lower deflexed, (12–)15–22 × 6–9 mm, lower median tepal with a quadrate yellow callus 2–4 mm high near base and lower laterals with or without smaller calluses. *Filaments* unilateral, arcuate, 12–16 mm long, exserted up to 6 mm; anthers 6–7 mm long, often curved, mauve. *Style* dividing below or opposite middle of anthers, branches ± 4 mm long. *Capsules* ellipsoid, (8–)10–15 mm long, erect and appressed against axis. *Flowering time*: April to July (October).

Distribution and ecology: endemic to coastal Mozambique as far south as Maputo and Inhaca; on dunes and in open woodland at or near the coast. The species thrives in cultivated lands, where the cormlets are dispersed by tilling. The long-tubed, orange-red flowers bear a remarkable resemblance to those of *Freesia grandiflora* and *F. laxa* and are probably adapted to pollination by butterflies.

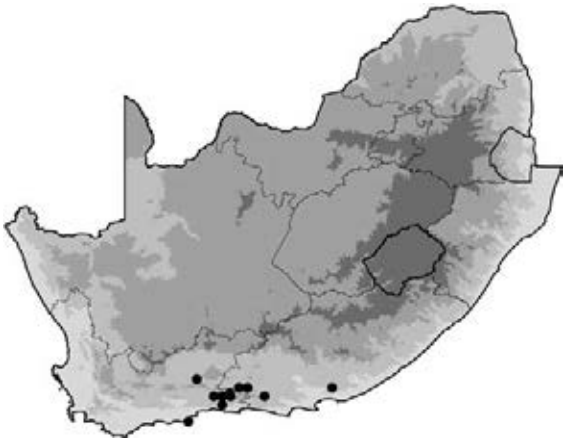
Diagnosis: recognised by the relatively soft-textured leaves with evident submarginal vein, and long-tubed, orange flowers with perianth tube (18–)25–35(–40) mm long and ± twice as long as the dorsal tepal. Although all three lower tepals have a yellow blotch near the base, typically only the median has a well-developed callus, the laterals either without calluses or with reduced calluses. The stiffly erect stems, relatively large capsules appressed to the rachis, and the development of stolons from the base of the corm all indicate a close relationship with *Tritonia laxifolia*.

13. **Tritonia chrysantha** *Fourc.* in Transactions of the Royal Society of South Africa 21: 77 (1932). Type: South Africa, [Eastern Cape], hills south of Georgida, *Fourcade 4394* (BOL, lecto. [as holo.], effectively designated by De Vos: 387 (1983); K, NBG, isolecto.).

Plants 150–300(–350) mm high. *Corm* subglobose, 10–20 mm diam.; tunics of fine-textured or wiry fibres forming flattened claws at base. *Stem* flexed outward above uppermost sheath then suberect, unbranched or 1- or 2-branched from near base. *Leaves* 4 to 8, lanceolate, suberect or spreading in a wide fan, usually < ½ as long as stem, 40–100(–150) × (2–)5–10 mm, acute, main vein moderately thickened, sometimes with slightly prominent submarginal vein, margins slightly thickened and hyaline, uppermost cauline leaf membranous and sheathing, bract-like, exserted or concealed by uppermost foliage leaf. *Spike* suberect or inclined, moderately lax, subsecund, 2- to 8-flowered; bracts dry-membranous, translucent flushed brown and speckled in upper ½, outer 6–12 mm long, obtuse and 3-toothed or irregularly toothed, inner ± as long, shortly bifid. *Flowers* zygomorphic, bright or paler yellow, sometimes tinged apricot, unscented; perianth tube slender and subcylindric widening distally and funnel-shaped, (18–)20–28 mm long, lower cylindric part 12–25 mm long, widening above to 6–8 mm diam.; tepals obovate, dorsal larger, slightly hooded over anthers, often paler inside, upper laterals spreading and lower deflexed, upper tepals 10–15(–20) × 7–15 mm, lower tepals (10–)12–15 × 5–8 mm, each with a quadrate yellow callus 2–4 mm high near base. *Filaments* unilateral and arcuate, 7–10 mm long, not or shortly exserted; anthers 4–6 mm long, often curved, brown or yellow. *Style* dividing opposite anthers, branches 3–5 mm long. *Capsules* subglobose, ± 6 mm long. *Flowering time*: late August to October.

Distribution and ecology: from Oudtshoorn in Western Cape eastward to Grahamstown in Eastern Cape, South Africa, with an outlying record from the mouth of the Gouritz River; mostly on drier clay soils in renosterveld and karroid scrub.

Diagnosis: distinguished from *Tritonia securigera* by the pale to bright yellow flowers, sometimes flushed apricot, with proportionally longer perianth tube, (18–)20–28 mm long and about twice as long as the dorsal tepal, and vegetatively by the more wiry tunics thickened into claws at the base. The tunics in *T. securigera* are always



Distribution of ***Tritonia chrysantha***.

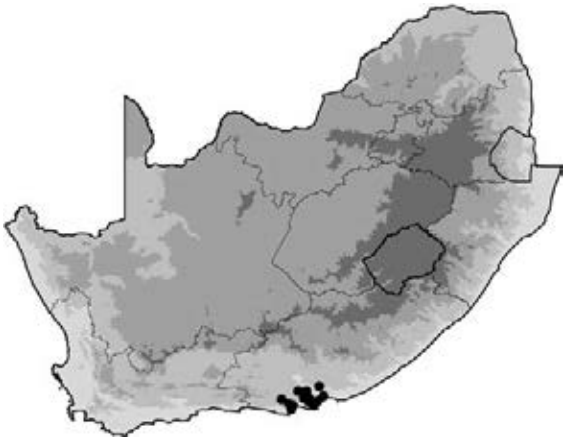
fine-textured and the mostly orange flowers have a shorter perianth tube more-or-less as long as the dorsal tepal or rarely slightly longer but never twice as long.

14. **Tritonia dubia** *Eckl. ex Klatt* in Linnaea 32: 761 (1864). *Montbretia dubia* (Eckl. ex Klatt) Baker: 169 (1877). *Tritonixia dubia* (Eckl. ex Klatt) Klatt: 356 (1882). Type: South Africa, [Eastern Cape], Uitenhage, *Ecklon & Zeyher Irid 102* (SAM, lecto., designated by De Vos: 140 (1982); G, S, iso.).

Tritonia bolusii Baker: 337 (1876). *Tritonixia bolusii* (Baker) Klatt: 356 (1882). Type: South Africa, [Eastern Cape], Uitenhage, *H. Bolus 1883* (K, lecto., designated by De Vos: 140 (1982); BOL, S, iso.).

[*Tritonia dubia* Eckl.: 30 (1827), invalid name without description.]

Plants 120–200(–300) mm high. *Corm* subglobose, 8–20 mm diam., with cormlets at base and in lower leaf axils; tunics of fine fibres. *Stem* erect, simple or up to 3-branched from near base. *Leaves* 5 to 8, suberect to falcate, lanceolate-ensiform, 40–150 × 3–7 mm, acute, with evident main vein, cauline leaves bract-like and often dry. *Spike* erect, subsecund, (3)5- to 10-flowered; bracts dry and papery, whitish or flushed pink but brown and densely speckled with rusty brown distally and on upper margins, outer 5–10 mm long, obtuse or 3-toothed to irregularly-toothed, inner subequal or slightly shorter, bifid. *Flowers* actinomorphic, rotate, pale orange or salmon-pink to red, with dark veins and yellow tube; perianth tube funnel-shaped, 6–10 mm long, ± filiform below widening in upper 2–3 mm to ± 3 mm diam.; tepals subequal spreading, elliptic, obtuse, 10–15(–20) × 4–6(–8) mm, without calluses. *Filaments* central and erect, 3–5 mm long, reaching < halfway up perianth; anthers 3.0–4.5 mm long, pale yellow; pollen yellow. *Style* 7–8 mm long, dividing below or opposite base of anthers, branches 3–5 mm long. *Capsules* elongate-ellipsoid, trigonous, 15–20(–25) × 5–6 mm, exserted beyond bracts. *Flowering time*: (July) August to September.



Distribution of ***Tritonia dubia***.

Distribution and ecology: a local endemic in southern Eastern Cape, South Africa, between Hankey and Paterson; in grassy fynbos and grassy clearings in thicket.

Diagnosis: unique in the genus, *Tritonia dubia* has perfectly radially symmetric flowers with erect, centrally placed stamens surrounding the style. The stamens are inserted near the top of the perianth tube which thus widens only in the upper 2–3 mm. In other species with a regular perianth the stamens are inserted in the lower half of the tube and the flowers thus have a prominent gullet. Plants appear to set seed readily and completely, and are thus evidently autogamous, an observation consistent with the branching of the style below the anthers where the stigmas will become dusted with self pollen. The capsules are unusually large and elongate for the genus, ellipsoid and 15–25 mm long, quite unlike the short capsules included in the bracts of other species in sect. *Tritonia*. The floral symmetry and structure and capsule size and shape suggest our placing of *T. dubia* in sect. *Montbretia* near *T. laxifolia*, which has similar capsules, rather than the earlier assignment by De Vos (1982) to sect. *Tritonia*.

Sect. 3. **Tritonia**

Tritonia subg. *Tritonixia* Klatt ex Baker: 190 (1892). Type species: *Tritonia squalida* (Aiton) Ker Gawl., lecto., designated by De Vos: 127 (1982), invalid name typified by the type of the genus.

Leaves distichous, lanceolate-ensiform; anatomically thickened marginal epidermal cells. *Spike* inclined or moderately deflexed; bracts dry and papery, densely speckled with rusty brown distally and along upper margins. *Flowers* subactinomorphic, perianth bowl-shaped, pink to reddish orange; perianth tube funnel-shaped, much shorter than tepals, with very short filiform lower portion expanded abruptly above into a wide cup or gullet; tepals ± obovate-spathulate, calluses lacking or reduced to thickened ridges. *Stamens* unilateral, laxly diverging. *Capsules* shortly ellipsoid to obovoid, 7–8 mm long.

Species 3: southwestern and southern Western Cape, South Africa.

A group of three closely allied species restricted to the lowlands and coastal plain in the southwestern and southern Western Cape, diagnosed by the relatively large, bowl-shaped flowers with symmetric perianth but arcuate, laxly diverging stamens. The perianth tube is less than half as long as the tepals and funnel-shaped with a very short, filiform basal portion widening abruptly into a broad gullet, the stamens inserted at the junction between the two portions, thus in the lower

half of the tube and scarcely exserted from it. The colourful flowers are adapted to pollination by hopliine beetles and adaptations include the development of hyaline zones along the tepal claws in two species and the presence of large, dark markings in the third.

A fourth species with short-tubed, actinomorphic flowers, *Tritonia dubia*, was included in the section by De Vos (1982) but differs from the other species in having perfectly actinomorphic flowers, with a proportionally longer tube only slightly shorter than the tepals and expanded near the top, thus without a gullet, and stamens inserted near the mouth of the tube and erect around the style. The floral similarities with the other members of the section are thus entirely superficial. In addition, the capsules in *T. dubia* are unlike those elsewhere in the section, much larger and ellipsoid in shape. Similar capsules are found in *T. laxifolia* and its allies in sect. *Montbretia* to which we have accordingly transferred it.

15. **Tritonia deusta** *(Aiton) Ker Gawl.* in Curtis's Botanical Magazine 17: t. 622 (1803a). *Ixia deusta* [Soland. in] Aiton: 60 (1789). *Waitzia deusta* (Aiton) Kreysig: 52 (1829). *Montbretia deusta* (Aiton) Endl.: 166 (1842). *Crocosmia deusta* (Aiton) Planch.: 161 (1851). *Tritonixia deusta* (Aiton) Klatt: 356 (1882). Type: South Africa, [Western Cape], without precise locality, *Masson s.n.* [BM, lecto. (as holo.), designated by De Vos: 136 (1982)].

Ixia gibba Salisb.: 38 (1796), illegitimate superfluous name for *I. deusta* Aiton. Type: unknown, probably as for *I. deusta*.

Plants (50)100–300(–400) mm high. *Corm* subglobose, 15–30 mm diam., with cormlets at base; tunics of fine-textured fibres. *Stem* erect, simple or with up to 2 branches. *Leaves* 5 to 8, suberect to falcate, lanceolate-ensiform, (20–)40–100(–200) × (2–)3–10(–15) mm, acute or subobtuse, with evident midrib, cauline leaves bract-like and often dry. *Spike* moderately deflexed, subsecund, (2)5- to 15-flowered; bracts dry and papery, whitish or flushed pink but brown and densely speckled with rusty brown distally and on upper margins, 5–13 mm long, outer obtuse or 3-toothed with median tooth smaller, inner bifid. *Flowers* subactinomorphic, widely cup-shaped, long, bright orange to orange-red or salmon, outer tepals sometimes with a dark reddish black blotch or transverse band at base of limb or lower tepals with small yellow or dark blotch or line, tube yellow with star-shaped yellow mouth outlined with red, unscented; perianth tube abruptly funnel-shaped, 8–12 mm long, subfiliform and arcuate in lower 2–4 mm widening abruptly to 6–8 mm diam.; tepals subequal or inner slightly broader, spreading, elliptic or obovate to obovate-spathulate, obtuse or minutely emarginate, (13–)15–25 × 5–12 mm, lower median or all 3 outer tepals with low ridge-like callus along midline. *Filaments* unilateral but diverging, 7–9 mm long, reaching < halfway up perianth, often orange distally; anthers 5–8 mm long, pale or purple; pollen yellow. *Style* 15–20 mm long, dividing opposite middle of anthers, branches 3–5 mm long. *Capsules* shortly ellipsoid or obovoid, 7–8 × 6 mm. *Flowering time*: late September to mid- or late October.

Distribution and ecology: historically relatively widespread through the lowlands in southwestern and southern Western Cape, South Africa, from Cape Town to Riversdale and Albertinia, but now probably extinct in the extreme west; on stony clay or granite soils mainly in renosterveld scrub, rarely on limestone in fynbos, now largely restricted to road verges or stony sites.

Diagnosis: recognised by the bright orange, bowl-shaped flowers with a star-shaped yellow marking in the throat, often outlined with red. The prominent yellow throat or gullet and the lack of hyaline zones along the margins of the tepal claws separates *Tritonia deusta* from both orange-flowered *T. crocata* and pink-flowered *T. squalida*. It is often also smaller in stature and flower size than either of these species. Hybrids are recorded with both *T. crocata* and *T. squalida*.

Tritonia deusta varies in the number, size and shape of the dark markings on the tepals: populations west of Swellendam typically lack dark markings on the outer tepals, although unmarked plants are also found further east, whereas plants east of Swellendam mostly have a prominent dark reddish black blotch at the base of the outer tepal limbs. The prominently marked forms conform to the type of the species, whereas unmarked plants were described as *Ixia miniata* Jacq. The two forms were reduced to subspecies by De Vos (1982).

Key to subspecies

1a Flowers with prominent reddish black blotch on outer tepals, rarely also on inner tepals . . . . . 15a. subsp. *deusta*

1b Flowers without prominent dark blotches on tepals, sometimes with yellow blotches on lower tepals or a small yellow or dark blotch on lower median tepal only . . . . . 15b. subsp. *miniata*

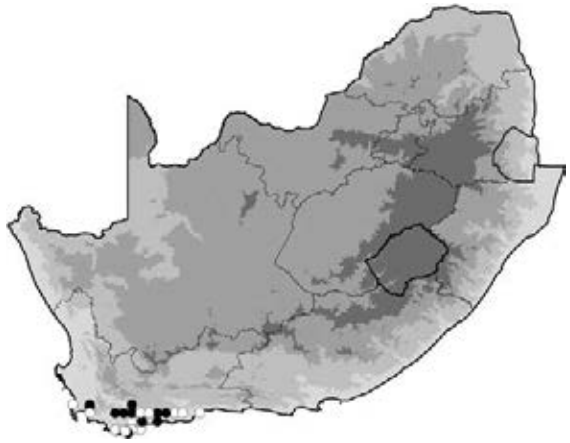
15a. subsp. **deusta**

Ixia crocata var. *nigromaculata* Andrews: t. 134 (1799). *I. miniata* var. *nigromaculata* (Andrews) DC. in Redouté: t. 89 (1804b). Type: South Africa, [Western Cape], without precise locality or collector, illustration in Andrews: t. 134 (1799).

Tritonia coccinea Eckl.: 29 (1827). *T. crocata* var. *coccinea* (Eckl.) Baker: 163 (1877). Type: unknown.

Tritonia maculata Denh.: 178 (1839). Type: illustration '*Ixia Miniata* nigro maculata' in Redouté: t. 89 (1804b), neo., designated by Del Guacchio *et al.*: 1413 (2016).

Outer tepals with a reddish black blotch or band at base of blade sometimes extending onto claw, each blotch usually with a dark, median ridge or callus; smaller blotches sometimes present on one or more lower tepals.



Distribution of ***Tritonia deusta*** subsp. ***deusta***, ●; subsp. ***miniata***, ○.

Distribution and ecology: the less widespread form of the species, ranging from Robertson and Bonnievale to Swellendam and eastward to Riversdale and Albertinia.

Diagnosis: distinguished by the presence of a large reddish black blotch or transverse band on the outer tepals at the base of the limb.

15b. subsp. **miniata** *(Jacq.) M.P.de Vos* in Journal of South African Botany 48: 139 (1982). *Ixia miniata* Jacq.: 10 (1797). *Tritonia miniata* (Jacq.) Ker Gawl.: t.609 (1803b). *Waitzia miniata* (Jacq.) Kreysig: 52 (1829). *Montbretia miniata* (Jacq.) Voigt: 611 (1845). *Crocosmia miniata* (Jacq.) Planch.: 161 (1851). *Tritonixia miniata* (Jacq.) Klatt: 356 (1882). *Tritonia crocata* var. *miniata* (Jacq.) Baker: 190 (1892). Type: South Africa, [Western Cape], without precise locality or collector, illustration in Jacq.: t. 24 (1797).

Tritonia aurantiaca Eckl.: 29 (1827). *Ixia aurantiaca* (Eckl.) Czerw.: 4 (1867), illegitimate homonym, not *I. aurantiaca* Klatt (1882). *T. crocata* var. *aurantiaca* (Eckl.) Baker: 163 (1877). Type: unknown [details of description suggest this determination].

Tritonia tardiflora Dehnh.: 179 (1939). Type: unnumbered plate '*Tritonia tardiflora* Dehnh.' in Botanical Garden of Naples, neo., designated by Del Guacchio et al.: 1413 (2016).

Outer tepals without dark blotches or markings; lower tepals sometimes with yellow, often red-margined blotch or small dark spot or median line in throat.

Distribution and ecology: occurring throughout the range of the species and historically recorded as far west as the Cape Peninsula but now possibly extinct there and encountered mainly between Caledon and Bredasdorp and Struisbaai, but also occurring in populations further east near Swellendam, Riversdale and Albertinia.

Diagnosis: distinguished by the lack of prominent, dark blotches on the outer tepals, although a small yellow or dark spot may be present on the lower median tepal.

16. **Tritonia crocata** *(L.) Ker Gawl.* in Curtis's Botanical Magazine 16: t. 581 (1802a). *Ixia crocata* L.: 52 (1762). *I. hyalina* Salisb.: 38 (1796), illegitimate superfluous name for *I. crocata* L. (1762). *Gladiolus crocatus* (L.) Pers.: 44 (1805). *Waitzia crocata* (L.) Hoffm.: 14 (1824). *Montbretia crocata* (L.) Endl.: 166 (1842). *Crocosmia crocata* (L.) Planch.: 161 (1851). *Tritonixia crocata* (L.) Klatt: 356 (1882). Type: South Africa, [Western Cape], without precise locality or collector [LINN 58.24, lecto. (as holo.), designated by De Vos: 132 (1982)].

Ixia iridifolia D.Delaroche: 24 (1766). Type: South Africa, [Western Cape], without precise locality or collector (L: Herb. van Royen, holo.).

Ixia hyalina L.f.: 91 (1782). *Tritonia hyalina* (L.f.) Baker: 163 (1877). *Tritonixia hyalina* (L.f.) Klatt: 356 (1882). Type: None cited.

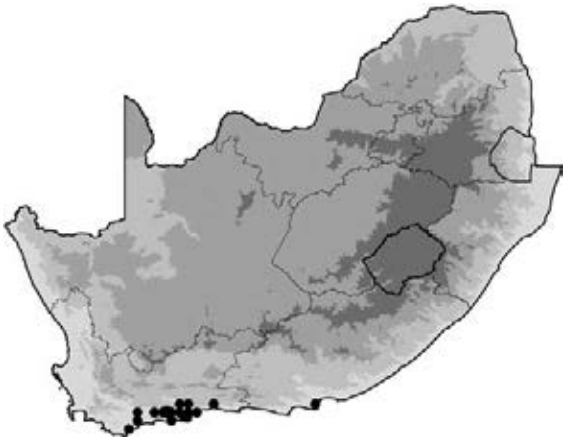
Ixia fenestrata Jacq.: 289 (1791). *Belamcanda fenestrata* (Jacq.) Moench: 529 (1794). *Tritonia fenestrata* (Jacq.) Ker Gawl.: t. 704 (1804a). *Waitzia fenestrata* (Jacq.) Kreysig: 52 (1829). *Montbretia fenestrata* (Jacq.) Endl.: 166 (1842). *Crocosmia fenestrata* (Jacq.) Planch.: 161 (1851). Type: South Africa, [Western Cape], without precise locality or collector, illustration in Jacq.: 289 (1792 [1788–1795]).

Ixia purpurea Lam.: 341 (1789). *Tritonia purpurea* (Lam.) Ker Gawl.: sub t. 1275 (1810a). *Montbretia purpurea* (Lam.) Heynh.: 418 (1847). *Tritonia crocata* var. *purpurea* (Lam.) Baker: 163 (1877). *Tritonixia purpurea* (Lam.) Klatt: 356 (1882). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* (UPS–THUNB '*Ixia crocata* var. c' or P: Herb. Lamarck?, holo.].

Tritonia sanguinea Eckl.: 29 (1827). *T. crocata* var. *sanguinea* (Eckl.) Baker: 163 (1877). *Montbretia sanguinea* (Eckl.) Heynh.: 418 (1847). Type: South Africa, [Western Cape], without precise locality or collector (S, holo.).

[*Ixia planifolia* Mill. ex Roem. & Schult.: 400 (1817), invalid name only in synonymy of *I. crocata* L.]

Plants 150–300(–500) mm high. *Corm* subglobose, 15–30 mm diam., with cormlets at base; tunics of fine-textured fibres. *Stem* erect, simple or up to 2-branched. *Leaves* 6 to 10, suberect to falcate, lanceolate-ensiform, (40–)50–200 × 4–10(–15) mm, acute or subobtuse, with evident main vein, cauline leaves bract-like, often dry. *Spike* moderately deflexed, subsecund, (2)5- to 15-flowered; bracts dry and papery, whitish or flushed pink but brown and densely speckled with rusty brown distally and on upper margins, (5–)10–16 mm long, outer obtuse or 3-toothed with median tooth smaller, inner



Distribution of ***Tritonia crocata***.

bifid. *Flowers* subactinomorphic, widely cup-shaped, bright fiery orange to orange-red or pinkish orange, lower median or all 3 tepals with a narrow yellow stripe in throat and sometimes a yellow patch at base, unscented; perianth tube abruptly funnel-shaped, (8–)12–15 mm long, subfiliform and arcuate in lower 2–4 mm widening abruptly to 7–10 mm diam.; tepals subequal or inner slightly broader, spreading, obovate-spathulate, obtuse or minutely emarginate, (16–)20–28 × 10–20 mm, claws with wide hyaline marginal zones, lower median or all three tepals sometimes with low ridge-like callus along midline. *Filaments* unilateral but diverging, 7–9 mm long, reaching < halfway up perianth, often orange distally; anthers 5–8 mm long, pale or purple with yellow pollen. *Style* 15–20 mm long, dividing opposite upper half or slightly beyond anthers, branches 5–6 mm long. *Capsules* shortly ellipsoid or obovoid, 7–8 × 6 mm. *Flowering time*: late September to mid- or late October.

Distribution and ecology: restricted to the southern coast of Western Cape from Swellendam to George and east to Humansdorp in Eastern Cape, South Africa; mainly in shale soils in renosterveld, rarely in loamy sands, now largely restricted to roadsides and isolated rocky sites that have escaped the plough.

Diagnosis: distinguished from the two other species with large, bowl-shaped flowers with spathulate tepals and diverging filaments by the broad, orange to red tepals with hyaline margins on the claws, the lower 3 tepals with a narrow median yellow stripe in the throat, sometimes raised as a low ridge. Orange-flowered *Tritonia deusta* lacks the hyaline margins to the tepals and has a distinct, large yellow star-like marking in the throat of the tube and often a large dark blotch on the outer tepals, and *T. squalida* has pink to mauve, often narrower tepals, also with hyaline margins on the claws. Hybrids between *T. crocata* and *T. deusta* have been recorded between Riversdale and Albertinia where the ranges of the two species overlap.

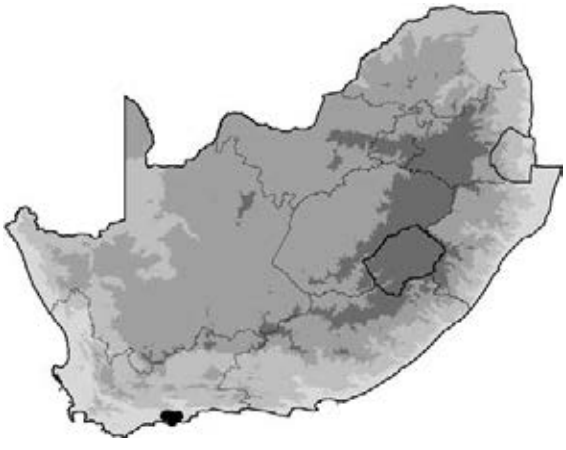
17. **Tritonia squalida** *(Aiton) Ker Gawl.* in Curtis's Botanical Magazine 16: t. 581 (1802a). *Ixia squalida* [Soland. in] Aiton: 61 (1789). *Waitzia squalida* (Aiton) Kreysig: 52 (1829). *Montbretia squalida* (Aiton) Voigt: 611 (1845). *Tritonixia squalida* (Aiton) Klatt: 356 (1882). Type: South Africa, [Western Cape], without precise locality, *Masson s.n.* (BM, holo.).

Ixia squalida var. *patula* [Soland. in] Aiton: 61 (1789). *I. similis* Salisb.: 38 (1796), as a new name for *I. squalida* var. α [*patula*] and superfluous name for *I. hyalina* L.f. (1782) (= *Tritonia crocata* (L.) Ker Gawl.). Type: South Africa, [Western Cape], without precise locality, *Masson s.n.* (BM, holo.).

Ixia hyalina DC. in Redouté: t. 87 (1804b), illegitimate homonym, not *I. hyalina* L.f. (1782). Type: South Africa, without precise locality or collector, illustration in Redouté: t. 87 (1804b).

Tritonia pulchella Dehnh.: 24 (1839). Type: unnumbered plate '*Tritonia pulchella* Dehnh.' in Botanical Garden of Naples, neo., designated by Del Guacchio et al.: 1414 (2016).

Plants 150–300(–500) mm high. *Corm* subglobose, 10–20(–30) mm diam., with cormlets at base; tunics of fine-textured fibres. *Stem* erect, simple or up to 2-branched. *Leaves* 6 to 10, suberect to falcate, lanceolate or sword-shaped, (50–)70–200 × 4–10(–15) mm, acute or subobtuse, with evident main vein, cauline leaves bract-like and often dry. *Spike* moderately deflexed, subsecund, (2)6- to 10(15)-flowered; bracts dry and papery, whitish or flushed pink but brown and densely speckled with rusty brown in distal ½ and on upper margins, outer (8–)10–16 mm long, outer obtuse or 3-toothed with median tooth smaller, inner subequal or slightly shorter, bifid. *Flowers* subactinomorphic, widely cup-shaped, deep mauve-pink to pale pink or almost white, with dark veins, often dark pink or yellowish at base and lower 3 tepals sometimes with pale pink or yellow line in throat, unscented; perianth tube abruptly funnel-shaped, (8–)12–15 mm long,



Distribution of ***Tritonia squalida***.

subfiliform and arcuate in lower 2–4 mm widening abruptly to 7–10 mm diam.; tepals subequal or inner slightly broader, spreading, rhomboid-spathulate to obovate-spathulate, obtuse or minutely emarginate, (16–)20–28 × 8–18 mm, claws with wide hyaline marginal zones, lower 3 sometimes with low ridges along midline. *Filaments* unilateral but diverging, 8–12 mm long, reaching < halfway up perianth, often pink distally; anthers 5–8 mm long, pale or purple with yellow or mauve pollen. *Style* 15–20 mm long, dividing opposite middle of anthers, branches 5–6 mm long. *Capsules* shortly ellipsoid or obovoid-trigonous, 7–8 × 6 mm. *Flowering time*: late September to mid- or late October.

Distribution and ecology: a local endemic of the south coast of Western Cape, South Africa, between Riversdale, Albertinia and Still Bay; on stony laterite and calcareous soils, often in crevices in rock pavement or outcrops.

Diagnosis: one of three closely allied species with almost symmetric, bowl-shaped flowers with more-or-less spathulate tepals and weakly diverging filaments, *Tritonia squalida* is distinguished by its pale to deep or dusty pink to mauve tepals, the claws with broad hyaline margins. It is separated from orange-flowered *T. crocata* from shale soils in the same region primarily by flower colour, but it seems that the style also branches slightly lower down and the tepals are never as broad as seen in some plants of *T. crocata*. The two species have different soil preferences and no intermediates between them have been found in the wild. Putative hybrids between *T. squalida* and *T. deusta* have been recorded near Albertinia.

Sect. 4. **Montbretiopsis** *(L.Bolus) J.C.Manning & Goldblatt*, new rank. *Montbretiopsis* L.Bolus in South African Gardening and Country Life 19: 215 (1929). Type species: *Tritonia florentiae* (Marloth) Goldblatt

Leaves ± falcate, leathery, with translucent midvein. *Stem* very short or subterranean. *Spike* short or modified into several 1-flowered units; bracts membranous or papery and translucent or pale straw-coloured. *Flowers* zygomorphic, funnel-shaped, cream-coloured to orange or bright yellow; perianth tube funnel-shaped, as long as or longer than tepals; lower tepals with long, crest-like calluses on lower half. *Stamens* arcuate, unilateral. *Capsules* large, sometimes inflated, ovoid to ellipsoid, 12–20 mm long.

Species 2: western interior South Africa.

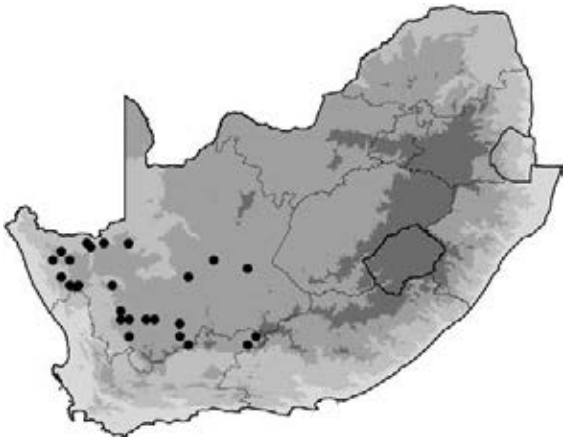
The section includes two short-stemmed or acaulescent species from the arid western interior of South Africa, characterised by their tight fan of falcate or recurved, leathery leaves and large, fragrant, cream-coloured to yellow or orange flowers with conspicuous, long, crest-like calluses on the lower tepals. The bracts are relatively large and translucent or pale straw-coloured finely stippled or speckled with brown. The capsules are large, 12–20 mm long, and in *Tritonia florentiae* are markedly inflated. This species is unique in the genus in having an inflorescence of several 1-flowered units, interpreted as a branched spike with each branch bearing a solitary terminal flower. This led to its segregation in the new genus *Montbretiopsis* L.Bolus (1929) but a similar specialised inflorescence is found in short-stemmed species in several other genera, and it was later transferred to *Tritonia* (Goldblatt, 1974).

18. **Tritonia karooica** *M.P.de Vos* in Journal of South African Botany 49: 407 (1983). Type: South Africa, [Eastern Cape], Murraysburg, *Tyson 311* (BOL, holo.; BM, K, NH, SAM, iso.).

Plants (60–)80–150 mm high. *Corm* moderately deep-seated, obovoid-conic, 15–30 mm diam.; tunics of moderately coarse-textured fibres sometimes thickened into claws at base, extending upward in a fibrous and papery collar. *Stem* suberect, shortly exserted up to 50 mm above leaves, usually simple, rarely with up to 3 suberect branches from base. *Leaves* 6 to 10, in close fan, falcate or rarely suberect, slightly succulent, 30–80(–100) × 3–7 mm, obtuse or acute, with translucent main vein only, cauline leaves all subbasal or rarely shortly exserted above basal fan, leaf-like. *Spike* inclined, moderately dense, 2-ranked, 2- to 6-flowered; bracts dry and papery, pale or pinkish translucent, minutely speckled brown above, outer (12–)15–20 mm long, acute or 3-toothed with middle tooth largest, inner subequal or slightly longer. *Flowers* zygomorphic, dull yellow or brownish yellow or sometimes cream, orange or salmon-coloured, conspicuously dark-veined; perianth tube funnel-shaped, sharply bent, 25–32 mm long, widening in upper ½ to ± 8–10 mm diam.; tepals unequal, upper 3 slightly wider, spreading or recurved, elliptic to obovate, 12–18 mm long, upper 7–12 mm wide, lower 6–7 mm wide, each with long, crisped or undulate, crest-like callus on lower ½ extending shortly into throat, 0.5–0.8 mm high and 6–10 mm long. *Filaments* unilateral, arcuate, 15–22 mm long, not or scarcely exserted; anthers 6–7 mm long; pollen creamy white. *Style* 28–35 mm long, dividing near middle of anthers, branches 4–5 mm long. *Capsules* shortly ellipsoid-trigonous or obovoid-trigonous, 8–12 mm long. *Flowering time*: August, September or sometimes early October.

Distribution and ecology: extending through the arid southwestern interior of South Africa, from northeast of Springbok through Bushmanland eastward to Kakamas and south through Calvinia and the Roggeveld to Leeu Gamka and inland across the Upper Karoo to Hanover and Carnarvon; on dry, stony or gravel flats.

Diagnosis: recognised by its short stature, tight fan of usually falcate or strongly curved, leathery leaves with the cauline leaves seldom visible above the basal fan,



Distribution of ***Tritonia karooica***.

and short, inclined spike of large, funnel-shaped flowers with a sharply bent perianth tube 25–32 mm long and about twice as long as the tepals. The stem is shortly exserted above the leaves and the fragrant flowers are pale creamy to dull orange, with conspicuous dark veins, and long, bright yellow ridge or crest-like calluses less than 1 mm high on the lower tepals extending into the throat.

The congested fan of recurved, leathery leaves, short stem, and large, funnel-shaped flowers with long, crest-like calluses, and large capsules all suggest a relationship with *Tritonia florentiae* from the Tanqua and western Great Karoo. Flowering in the winter in May and June, acaulescent *T. florentiae* has bright yellow flowers without conspicuous veins and a perianth tube about as long as the tepals.

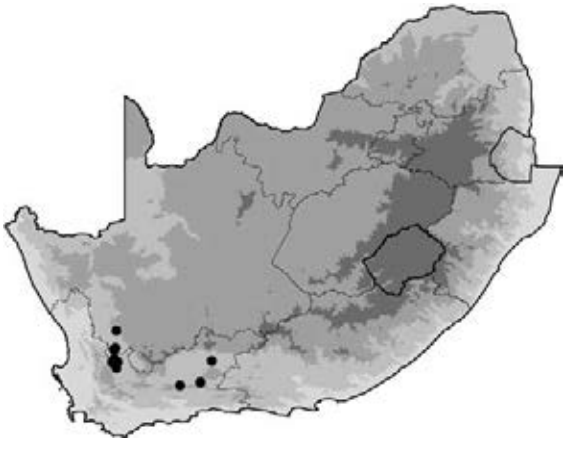
19. **Tritonia florentiae** *(Marloth) Goldblatt* in Bothalia 11: 281 (1974). *Gladiolus florentiae* Marloth: 241 (1912). *Montbretiopsis florentiae* (Marloth) L.Bolus: 215 (1929). Type: South Africa, [Western Cape], near Groot Tygerberg, Prince Albert, *Marloth 4452* (PRE, holo.; BOL, iso.).

Plants 50–70 mm high. *Corm* moderately deep-seated, ovoid-conical, 10–20 mm diam.; tunics of fine-textured fibres, extending upward in a fibrous and papery neck. *Stem* subterranean, with up to 4 branches ± 10 mm long. *Leaves* 5 to 8, in a close fan, falcate, slightly succulent, 30–70 × 3–6 mm, acute, with translucent main vein, cauline leaves not exserted above basal fan, dry and bract-like. *Inflorescence* of up to 4, 1-flowered spikes hidden among leaf bases; bracts membranous or dry and papery, soon crumpled, translucent or pale straw-coloured translucent and finely stippled or speckled brown, 12–18 mm long, outer acute, soon lacerated, inner 2-toothed. *Flowers* zygomorphic, bright yellow, reddish in throat, lower tepals with red arrow-shaped mark and bright yellow median calluses; perianth tube funnel-shaped, (15–)18–25(–30) mm long, filiform in lower 8–10(–15) mm widening strongly in upper ½ to ± 8–10 mm diam.; tepals recurved distally, (15–)20–25 mm long, dorsal largest, obovate, 13–15(–18) mm wide, upper laterals oblanceolate, 8–10 mm wide, lower tepals oblanceolate, 5–7(–9) mm wide, each with long, crisped or undulate, crest-like callus on lower ½, 0.5–1.0 mm high, 8–10 mm long. *Filaments* unilateral, arcuate, 10–13 mm long, shortly exserted up to 5 mm; anthers 5–6 mm long, pale to mauve; pollen pale yellow. *Style* 25–33 mm long, dividing shortly beyond anthers, branches 3–4 mm long. *Capsules* inflated, ovoid-trigonous to ellipsoid-trigonous, 12–20 mm long. *Flowering time*: May to June.

Distribution and ecology: a local endemic of dry inland basins in Western Cape, South Africa, recorded from the northern half of the Tanqua Karoo and further east in the western Great Karoo between Prince Albert and Beaufort West; on gravel flats in washes and drainage lines, flowering in winter and responding rapidly to early winter rains that fall erratically.

Diagnosis: a dwarf species, *Tritonia florentiae*, the only acaulescent member of the genus, has a tight fan of recurved, leathery leaves and large, fragrant, bright yellow flowers with long, crest-like calluses on the lower tepals. The species exhibits some highly unusual features, presumably associated with its ecology and habit. The inflorescence is reduced to several short, one-flowered branches, a development that has evolved several times in acaulescent members of several different genera of Crocoideae, including *Crocus*, *Duthiastrum* and *Syringodea*. The large, inflated capsules are unique in the genus.

Tritonia florentiae resembles spring-flowering *T. karooica* in general habit, notably the tight fan of recurved, leathery leaves, and large flowers with long, crest-like calluses on the lower tepals, but the latter has an aerial stem, cream-coloured to dull orange flowers with conspicuous dark veins and a relatively longer, sharply bent perianth, about twice as long as the tepals.



Distribution of ***Tritonia florentiae***.

Sect. 5. **Pallidae** *J.C.Manning & Goldblatt*, new section. Type species: *Tritonia pallida* Ker Gawl.

Corm moderately deeply seated. *Leaves* shorter or longer than spike, linear to lanceolate, plane with thickened midrib. *Spike* erect, moderately dense; bracts papery and translucent speckled and flecked brown distally. *Flowers* zygomorphic, white to pink; perianth tube long and cylindric, widening and funnel-shaped distally, two to four times as long as tepals; lower tepals often with thickened median ridges or rarely with obliquely quadrate callus on median tepal and smaller peg-like calluses on lower laterals. *Stamens* arcuate, unilateral, inserted near top of tube; anthers apiculate, purple. *Capsules* ellipsoid, 12–20 mm long.

Species 3: southern Western Cape, South Africa.

A group of three, parapatric species from the Little Karoo and southern coast of Western Cape, with pale, long-tubed flowers usually lacking calluses and adapted to pollination by long-proboscid flies in the families Tabanidae and Nemestrinidae. The species often have a thickened, ridge-like callus on the lower tepals, sometimes high and axe-like in *Tritonia pallida*, suggesting an alliance with sect. *Montbretia*. De Vos (1982, 1999) included the florally similar *T. bakeri* here but this species stands apart in its distinctive, more-or-less terete leaves lacking a distinct main vein and its salver-shaped, inverted flowers.

20. **Tritonia pallida** *Ker Gawl.* in Curtis's Botanical Magazine 31: sub t. 1275 (1810), as a replacement name for *Gladiolus longiflorus* Jacq.: 6 (1795 [1788–1795]) [not *T. longiflora* (P.J.Bergius) Ker Gawl.]. *Waitzia pallida* (Ker Gawl.) Heynh.: 855 (1841). *Montbretia pallida* (Ker Gawl.) Baker: 168 (1877). Type: South Africa, without precise locality, illustration in Jacq.: t. 262 (1794 [1788–1795]).

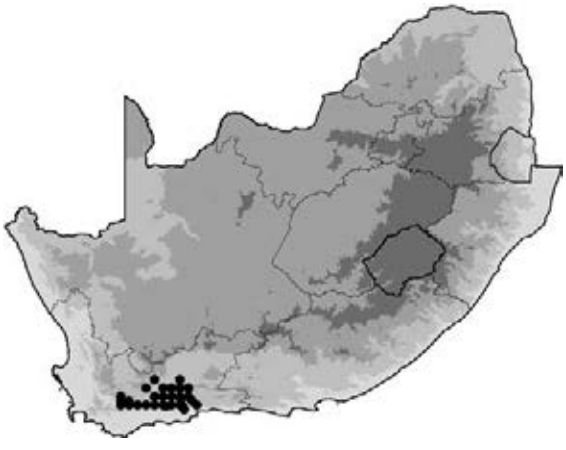
Tritonia tayloriae [as *taylorae*] L.Bolus: 44 (1926). *T. pallida* subsp. *tayloriae* (L.Bolus) M.P.de Vos: 362 (1983), new synonym. Type: South Africa, [Western Cape], near Oudtshoorn, Bankhoogte, dry hills, *Taylor 251* (BOL, holo.).

Tritonia ventricosa Dehnh.: 162 (1839). Type: unnumbered plate '*Tritonia* [...] *ventricosa* Dehnh.' in Botanical Garden of Naples, lecto., designated by Del Guacchio et al.: 1413 (2016).

Plants 150–300(–450) mm high. *Corm* subglobose, 10–20 mm diam., sometimes deep-seated; tunics of fine-textured fibres, sometimes extending into a fibrous or papery neck. *Stem* usually flexed outward above upper leaf and slightly inclined, simple or with up to 2(3) suberect branches from lower ½. *Leaves* 5 to 8, often drying at flowering, suberect or arcuate, narrowly lanceolate, 30–150(–200) × (3–)5–10(–15) mm, acute or acuminate, thin-textured with raised main vein, ± ½ as long as flowering stem, cauline leaves dry, clasping, bract-like. *Spike* inclined, ± 2-ranked, rather lax, 4- to 10-flowered; bracts dry and papery, pale and translucent below, densely speckled and flecked reddish to dark brown above or at tips, outer (7–)10–15(–18) mm long, minutely ± 3-toothed, often recurved at tips, inner slightly shorter, bifid. *Flowers* zygomorphic, suberect, white or cream-coloured to pale lilac with dark veins, especially on tube, lower 3 tepals often with greenish yellow median streak or callus, rarely outlined with red or with red lines at base, unscented; perianth tube ± cylindric, (30–)45–65(–70) mm long, straight below, curved outward and widening in upper 7–10 mm to 5–8 mm diam.; tepals obtuse, dorsal largest, suberect or curved outward, upper (10–)15–20 mm long, dorsal obovate to suborbicular, 8–13 mm wide, upper laterals oblong-elliptic, 5–8 mm wide, lower oblong, 8–15 × 4–6 mm, without calluses or with low, thickened basal ridge, usually best developed on lower median and sometimes oblong and ± 1 mm high, rarely lower median tepal with a forward-directed, obliquely quadrate callus up to 2 mm high and lower laterals with smaller peg-like calluses. *Filaments* unilateral and arcuate, (7–)10–14 mm long, shortly exserted; anthers 4–8 mm long, apiculate, purple; pollen violet. *Style* dividing shortly below or above anther tips, branches 2–4 mm long. *Capsules* ellipsoid, 12–20 mm long. *Flowering time*: late September to early November.

Distribution and ecology: centred in the western Little Karoo in Western Cape, South Africa, extending from Robertson to Calitzdorp and the Gamkaberg, also along the northern foothills of the Witteberg and Swartberg; typically on stony shale slopes and banks in succulent karroid shrubland with the corms wedged in crevices in rocks.

Diagnosis: distinguished from other species with white, long-tubed flowers by its narrowly lanceolate, often spreading, soft-textured leaves, typically about half as long as the flowering stem and mostly 10–15 mm wide with a prominent main vein and the ± 3-toothed outer bracts mostly 7–10(–15) mm long. The lower three or



Distribution of ***Tritonia pallida***.

only the median tepal often has a yellow ridge-like or low, oblong callus near the base. Rarely, especially in the plants on the Rooiberg and Gamkaberg, the calluses are enlarged into obliquely square teeth up to 2 mm high, as found in sect. *Montbretia*. Populations near Robertson are distinctive in having longitudinal red streaks near the bases of the lower tepals.

Plants with a shorter perianth tube, 30–35(–45) mm long vs. 45–65(–70) mm long, were segregated as subsp. *tayloriae* by De Vos (1983). Shorter-tubed populations are recorded from the western and eastern periphery of the range of the species, between Robertson and Montagu, and north and south of Calitzdorp. They do not differ in any other way from typical plants, and short- and long-tubed populations display a similar variation in the development of a callus on the median lower tepal. In the absence of any clear geographical pattern we regard the short-tubed populations as local variants.

Tritonia pallida can be confused with the parapatric *T. flabellifolia*, which ranges from the Riviersonderend Mtns eastward along the foot of the coastal ranges as far as Riversdale, but that species has distinctive attenuate-aristate bracts mostly 15–40 mm long and stiffly erect, linear to linear-lanceolate, attenuate leaves mostly 4–10 mm wide.

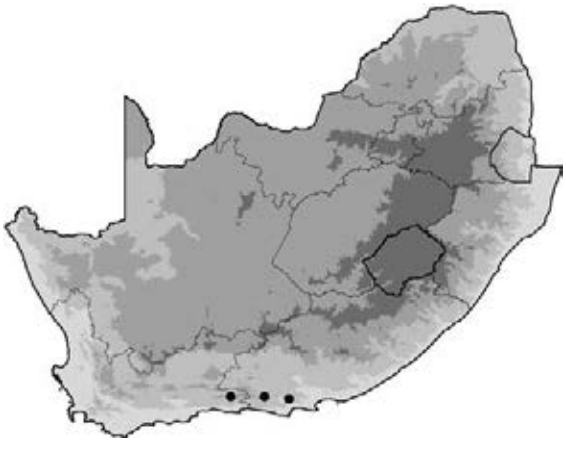
21. **Tritonia linearifolia** *Goldblatt & J.C.Manning* in Bothalia 41: 173 (2011). Type: South Africa, Eastern Cape, Joubertina, Kouga Mtns, valley of Dwarsrivier west of Kransfontein Farm, 12 Dec. 2009, *Manning 3244* (NBG, holo.; MO, iso.).

Plants mostly 150–500 mm high. *Corm* subglobose or depressed-globose, 10–20 mm diam., tunics somewhat papery, of fine-textured fibres, extending in a papery or fibrous neck, with clusters of cormlets at base on short, fasciated stolons. *Stem* ± erect below, simple or with up to 2 branches. *Leaves* 7 to 12, dry at flowering, linear, suberect or trailing, slightly twisted, ± as long as or slightly longer than stem, (10–)20–60 × 1–2 mm, soft-textured, main vein moderately thickened. *Spike* inclined, ± 2-ranked, (2–)4- to 8-flowered; bracts soft-textured, papery of membranous, translucent or straw-coloured lightly flushed or speckled brownish distally, outer 8–12 mm long, acute or minutely 3-toothed, inner bracts slightly shorter, bifid. *Flowers* zygomorphic, white with purple veins on reverse, lower 3 tepals with narrow, median, yellowish green longitudinal mark at base, unscented; perianth tube cylindric, 35–45 mm long, straight but curved outward and widening in upper 5–7 mm to 5–8 mm diam.; tepals unequal, uppermost largest, dorsal and lower median tepals suberect, other tepals spreading in distal half, dorsal tepal ovate-elliptic, 18–20 × 10–12 mm, remaining tepals oblong, 18–20 × 5–7 mm, lower 3 tepals with low, median, ridge-like callus. *Filaments* arcuate and unilateral, 13–16 mm long; anthers 5–6 mm long, apiculate, purple; pollen purple. *Style* dividing opposite middle to apex of anthers, branches ± 2 mm long. *Flowering time*: early to mid-December.

Distribution and ecology: centred in the Kouga and Baviaanskloof Mtns in Eastern Cape but also recorded from the northern foothills of the Fouriesberg at the western end of the Outeniqua Mtns in Western Cape, South Africa; on cooler south-facing sandstone lower slopes in arid and grassy fynbos, with the corms wedged among rocks.

Diagnosis: recognised by the linear, grass-like leaves as long as the flowering stem or longer, 1–2 mm wide and dry at flowering, and inclined spikes of white, long-tubed, zygomorphic flowers with low, greenish yellow, ridge-like calluses on the lower tepals. The corms bear short, fasciated stolons and many small cormlets. The species flowers in summer, in December, at which time the leaves are dry and withered. The flowers are almost indistinguishable from those of *Tritonia pallida* and the two may comprise a vicariant species pair. That species, centred in the western and central Little Karoo, has lanceolate leaves mostly 8–15 mm wide and about half as long as the flowering stem, and occurs on shale slopes, primarily in renosterveld or transitional vegetation types, flowering from mid-September to late October.

The long, linear leaves of *Tritonia linearifolia* may lead to confusion with the partially sympatric *T. bakeri*, a long-tubed species widespread through the Little Karoo from Ladismith to the Long Kloof, but the leaves of *T. bakeri* are highly characteristic, fleshy and semi-terete in section when fresh, without thickened main vein or margins. Flowering is also somewhat earlier, mainly October to November, at which time the foliage is still green. The two species are florally very different, although this is best seen when alive. *Tritonia linearifolia* has zygomorphic flowers with arcuate stamens whereas the perianth in *T. bakeri* is almost actinomorphic and salver-shaped, with the flowers inverted, curved or slightly twisted at the base, so that the dorsal tepal is lowermost and the stamens almost central with the anthers facing upwards.



Distribution of ***Tritonia linearifolia***.

22. **Tritonia flabellifolia** *(D.Delaroche) G.J.Lewis* in Journal of South African Botany 7: 30 (1941). *Ixia flabellifolia* D.Delaroche: 24 (1766). *Acidanthera flabellifolia* (D.Delaroche) N.E.Br.: 135 (1929). Type: South Africa, without precise locality or collector [L-Herb. Van Royen, neo., designated by Goldblatt & Barnard (1970)].

Gladiolus flavus [Soland. in] Aiton: 65 (1789). *Tritonia flava* (Aiton) Ker Gawl.: 228 (1804b). *Freesea flava* (Aiton) Eckl.: 30 (1827), illegitimate name [genus not validly published]. *Waitzia flava* (Aiton) Kreysig: 52 (1829). *Montbretia flava* (Aiton) Heynh.: 417 (1847). Type: South Africa, without precise locality, cultivated in Great Britain, *Paterson s.n.* (BM, holo.).

Gladiolus roseus Jacq.: 5 (1795 [1788–1795]). *Watsonia amoena* Ehrh. ex Pers.: 43 (1805), as a replacement name for *G. roseus* Jacq. [not *Watsonia rosea* Ker Gawl. (1804b)]. *Tritonia rosea* (Jacq.) Aiton: 91 (1810). *Waitzia rosea* (Jacq.) Heynh.: 855 (1841). *Montbretia rosea* (Jacq.) Voigt: 610 (1845). *Tritonixia rosea* (Jacq.) Klatt: 356 (1882). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 261 (1795 [1788–1795]).

Tritonia capensis var. *major* Ker Gawl.: sub t. 1531 (1813), new synonym. *T. flabellifolia* var. *major* (Ker Gawl.) M.P.de Vos: 367 (1983): Type: South Africa, without precise locality or collector, illustration in Ker Gawl: t. 618 (1802b).

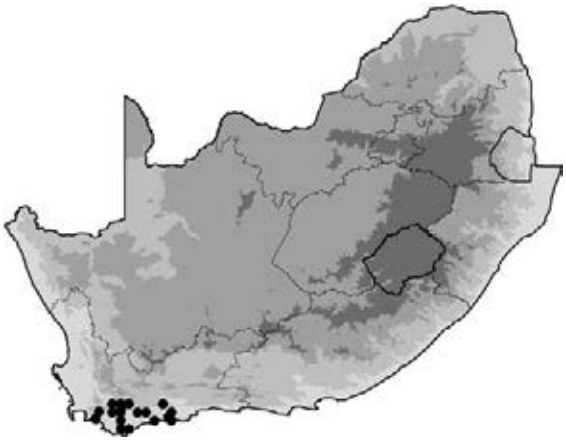
Tritonia flabellifolia var. *thomasiae* M.P.de Vos: 368 (1983), new synonym. Type: South Africa, [Western Cape], between Bot River and Hawston, *Thomas s.n.* (NBG, holo.; NBG, iso.).

[*Gladiolus amoenus* Ehrh. ex Roem. & Schult.: 435 (1817), invalid name only in synonymy, identity uncertain.]

[*Freesea secunda* Eckl.: 30 (1827), invalid name without description.]

[*Tritonia secunda* Eckl. ex Steud.: 719 (1841), invalid name without description.]

Plants 150–300(–450) mm high. *Corm* subglobose or depressed-globose, 10–20(–30) mm diam., tunics of fine-textured fibres, extending in a papery or fibrous neck. *Stem* ± erect below, inclined above, uppermost cauline leaf, simple or up to 3-branched. *Leaves* 6 to 10, drying and brown at flowering, stiffly suberect or arcuate, ± reaching to base of spike, linear to linear-lanceolate, 50–150(–200) × (2–)4–6(–10) mm, acuminate to attenuate, firm, with main vein moderately thickened, secondary veins prominent and lightly thickened, cauline leaves smaller, entirely sheathing. *Spike* inclined, subsecund, 3- to 7-flowered; bracts dry and papery, translucent below, pale brownish densely speckled with dark reddish brown above, outer (10–)15–30(–50) mm long, acuminate or attenuate-aristate, rarely with 3 acuminate tips held close together, keeled with strong median vein, inner slightly to much shorter than outer, bifid-aristate. *Flowers* zygomorphic, white or cream-coloured to pale pink with darker veins, lower 3 tepals with median red streak or narrow yellow mark outlined with red, unscented; perianth tube cylindric or narrowly funnel-shaped, (30–)35–60(–65) mm long, slender and straight but curved outward and widening in upper 10–20 mm to 8–10 mm diam.; tepals obtuse, uppermost largest, often suberect, others spreading distally, dorsal obovate, 17–25 × 10–15 mm, remaining tepals oblanceolate, 13–20 × 5–8 mm, without calluses. *Filaments* unilateral, arcuate, (13–)15–18 mm long; anthers 5–7(–9) mm long, apiculate, purple; pollen purple. *Style* dividing shortly below or beyond anther apices, branches 4–7 mm long. *Capsules* obovoid, 7–10 mm long. *Flowering time*: early to mid-December.



Distribution of ***Tritonia flabellifolia***.

Distribution and ecology: endemic to the southern coastal districts of Western Cape, South Africa, from Botrivier and the lower northern and southern slopes of the Riviersonderend Mtns to Bredasdorp and across the coastal plain south of the Langeberg as far east as Riversdale; on stony clay slopes and shale outcrops in renosterveld or transitional fynbos vegetation.

The flowers are pollinated by long-proboscid flies, including *Philoliche rostrata* (Tabanidae).

Diagnosis: distinguished from the florally similar *Tritonia pallida* from the Little Karoo by always lacking calluses on the lower tepals, which are marked with a red or yellow and red streak, and by its stiffly erect, narrowly lanceolate-attenuate leaves, mostly 4–10 mm wide, and distinctive attenuate-aristate bracts mostly 15–40 mm long.

Long-tubed plants with the perianth tube (45–)50–65 mm long were distinguished by De Vos as var. *major* but these forms grade imperceptibly into typical var. *flabellifolia* with perianth tube 30–40 mm long. Both forms have the tube two or three times as long as the tepals. A population between Hawston and Botrivier at the extreme western edge of the range with pink

flowers and relatively larger tepals was recognised as var. *thomasiae* by De Vos (1983). This taxon, still known only from the type collection and now probably extinct, was distinguished by its perianth tube, 30–45 mm long and ±1.5 times as long as the tepals but we have measured the flowers on the type and find them to have the perianth tube twice as long as the tepals, thus no different from the typical variety.

Sect. 6. **Pseudopectinatae** *J.C.Manning & Goldblatt*, new section. Type species: *Tritonia tugwelliae* L.Bolus

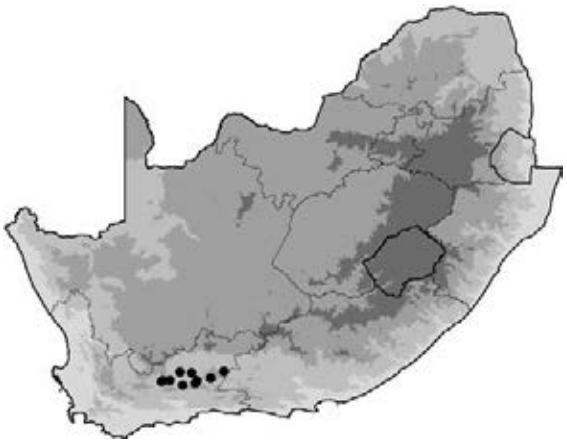
Leaves distichous, falcate, with ± crisped or undulate margins. *Spike* strongly deflexed and horizontal, secund and densely-flowered thus ± pectinate; bracts small, uniformly pale to pale reddish brown. *Flowers* zygomorphic, suberect, white with small red or purple spot on lower median or all lower tepals; perianth tube slender and subcylindric, much longer than tepals; lower tepals narrower than upper, without calluses. *Stamens* arcuate, unilateral; anthers violet or purple. *Capsules* unknown.

Species 1: western Great Karoo of Western Cape, South Africa.

A monotypic section from the western Great Karoo, Western Cape, with a fan of falcate leaves with crisped or undulate margins, and a horizontal spike of small, white, long-tubed flowers arranged in a dense, comb-like spray, with small, pale pinkish or brownish bracts without darker tips. The sole species was included by De Vos (1982) in sect. *Pectinatae* but is anomalous there in its unspecialised, plane leaves and small, uniformly pale bracts without dark upper margins.

23. **Tritonia tugwelliae** *L.Bolus* in Annals of the Bolus Herbarium 4: 45 (1926). Type: South Africa, [Western Cape], near Prince Albert, *Tugwell s.n. BOL13487* (BOL, holo.).

Plants 100–150(–200) mm high. *Corm* conical, 10–25 mm diam.; tunics of fine to coarse fibres. *Stem* suberect, simple or up to 3-branched. *Leaves* 6 to 8, lanceolate-falcate, 50–100 × (3–)5–10(–12) mm, acute or acuminate, margins undulate or crisped, cauline leaves smaller and often dry and bract-like. *Spike* sharply deflexed, horizontal, secund, densely 5- to 15-flowered; bracts small, dry and membranous, translucent or pale brown, lightly speckled in upper ½, outer 3–8 mm long, obtuse, acute or obscurely 3-toothed, inner slightly shorter, bifid. *Flowers* zygomorphic, suberect, white with red streaks in throat and small red or purple dot on lower 3 or only lower median tepal, unscented; perianth tube ± cylindric, curved outward above, (20–)25–30 mm long, widening gradually in upper 5 mm to ± 3 mm diam. and laterally compressed; tepals unequal, upper 3 largest, dorsal spreading and upper laterals reflexed, oblong-spathulate, 7–9 × 3–4 mm, lower 3 spreading, oblong, 6–8 × 2–3 mm, without calluses. *Filaments* unilateral and arcuate, 5–7 mm long, enclosed by upper part of gullet, scarcely exserted; anthers ± 3 mm long, lilac; pollen purple. *Style* dividing at or shortly beyond anther apices, branches 1.5–2.0 mm long. *Flowering time*: September.



Distribution of ***Tritonia tugwelliae***.

Distribution and ecology: local in the western Great Karoo in Western Cape, South Africa, between Laingsburg and Prince Albert; on dry stony flats, often in seasonal washes and drainage lines.

Diagnosis: a distinctive species with a remarkable superficial resemblance to *Freesia verrucosa*, and recognised by the fan of falcate, acuminate leaves with crisped or undulate margins and the dense, horizontal spike of long-tubed, white flowers with cylindric perianth tube 10–30 mm long, compressed in the gullet, with the upper lateral tepals sharply reflexed behind the spreading dorsal tepal.

Sect. 7. **Pectinatae** *M.P.de Vos* in Journal of South African Botany 48: 143 (1982). Type species: *Tritonia crispa* (L.f.) Ker Gawl. = *T. undulata* (Burm.f.) Baker

Leaves morphologically specialised through the development of one or more longitudinal flanges from the face or adaxial margin of the blade, the edges more-or-less revolute, either plane or crispulate-undulate, sometimes ciliolate or ciliate. *Spike* inclined to horizontal, secund and densely-flowered thus ± pectinate; bracts with dark, red-brown, crisped upper margins. *Flowers* zygomorphic, suberect, white or cream-coloured

to pink with red markings on lower tepals; perianth tube slender and subcylindric, much longer than tepals; lower tepals narrower than upper, without calluses but lowermost sometimes with slight median thickening in throat. *Stamens* arcuate, unilateral; anthers violet or purple. *Capsules* shortly ellipsoid, 5–7 mm long.

Species 3: mountians of Western Cape, South Africa.

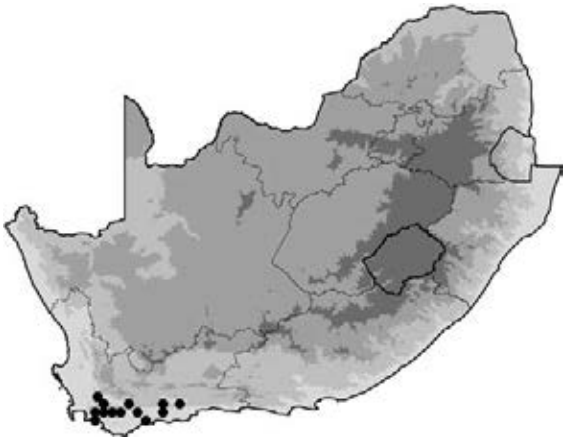
A group of three closely allied, allopatric species from fynbos habitats in the western mountains of Western Cape, all with pale, long-tubed flowers adapted to pollination by long-proboscid flies in the families Nemestrinidae and Tabanidae. The section is characterised by its distinctive leaf structure, the blade developing one or two longitudinal flanges from the lower margin and the upper face, these secondary elaborations assuming the appearance of the true margins. These 'false margins' are more-or-less inrolled and the leaf blade is thus variously involute on one or both faces. The bracts have dark reddish brown upper margins and the spikes are inclined or horizontal with the flowers closely arranged, thus comb-like in appearance. A fourth species from the western Great Karoo, *Tritonia tugwelliae*, with similar inflorescence and flowers was included here by De Vos (1982), but it has anatomically unspecialised plane leaves and smaller, unmarked bracts and is removed here to a separate section, *Pseudopectinatae*.

24. **Tritonia cooperi** *(Baker) Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 358 (1882). *Morphixia cooperi* Baker: 237 (1876). *Ixia cooperi* (Baker) Baker: 166 (1892). Type: South Africa, [Western Cape], Worcester District, *Cooper 1683* [K, lecto., designated by De Vos: 156 (1982)].

Gladiolus longiflorus L.f.: 96 (1782). *Hyalis longiflora* (L.f.) Salisb.: 318 (1812). *Freesea longiflora* (L.f.) Eckl.: 30 (1827), illegitimate name, genus invalid. *Waitzia longiflora* (L.f.) Kreysig: 52 (1829). *Babiana longiflora* (L.f.) Steud.: 686 (1840). *Montbretia longiflora* (L.f.) Voigt: 610 (1845). *Crocosmia longiflora* (L.f.) Klatt in W.C.H.Peters: 516 (1864). *Tritonia longiflora* (L.f.) N.E.Br.: 25 (1928), illegitimate homonym, not *T. longiflora* (P.J.Berg.) Ker Gawl. (1804a). *Tritonia longituba* R.C.Foster: 45 (1936), as a new name for *T. longiflora* (L.f.) N.E.Br. Type: South Africa, without precise locality, *Thunberg s.n.* [UPS-THUNB 1041, lecto., designated by De Vos: 156 (1982)].

Tritonia cooperi subsp. *quadrialata* M.P.de Vos: 157 (1982), new synonym. Type: South Africa, [Western Cape], Potberg, Bredasdorp, 16 Nov. 1965, *Tropper s.n.* (NBG [as STE], holo.).

Plants mostly 250–350 mm high. *Corm* conic, 15–30 mm diam.; tunics of fine fibres, often extending upward in a fibrous or papery collar. *Stem* suberect or flexed outward, simple or 1- or 2-branched. *Leaves* 5 to 8, suberect, linear and grooved or almost quadrangular to lanceolate with four longitudinal flanges, thus H-shaped in section, with long clasping base, (50–)100–200 × (0.5–)2.0–10.0(–20.0) mm, acute or acuminate, with prominent main vein, margins sometimes ciliolate, cauline leaves smaller, entirely sheathing. *Spike* suberect or deflexed, secund-pectinate, densely 5- to 10-flowered; bracts dry and membranous, sometimes greenish below, upper margins dark reddish brown, outer 5–10(–13) mm long, irregularly 3-toothed with median tooth smaller or slightly lacerate, upper margins crisped, inner subequal or slightly shorter, bifid. *Flowers* zygomorphic, sometimes inverted, cream- to pale apricot-coloured or pale to bright pink, lower tepals with a lozenge-shaped red or purple median marking sometimes with a yellow central stripe, unscented; perianth tube cylindric, widening gradually above, slightly curved, (30–)40–55 mm long, widening up to 5–8 mm diam.; tepals unequal, dorsal largest, suberect, obovate-spathulate, 12–18(–24) × 7–15(–20) mm, upper laterals spreading, 5–15 mm wide, lower 3 oblanceolate-spathulate, 4–9 mm wide, without calluses. *Filaments* unilateral and arcuate, 8–12(–16) mm long, inserted 2–3 mm from mouth of tube, exserted; anthers 4–6(–8) mm long, purple. *Style* dividing shortly below or above anther tips, branches 3–5(–7) mm long. *Capsules* shortly ellipsoid, ± 7 mm long. *Flowering time*: late mid-November to December.



Distribution of ***Tritonia cooperi***.

Distribution and ecology: restricted to the coastal plain and mountains of Western Cape, South Africa, from Du Toit's Kloof to Kogelberg and east across the Riviersonderend Mtns and Langeberg to Riversdale and the Potberg; on sandstone slopes in fynbos, flowering well after fire.

Diagnosis: distinguished from other species in sect. *Pectinatae* by the linear to lanceolate leaves that develop broad wings on the edges typically rendering them H-shaped in section. The wing edges are smooth or ciliolate. The flanges or wings are flattened when pressed, making it difficult to establish the form of the leaves in herbarium specimens. The species resembles *Tritonia undulata* closely in its flowers but lacks the inrolled and crisped or undulate leaf edges characteristic of that species. Plants from the Riviersonderend Mtns have

broader leaves with poorly or incompletely developed wings and look vegetatively remarkably like *T. lancea* but the flowers are clearly bilabiate with longer tubes, 30–55 mm long.

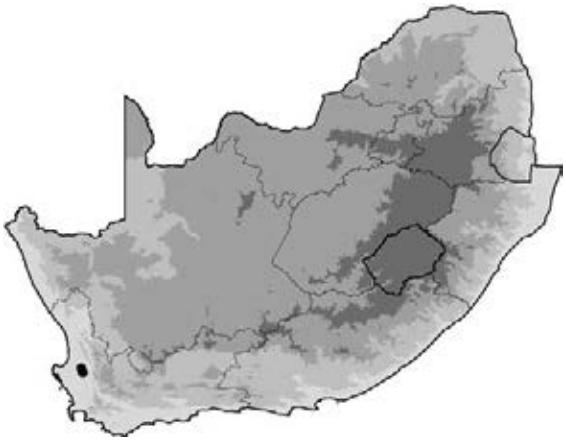
Plants with broader leaves 6–10 mm wide from the coastal plain and lower mountain slopes between Betty's Bay and Cape Infanta were segregated by De Vos (1982) as subsp. *quadrialata*. Exceptionally broad-leaved plants have been collected from the Riviersonderend and Potberg ranges but these represent the extreme in a more-or-less continuous range of variation.

25. **Tritonia lancea** *(Thunb.) N.E.Br.* in Journal of the Linnean Society of London, Botany 48: 48 (1928). *Ixia lancea* Thunb.: 18 (1783). *Montbretia lancea* (Thunb.) Endl. ex Heynh.: 417 (1847). Type: South Africa, [Western Cape], below Piketberg, *Thunberg s.n.* (UPS-THUNB 963, holo.).

Ixia pectinata Vahl: 62 (1805). *Waitzia pectinata* (Vahl) Heynh.: 855 (1841). *Montbretia pectinata* (Vahl) Heynh.: 418 (1847). *M. lacerata* var. *pectinata* (Vahl) Baker: 168 (1877). *Tritonia crispa* var. *pectinata* (Vahl) Baker: 192 (1892). Type: South Africa, [Western Cape], without precise locality or collector (C-Herb. Vahl, holo.).

Plants mostly 150–250 mm high. *Corm* conic, 10–20 mm diam.; tunics of fine-textured fibres, often extending upward in a fibrous or papery collar. *Stem* flexed outward, then suberect, often flexuose, simple. *Leaves* 5 to 7, suberect, linear-lanceolate to lanceolate, with long clasping base, often contracted above sheath into filiform, petiole-like portion up to 100 mm long, 30–120 × 2–7(–10) mm, acute or acuminate, slightly concave with margins curved inward, often ciliate, with prominent main vein raised on concave surface, cauline leaves smaller, entirely sheathing. *Spike* suberect or deflexed, secund-pectinate, densely 2- to 7-flowered; bracts dry-membranous, sometimes greenish and leathery below, upper margins dark reddish brown, outer 7–10(–12) mm long, irregularly 3-toothed with median tooth smaller or slightly lacerate, crisped upper margins crisped, inner subequal or slightly shorter, bifid. *Flowers* zygomorphic, almost salver-shaped, sometimes inverted, white flushed red on reverse of tepals, lower tepals with 2 short red lines near base, unscented; perianth tube cylindric, (17–)20–25 mm long, widening up to 5 mm diam.; tepals subequal but upper 3 broader, oblanceolate or oblong, 12–18 × 7–10 mm, lower 5–7 mm wide, without calluses. *Filaments* unilateral, arcuate, 6–7 mm long, inserted 2–3 mm from mouth, shortly exserted; anthers ± 5 mm long, purple. *Style* 22–30 mm long, dividing opposite upper ½ of anthers, branches 3–4 mm long. *Capsules* shortly ellipsoid, 5–7 mm long. *Flowering time*: late August to September.

Distribution and ecology: a local endemic of upper elevations of the Piketberg in Western Cape, South Africa; on sandstone slopes in fynbos, flowering mainly after fire.



Distribution of ***Tritonia lancea***.

Diagnosis: distinguished from the other members of sect. *Pectinatae* by its linear-lanceolate leaves with slightly concave blade with margins inrolled but never crisped, and by its salver-shaped flowers with relatively short tube up to 25 mm long, spreading, subequal tepals, the lower three slightly smaller and marked with two short red lines near the bases, and short filaments 6–7 mm long. Both *Tritonia undulata*, with crisped leaf margins, and *T. cooperi* with winged leaf margins, have more markedly bilabiate flowers with longer tubes, usually more than 30 mm long, and filaments 8–12 mm long.

26. **Tritonia undulata** *(Burm.f.) Baker* in Journal of the Linnean Society, Botany 16: 163 (1877). *Ixia undulata* Burm.f.: 1 (1768). *Tritonixia undulata* (Burm.f.) Klatt: 357 (1882). Type: South Africa [Western Cape], without precise locality, collector unknown (G-BU, holo.).

Gladiolus crispus L.f.: 94 (1782). *Tritonia crispa* (L.f.) Ker Gawl.: t. 678 (1803c). *Freesea crispa* (L.f.) Eckl.: 30 (1827), illegitimate name, genus invalid. *Waitzia crispa* (L.f.) Kreysig: 52 (1829). *Montbretia crispa* (L.f.) Voigt: 610 (1845). *Acidanthera crispa* (L.f.) Pax: 155 (1887). Type: South Africa, [Western Cape], without precise locality, *A. Sparrman s.n.* (LINN 59.18, holo.).

Tritonia crispa var. *parviflora* Baker: 192 (1892). Type: South Africa [Western Cape], Winterhoek, Tulbagh, *C.L. Pappe s.n.* (K, holo.).

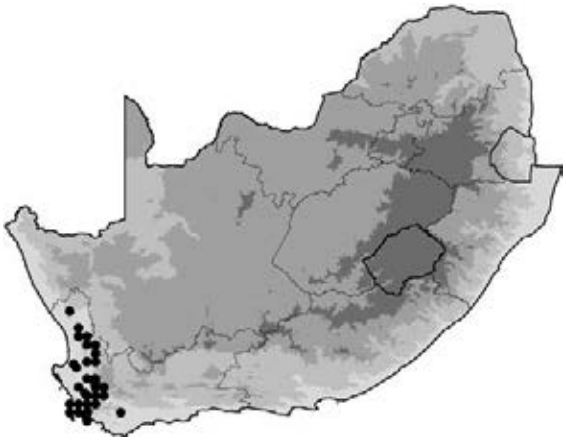
Tritonia crispa var. *grandiflora* Baker: 192 (1892). Type: South Africa [Western Cape], foot of Table Mt. below Kasteelpoort, Oct. 1883, *MacOwan 2389* (K, lecto., designated here).

Plants mostly 250–350 mm high. *Corm* conical, 10–20(–30) mm diam.; tunics of fine-textured fibres, often extending upward in a fibrous or papery neck. *Stem* suberect or flexed outward, simple or with up to 3 branches. *Leaves* 5 to 8, suberect, lanceolate to sword-shaped, with long clasping base, (50–)100–200 × (5–)10–15(–25) mm, acute or acuminate, plane with prominent main vein,

margins crisped to undulate and often ciliate, cauline leaves smaller and entirely sheathing. *Spike* suberect or inclined, secund-pectinate, densely 4- to 12-flowered; bracts dry and membranous, sometimes greenish below, upper margins dark reddish brown, outer (5–)7–12(–15) mm long, irregularly 3-toothed with median tooth smaller or slightly lacerate, upper margins crisped, inner ± equal or slightly shorter, bifid. *Flowers* zygomorphic, sometimes inverted, cream-coloured to pale yellow or shell-pink to bright or salmon-pink, lower tepals with a lozenge-shaped red or purple median marking sometimes with a yellow central stripe, unscented; perianth tube cylindric, (20–)40–60(–85) mm long, slightly curved, widening up to ± 7 mm diam.; tepals unequal, upper 3 largest, spreading, obovate-spathulate, (12–)15–20(–25) × 5–13 mm, lower 3 spreading, oblanceolate, 3–10 mm wide, without calluses. *Filaments* unilateral, arcuate, 8–12 mm long; anthers 3–6 mm long, purple. *Style* (32–)40–70(–85) mm long, dividing shortly below or above anther tips, branches 3–6 mm long. *Capsules* shortly ellipsoid, ± 7 mm long. *Flowering time*: late September to November.

Distribution and ecology: widespread along the lower slopes of the western mountains of Western Cape, South Africa, from Gifberg to Gordon's Bay; on stony sandstone slopes in fynbos, flowering stimulated by fire.

Diagnosis: distinguished in sect. *Pectinatae* by the plane, lanceolate to sword-shaped leaves with closely crisped and undulate, often ciliate margins. The only other species with crisped leaves and long-tubed flowers, *Tritonia tugwelliae* from the western Great Karoo, has plane, falcate leaves and uniformly pale bracts, thus evidently not immediately related to the species of sect. *Pectinatae* in which it was once included.



Distribution of ***Tritonia undulata***.

The length of the perianth tube in *Tritonia undulata* varies widely across its range, with a trend for longer tubes, 60–85 mm long, in populations in the north and west, from the Olifants River Valley along the coast to the Cape Peninsula, and shorter tubes, 22–50 mm, inland and to the south, from Tulbagh to Gordon's Bay. This pattern presumably reflects variation in proboscis length of the local pollinators, species of long-proboscid, nemestrinid or tabanid flies.

Sect. 8. **Subteretifoliae** *J.C.Manning & Goldblatt*, new section. Type species: *Tritonia bakeri* Klatt

Leaves compressed-cylindric or subterete, firm-textured, with several strands of sclerenchyma, appearing striate when dry; anatomically with marginal vein and associated sclerenchyma bundle present, lacking thickened marginal epidermal cells. *Spike* erect, moderately dense; bracts dry and papery, brown in upper ½. *Flowers* weakly zygomorphic, white to pink, somewhat salver-shaped; perianth tube subcylindric, ± twice as long as tepals, lower tepals without calluses. *Stamens* unilateral but suberect and almost central, inserted near top of tube; anthers violet. *Capsules* obovoid, 10–12 mm long.

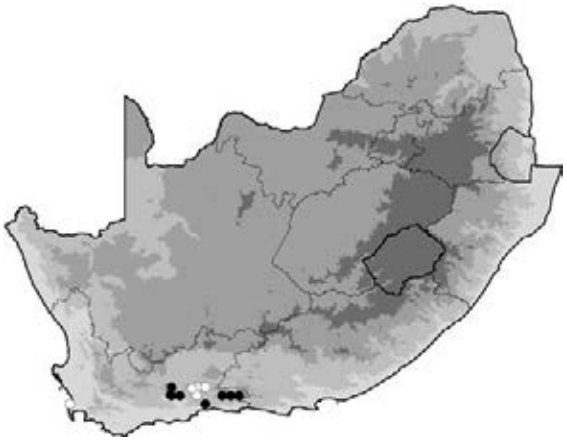
Species 1: southern Western Cape, South Africa.

A monospecific section erected here for *Tritonia bakeri*, which was previously associated by De Vos (1982, 1983) with other species with pale, long-tubed flowers segregated here as sect. *Pallidae*. It differs markedly from them in its centric, subterete or compressed-terete leaves without an evident main vein and anatomically lacking a true margin, and in its subactinomorphic, salver-shaped flowers with almost central stamens lying above the dorsal tepal.

27. **Tritonia bakeri** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 358 (1882), as a new name for *Montbretia striata* Sol. ex Baker: 337 (1876), illegitimate homonym, not *M. striata* (Jacq.) Heynh. (1847). *T. striata* Klatt: 208 (1894), illegitimate homonym, not *T. striata* (Jacq.) Ker Gawl. Type: South Africa, 'Promont. b. Spei.', *Masson & Oldenburg s.n.* (BM, holo.).

[*Gladiolus striatus* Sol. ex Baker: 337 (1876), invalid name only in synonymy.]

Plants mostly 300–500 mm high. *Corm* subglobose, 15–30 mm diam., sometimes deep-seated; tunics of fine-textured fibres, extending into a thick, fibrous collar. *Stem* simple or with up to 2 suberect or weakly spreading branches. *Leaves* 5 to 8, ± erect, firm, compressed-cylindric or ± terete, (150–)200–300(–600) × 1–2(–3) mm, acute, striate with translucent veins when dry but without evident thickened main vein, sometimes as long as stem, cauline leaves dry and clasping, bract-like. *Spike* erect or arching, rather lax, (3–)6- to 10-flowered; bracts dry and



Distribution of ***Tritonia bakeri*** subsp. ***bakeri***, ●; subsp. ***lilacina***, ○.

papery, pale and translucent below and brown speckled dark brown at tips, outer (6–)10–15(–18) mm long, obtuse or ± 3-toothed with median tooth sometimes reduced, inner subequal, bifid. *Flowers* weakly zygomorphic, nodding, inverted, white to cream-coloured or pink to pale pink to rose-pink, darkly veined, unscented; perianth tube cylindric, curving outward, (20–)30–45(–55) mm long, slender, widening in upper 6–8 mm to 5–7 mm diam.; tepals subequal or outer, especially dorsal, wider, spreading, oblong to oblanceolate, (15–)20–25(–30) × (5–)7–10 mm but dorsal 8–14 mm wide, without calluses. *Filaments* unilateral, ± horizontal, (8–)15–20(–25) long, exserted; anthers 5–10 mm long, facing upward through inversion of flower, purple or cream; pollen violet or cream-white. *Style* dividing opposite upper ½ of anthers, branches 3–5 mm long. *Capsules* obovoid, 10–12 mm long. *Flowering time*: October to early December.

Distribution and ecology: restricted to the central and eastern Little Karoo, from Ladismith in Western Cape to the upper Long Kloof east of Avontuur in Eastern Cape, South Africa; on stony lower slopes, mainly on clay.

Diagnosis: readily recognised among the pale-flowered, long-tubed species of *Tritonia* by its slender, straight leaves, terete to elliptic in section without an evident main vein, and almost symmetrical, salver-shaped perianth with a slender, curved tube, the flowers tilted backward so that the anthers face upwards. The long-tubed species of sect. *Pectinatae* have plane leaves with a thickened main vein and zygomorphic, bilabiate flowers facing outward, with arcuate stamens held under the arching to horizontal dorsal tepal.

Populations from the southern foothills of the Swartberg between Calitzdorp and De Rust typically have pale to rose-pink but sometimes white flowers with a slightly shorter perianth tube and sometimes smaller tepals than the typical form. Treated as subsp. *lilacina*, they may represent a local pollination ecotype.

Key to subspecies

1a Flowers white to cream; perianth tube (30–)40–50(–65) mm long; tepals 18–25(–30) × 7–12 mm . . . . . 27a. subsp. *bakeri*

1b Flowers pale to rose-pink, rarely white; perianth tube 20–30(–35) mm long; tepals 15–22(–25) × 5–8(–10) mm . . . . . 27b. subsp. *lilacina*

27a. subsp. **bakeri**

Flowers white to cream; perianth tube (30–)40–50(–65) mm long; tepals 18–25(–30) × 7–12 mm.

Distribution and ecology: extending from the central Little Karoo near Ladismith across the Rooiberg to the northern slopes of the Outeniqua Mtns and in the upper Long Kloof between Avontuur and Haarlem.

Diagnosis: recognised by its white to cream-coloured flowers with a longer perianth tube, mostly more than 30 mm long and up to 65 mm long.

27b. subsp. **lilacina** *(L.Bolus) M.P.de Vos* in Journal of South African Botany 49: 358 (1983). *Tritonia lilacina* L.Bolus: 161 (1918). Type: South Africa, [Western Cape], exhibited at the Cape Town Wild Flower Show among plants sent from Riversdale, without precise locality or collector, *BOL13755* (BOL, holo.).

Flowers pale to rose-pink, usually with dark veins, rarely white; perianth tube 20–30(–35) mm long; tepals 15–22(–25) × 5–8(–10) mm.

Distribution and ecology: restricted to the southern foothills of the Swartberg between Calitzdorp and De Rust.

Diagnosis: distinguished by its pale to rose-pink (rarely white) flowers with shorter perianth tube, mostly 20–30 mm long. Flowering is somewhat earlier than in subsp. *bakeri*.

Sect. 9. **Deserticolae** *J.C.Manning & Goldblatt*, new section. Type species: *Tritonia marlothii* M.P. de Vos

Leaves linear to falcate, slightly succulent, with main vein and sometimes an additional secondary vein translucent, margins also translucent; anatomically with marginal vein and associated sclerenchyma bundle, lacking thickened marginal epidermal cells. *Spike* erect, lax or dense; bracts ± green, leathery. *Flowers* weakly zygomorphic, ± salver-shaped, pale yellow or mauve; perianth tube subcylindric, much longer than tepals; lower tepals puberulous in lower ½, with small obliquely peg-like callus toward base. *Stamens* arcuate,

unilateral; anthers pale. *Capsules* subglobose, 5–10 mm long. *Basic chromosome number x* = 10.

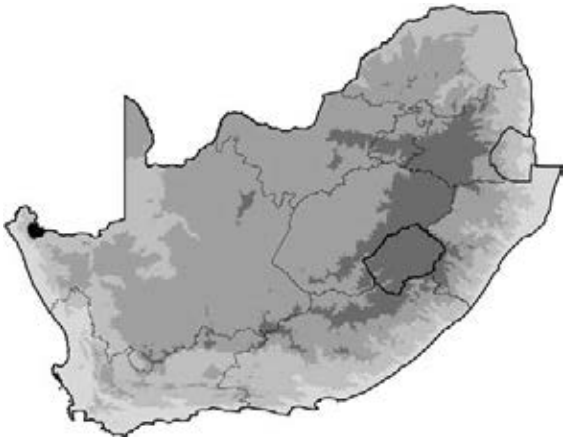
Species 2: winter-rainfall northwestern Northern Cape, South Africa.

A section of two closely allied species from the Richtersveld and northern Bushmanland, distinguished by their subsucculent leaves with only the midvein and sometimes one additional vein evident and with translucent margins representing a marginal bundle and associated sclerenchyma strand, thus lacking the thickened marginal epidermis typical of the genus. The bracts are ± entirely green and leathery, later becoming dry from the tips, and the long-tubed, bilabiate or almost salver-shaped flowers are unique in the genus in having the lower tepals finely puberulous on the upper surface. The lower 3 tepals each bear a small, wedge-shaped or obliquely peg-like callus less than 1 mm high.

The two species were included in sect. *Subcallosae* by De Vos (1982) but are distinctive in several features, notably the subsucculent leaves without thickened marginal epidermis, green bracts, puberulous lower tepals, and derived chromosome number.

28. **Tritonia delpierrei** *M.P.de Vos* in Journal of South African Botany 49: 403 (1983). *T. marlothii* subsp. *delpierrei* (M.P.de Vos) M.P.de Vos: 121 (1999). Type: South Africa, [Northern Cape], Richtersveld, top of Helskloof, *De Vos 2462* (NBG [as STE], holo.).

Plants 200–350 mm high. *Corm* moderately deep-seated, subglobose, 15–30 mm diam.; tunics of fine–moderately coarse-textured fibres, extending into a fibrous and papery collar. *Stem* flexed outward near base then suberect, simple or with up to 3 suberect branches. *Leaves* 5 to 7, linear to narrowly lanceolate or falcate, slightly succulent, 50–120 × (1.5–)2.0–4.0 mm, acuminate, with translucent main vein and sometimes 1 additional vein, margins translucent, cauline leaves bract-like and often dry. *Spike* erect, almost 2-ranked, rather lax, 5- to 9-flowered; bracts green and leathery becoming dry and membranous above or dry entirely, margins membranous, brown, speckled dark brown at tips, outer 5–10 mm long, 2- or 3-toothed or subacute, inner ± equal or slightly shorter, bifid. *Flowers* weakly zygomorphic, ± salver-shaped, sometimes inverted, cream-coloured or creamy yellow, lower tepals paler, lightly sweet-scented; perianth tube subcylindric to narrowly funnel-shaped, 12–22 mm long, widening gradually from near middle to 2 mm diam.; tepals subequal, elliptic, spreading but dorsal initially suberect, 8–12 × 3–5 mm, lower tepals puberulous, each with small, obliquely peg-like callus 0.5 mm high. *Filaments* unilateral, arcuate, 5–7 mm long, shortly exserted; anthers 3–5 mm long, pale yellow; pollen cream. *Style* 18–25 mm long, dividing between middle and tips of anthers, branches 1.5–2.0 mm long. *Capsules* subglobose, 5–10 mm long. *Flowering time*: late July to early October, depending on the rains.



Distribution of ***Tritonia delpierrei***.

Distribution and ecology: endemic to the Richtersveld in Northern Cape, South Africa, from Helskloof to Eksteenfontein; in light clay, loam or gravelly soils, sometimes among quartzite pebbles.

The sweetly scented flowers are probably adapted to pollination by long-tongued bees.

Diagnosis: closely allied to the largely sympatric *Tritonia marlothii*, with which it shares similar narrow, leathery leaves without evident secondary veins and spikes of long-tubed flowers with short, often largely herbaceous bracts and unusual lower tepals minutely puberulous on the upper surface. They are distinguished by details of the flowers, *T. delpierrei* having fragrant, pale creamy yellow flowers with a perianth tube 12–22 mm long and *T. marlothii* with odourless, pale to deep purple flowers with a longer tube 28–42 mm long.

29. **Tritonia marlothii** *M.P.de Vos* in Journal of South African Botany 49: 406 (1983). Type: South Africa, [Northern Cape], Richtersveld, *Marloth 12296* (BOL, holo.; PRE, iso.).

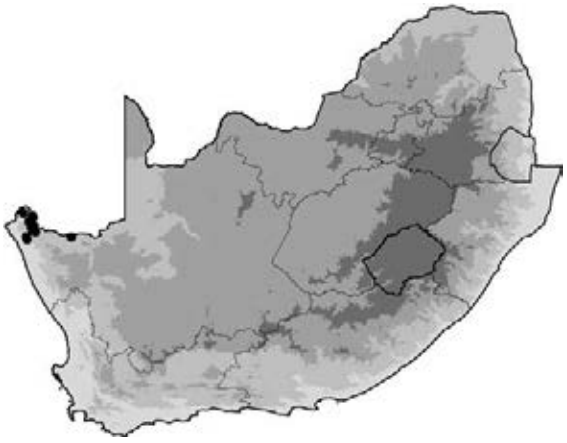
Plants 200–350 mm high. *Corm* not seen. *Stem* flexed outward near base then suberect, simple or with up to 3 suberect branches. *Leaves* 5 to 7, linear to narrowly lanceolate or falcate, slightly succulent, 50–120 × 1.5–4.0 mm, acuminate, with translucent main vein and sometimes 1 additional vein, margins translucent, cauline leaves bract-like and often dry. *Spike* erect, nearly 2-ranked, rather lax to dense, 5- to 12-flowered; bracts green and leathery becoming dry and membranous above or entirely, brown and speckled dark brown at tips, outer 7–12 mm long, margins membranous, 2- or 3-toothed or subacute, inner subequal or slightly shorter, bifid. *Flowers* weakly zygomorphic, almost salver-shaped, mauve to violet, lower tepals pale creamy yellow in lower ½ with median purple blotch, unscented; perianth tube subcylindric, 28–42 mm long, widening gradually to 2 mm diam.; tepals subequal, spreading, elliptic to obovate, 8–12 × 3–5(–6) mm, lower tepals puberulous and each with small, obliquely peg-like

callus 0.5–0.8 mm high. *Filaments* unilateral, arcuate, 6–8 mm long, exserted 3–5 mm; anthers 3–5 mm long, pale; pollen cream. *Style* 32–45 mm long, dividing between base and middle of anthers (or shortly below them), branches 1.5–2.0 mm long. *Capsules* subglobose, 6–10 mm long. *Flowering time*: late August to November, depending on the rains.

Distribution and ecology: centred in the Richtersveld in Northern Cape, South Africa, mainly north of Eksteenfontein, with an outlying population on the Abbasasberg in northern Bushmanland; on rocky slopes and outcrops with the corms often wedged in cracks and fissures.

The long-tubed flowers are adapted to pollination by the long-proboscid nemestrinid fly *Prosoeca peringueyi* (Manning & Goldblatt, 1996).

Diagnosis: *Tritonia marlothii* is closely allied to *T. delpierrei,* also from the Richtersveld, and shares with it similar narrow, leathery leaves without evident secondary veins and spikes of long-tubed flowers with short, often largely green bracts and unusual lower tepals minutely puberulous on the upper surface, especially toward the base. The two species are distinguished by the flowers, *T. marlothii* having odourless, pale to deep purple flowers with a perianth tube 28–42 mm long and style branching between the base and middle of the anthers, and *T. delpierrei* having fragrant, pale creamy yellow flowers with a perianth tube 12–22 mm long and style dividing between the middle and apex of the anthers. Plants of the disjunct population in Bushmanland differ in their smaller size, softer-textured leaves and flowers with slightly broader, obovate tepals, the style branching shortly below the anthers.



Distribution of ***Tritonia marlothii***.

Sect. 10. **Teretifoliae** *M.P.de Vos* in Journal of South African Botany 48: 159 (1982). Type species: *Tritonia kamisbergensis* Eckl. ex Klatt

Corm deeply seated with matted tunics accumulating in a long, fibrous collar. *Leaves* longer than inflorescence, terete or subterete, wiry, striate with several strands of sclerenchyma, appearing closely ribbed when dry; anatomically with marginal vein and associated sclerenchyma bundle present, lacking thickened marginal epidermal cells. *Spike* erect, lax; bracts small, green and leathery in lower ½. *Flowers* zygomorphic; perianth tube obliquely funnel-shaped, twice as long as tepals; lower tepals without calluses. *Stamens* arcuate, unilateral. *Capsules* subglobose, 5–10 mm long.

Species 1: Namaqualand in Northern Cape, South Africa.

A monotypic section including only *Tritonia kamisbergensis* from the Kamiesberg in central Namaqualand, Northern Cape, without evident affinities and characterised by the long, striate, wiry leaves, and the partially leathery bracts. The leaves are centric and lack the specialised, thickened marginal epidermal cells typical of the genus. In this respect they resemble those of *T. bakeri*, *T. delpierrei* and *T. marlothii*, but in these species the leaves are subsucculent and in *T. bakeri* markedly sclerified or fibrous. The corms of *T. kamisbergensis* are exceptionally deep-seated, with the old tunics accumulating as a dense, matted covering. The dark ruby-red or purple flowers are remarkably *Freesia*-like in appearance.

30. **Tritonia kamisbergensis** *Eckl. ex Klatt* in Linnaea 32: 760 (1864). *Montbretia kamisbergensis* (Eckl. ex Klatt) Baker: 169 (1877). *Tritonixia kamisbergensis* (Eckl. ex Klatt) Klatt: 356 (1882). Type: South Africa, [Northern Cape], 'Kamiesbergen' [Kamiesberg], *Ecklon & Zeyher Irid 109* (B, holo.; G, MO, S, SAM, iso.).

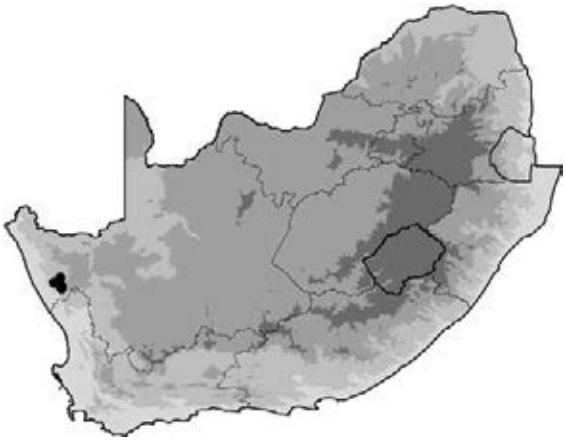
[*Freesea kamisbergensis* Eckl., unpublished name. in herb. S]

Plants 300–700 mm high, forming dense tufts. *Corm* deep-seated, obliquely subglobose, 20–30 mm diam.; tunics of moderately coarse fibres forming thickly matted layers, extending in a thick, fibrous collar. *Stem* simple or with up to 2 suberect branches. *Leaves* 6 to 8, wiry, terete to elliptic in section, 600–700 × 1–3 mm, acuminate, striate with translucent veins and margins, often longer than stem, cauline leaves bract-like, often dry. *Spike* erect, 2-ranked, rather lax, 4- to 12-flowered; bracts green, leathery becoming membranous and dry above, margins membranous, brown and speckled dark brown at tips, 5–8 mm long, outer acuminate or ± 3-toothed with median tooth largest, inner bifid. *Flowers* zygomorphic, bilabiate, sometimes inverted, bright ruby-red or purple, lower tepals with white median patch, unscented; perianth tube obliquely funnel-shaped, 16–20 mm long with basal tubular portion ± 5 mm long, widening obliquely to ± 8 mm diam.; tepals unequal, dorsal largest, suberect,

hooded, subrotund, 9–12 × 8–10 mm, others oblong to obovate, obtuse, 7–9 × 6–9 mm, inner wider than outer, lower 3 recurved, without calluses. *Filaments* unilateral, arcuate, 12–15 mm long, shortly exserted; anthers 4–6 mm long, violet; pollen cream. *Style* (18–)20–25 mm long, dividing opposite middle of anthers, branches 1.5–2.0 mm long. *Capsules* subglobose, 5–10 mm long. *Flowering time*: November to early December.

Distribution and ecology: a local endemic restricted to middle and upper elevations of the Kamiesberg in Northern Cape, South Africa; in renosterveld scrub with the corms deeply wedged in fissures in granite outcrops.

Diagnosis: a very distinct species with long, striate, firm-textured, terete or subterete leaves often taller than the inflorescence and with a dense fibrous collar around the base. The lax spikes bear zygomorphic, ruby-red or purple, somewhat *Freesia*-like flowers with a funnel-shaped perianth tube 16–20 mm long. The small, leathery bracts are dry and papery only near the tips.



Distribution of ***Tritonia kamisbergensis***.

UNCERTAIN SPECIES

Tritonia fulva Dehnh., Catalogus plantarum horti camalduensis, edn. 2: 24 (1832). Type not designated and identity unknown.

Tritonia lacerata (Burm.f.) Klatt in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 358 (1882). *Montbretia lacerata* (Burm.f.) Baker: 168 (1877). *Gladiolus laceratus* Burm.f.: 2 (1768). Type and identity unknown [Goldblatt & Manning: 59, 60 (2006)].

Tritonia magniflora Dehnh., Catalogus plantarum horti camalduensis, edn. 2: 24 (1832). Type not designated and identity unknown.

Tritonia tripunctata Dehnh., Catalogus plantarum horti camalduensis, edn. 2: 24 (1832). Type not designated and identity unknown.

REFERENCES

AITON, W. 1789. *Hortus Kewensis*, vol. 1. Nicol, London.

AITON, W.T. 1810. *Hortus Kewensis*, edn. 2, vol. 1. Longmans, London.

ANDREWS, H.C. 1799. *Ixia crocata* var. *nigromaculata*. *The Botanist's Repository* 2: t. 134.

BAKER, J.G. 1875. *Montbretia laxifolia*. *Transactions of the Linnean Society of London* 29: 155, t. 101A.

BAKER, J.G. 1876. New species of Ixieae. *Journal of Botany, British and foreign* 14: 236, 237.

BAKER, J.G. 1877. Systema Iridacearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell, London.

BAKER, J.G. 1901. Iridaceae. *Bulletin de l'Herbier Boissier*, sér. 2, vol. 1: 862–868.

BAKER, J.G. 1904. Iridaceae. *Bulletin de l'Herbier Boissier*, sér. 2, vol. 4: 1003–1007.

BOLUS, L. 1918. Novitates Africanae. *Annals of the Bolus Herbarium* 2: 153–161.

BOLUS, L. 1925. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 1–30.

BOLUS, L. 1926. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 37–55.

BOLUS, L. 1927. Novitates Africanae. *Journal of Botany, British and foreign* 67: 133.

BOLUS, L. 1929. Plants—new and noteworthy. *Montbretiopsis*. *South African Gardening and Country Life* 19: 215.

BROWN, N.E. 1914. Diagnoses Africanae: LVIII. *Bulletin of Miscellaneous Information, Kew* 1914: 132–137.

BROWN, N.E. 1928. The South African Iridaceae of Thunberg's Herbarium. *Journal of the Linnean Society of London, Botany* 48: 15–55.

BROWN, N.E. 1929. The Iridaceae of Burmann's *Florae capensis prodromus*. *Bulletin of Miscellaneous Information, Kew* 1929: 129–139.

BROWN, N.E. 1931. Decades Kewenses plantarum novarum in Herbario Horti Regnii Conservatorum. *Bulletin of Miscellaneous Information, Kew* 1931: 448–453.

BURMAN, N.L. 1768. *Prodromus florae capensis*. Cornelius Haek, Amsterdam.

CANDOLLE, A.P. de. 1803. *Montbretia*. *Bulletin des sciences, par la société philomatique de Paris* 3: 151.

CZERWIAKOWSKI, I.R. 1867. *Index seminum (Cracow) 1866*.

DEHNHARDT, F. 1832. *Catalogus plantarum horti camalduensis*, edn. 2. Naples.

DEHNHARDT, F. 1839. Di alcune piante notabili dell'Orto Camaldolese. *Rivista Napolitana* 1: 161–181.

DELAROCHE, D. 1766. *Descriptiones plantarum aliquot novarum*. Leiden.

DEL GUACCHIO, E., MANNING, J.C., MENALE, B. & CAPUTO, P. 2016. A posy of neglected *Tritonia* species (Iridaceae) from the erstwhile Garden of Camaldoli (Naples, Italy). *Taxon* 65: 1409–1414.

DE VOS, M.P. 1982. The African genus *Tritonia* Ker Gawler (Iridaceae): part 1. *Journal of South African Botany* 48: 105–163.
DE VOS, M.P. 1983. The African genus *Tritonia* Ker Gawler (Iridaceae): part 2. Sections *Subcallosae* and *Montbretia*. *Journal of South African Botany* 49: 347–422.
DE VOS, M.P. 1999. *Tritonia*. In G. Germishuizen, *Flora of southern Africa* 7 (2, 1) (Iridaceae: Ixioideae: Ixeae: Ixiinae and Tritoniinae): 89–127. National Botanical Institute, Pretoria.
ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.
ENDLICHER, S.L. 1842. *Catalogus horti academici Vindobonensis*, vol. 1. Gerold, Vienna.
FOSTER, R.C. 1936. Notes on nomenclature in Iridaceae. *Contributions from the Gray Herbarium of Harvard University* 114: 37–50.
FOURCADE, G.H. 1932. Contributions to the flora of the Knysna and neighbouring devisions. *Transactions of the Royal Society of South Africa* 21: 75–102.
GOLDBLATT, P. 1974. *Montbretiopsis* reduced to synonymy in *Tritonia* (Iridaceae). *Bothalia* 11: 281.
GOLDBLATT, P. & BARNARD, T.T. 1970. The Iridaceae of Daniel De la Roche. *Journal of South African Botany* 36: 291–318.
GOLDBLATT, P. & MANNING, J.C. 2006. Notes on the systematics and nomenclature of *Tritonia* (Iridaceae: Crocoideae). *Bothalia* 36: 57–61.
GOLDBLATT, P., DAVIES, T.J., MANNING, J.C., VAN DER BANK, M. & SAVOLAINEN, V. 2006. Phylogeny of Iridaceae subfamily Crocoideae based on a combined multigene plastid analysis. *Aliso* 22: 399–411.
HEYNHOLD, G. 1841. *Nomenclator botanicus hortensis*, vol. 2. Dresden and Leipzig.
HEYNHOLD, G. 1847 [‘1846’]. *Alphabetische und synonymische Aufzählung der Gewächse*. Dresden & Leipzig.
HOFFMANNSEGG, J.C. 1824. *Verzeichniss der Pflanzenkulturen, Nachtrag 3*. Dresden.
JACKSON, B.D. 1893–1895. *Index Kewensis*. Clarendon, Oxford.
JACQUIN, N.J. 1788–1795 [1786–1793]. *Icones plantarum rariorum*, vol. 2. C.F. Wappler, Vienna.
JACQUIN, N.J. 1791 [‘1789’]. *Collectanea*, vol. 3. C.F. Wappler, Vienna.
JACQUIN, N.J. 1797. *Plantarum rariorum horti caesarei schoenbrunnensis*, vol. 1. C.F. Wappler, Vienna.
KER GAWLER, J.B. 1802a. *Tritonia squalida*. *Curtis’s Botanical Magazine* 16: t. 581.
KER GAWLER, J.B. 1802b. *Tritonia capensis*. *Curtis’s Botanical Magazine* 17: t. 618.
KER GAWLER, J.B. 1803a. *Tritonia deusta*. *Curtis’s Botanical Magazine* 17: t. 622.
KER GAWLER, J.B. 1803b. *Tritonia miniata*. *Curtis’s Botanical Magazine* 17: t. 609.
KER GAWLER, J.B. 1803c. *Tritonia crispa*. *Curtis’s Botanical Magazine* 18: t. 678.
KER GAWLER, J.B. 1804a. *Tritonia fenestrata*. *Curtis’s Botanical Magazine* 19: t. 704.
KER GAWLER, J.B. 1804b [‘1805’]. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247. Taylor, London.
KER GAWLER, J.B. 1810. *Tritonia pallida*. *Curtis’s Botanical Magazine* 31: sub t. 1275.
KER GAWLER, J.B. 1813. *Tritonia capensis* var. *major*. *Curtis’s Botanical Magazine* 37: sub t. 1531.
KLATT, F.W. 1864. Revisio Iridearum. *Linnaea* 32: 689–784.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker’s Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
KLATT, F.W. 1894 [‘1895’]. Iridaceae. In Th. Durand & H. Schinz, *Conspectus florae africae* 5: 143–230. Jardin botanique de l’Etat, Bruxelles etc.
KREYSIG, F.L. 1829. *Verzeichniss der warmen und kalten Hauspflanzen, welche im den Garten des D. Kreysig in Dresden unterhalten werden*. Dresden.
LAMARCK, J.B.A.M. de. 1789. *Encyclopedie Methodique Botanique*, vol. 3. Paris.
LEWIS, G.J. 1941. Iridaceae. New genera and miscellaneous notes. *Journal of South African Botany* 7: 19–59.
LINK, J.H.F. 1821. *Enumeratio plantarum horti regnii berolinensis altera*, vol. 1. Georg Reimer, Berlin.
LINNAEUS, C. 1762. *Species plantarum*, edn. 2, vol.1. Stockholm.
LINNAEUS, C. fil. 1782 [‘1781’]. *Supplementarum plantarum*. Orphanotropheus, Brunswick.
MANNING, J.C. & GOLDBLATT, P. 1996. The *Prosoeca peringueyi* (Diptera: Nemestrinidae) pollination guild in southern Africa: long-tongued flies and their tubular flowers. *Annals of the Missouri Botanical Garden* 83: 67–86.
MANNING, J.C. & GOLDBLATT, P. 2011. *Tritonia cedarmontana* and *T. linearifolia* (Iridaceae: Crocoideae), two new species from the Cape Floristic Region; *T. lineata* var. *parvifolia* included in *T. gladiolaris*; and the correct author citation for *T. strictifolia*. *Bothalia* 41: 171–207.
MARLOTH, R. 1912. Some new South African succulents and other plants. Part IV. *Transactions of the Royal Society of South Africa* 2: 237–241.
MOENCH, C. 1794. *Methodus plantas horti botanici*. Marburg.
OBERMEYER, A.A. 1963. A new haemanthus and a new tritonia from southern Africa. *Kirkia* 3: 22–24.
PAX, F.A. 1887. Iridaceae. In H.G.A. Engler & K.A.E. Prantl, *Die natürlichen Pflanzenfamilien* 5: 137–158.
PERSOON, C.H. 1805. *Synopsis plantarum* 1. Cramer, Paris.
PETERS, W.C.H. 1864. *Naturwissenschaftliche Reise nach Mossambique*. Goerg Reimer, Berlin.
PLANCHON, J.E. 1851. *Crocosmia aurea*. *Flore des serres et des jardins de l’Europe* 7: 161, 162.
RAFINESQUE, C.S. 1832. *Belendenia*. *Gardeners’ Magazine London* 8: 245.
REDOUTÉ, P.J. 1804a. *Les Liliacées*, vol. 1. Didot Jeune, Paris.
REDOUTÉ, P.J. 1804b. *Les Liliacées*, vol. 2. Didot Jeune, Paris.
REICHENBACH, H.G.L. 1828. *Conspectus regni vegetabilis,* vol. 1. Cnobloch, Leipzig.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium secundum*, vol. 1. J.G. Cotta, Stuttgart.
SALISBURY, R.A. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.
SCHLECHTER, R. 1907 [‘1908’]. Beiträge zur Kenntnis der Flora von Natal. *Botanische Jahrbücher für Systematik 40*: 89–96.
SEALY, J.R. 1963. *Montbretia watermeyeri* (L.Bolus) Sealy. *Curtis’s Botanical Magazine* NS 175: t. 428.
STEUDEL, E.G. 1840. *Nomenclator botanicus*, edn. 2, vol. 1. J.G. Cotta, Stuttgart.
STEUDEL, E.G. 1841. *Nomenclator botanicus*, edn. 2, vol. 2. J.G. Cotta, Stuttgart.
THUNBERG, C.P. 1783. *Dissertatio de Ixia*. Edman, Uppsala.
THUNBERG, C.P. 1803. In G.J. Hoffmann, *Phytographische Blätter*. Göttingen.
THUNBERG, C.P. 1823. *Flora capensis*, edn. 2. Cotta, Stuttgart.
VAHL, M.H. 1805. *Enumeratio plantarum*, vol. 2. Copenhagen.

VOIGT, J.O. 1845. *Hortus suburbanus calcuttensis*. Bishop's College Press, Calcutta.
WILLDENOW, C.L. 1809. *Enumeratio plantarum*, vol. 1. Berlin.
WORSLEY, A. 1905. New or noteworthy plants. *The Gardeners' Chronicle* 38: 269.
WORSLEY, A. 1906. New or noteworthy plants. *The Gardeners' Chronicle* 39: 2.

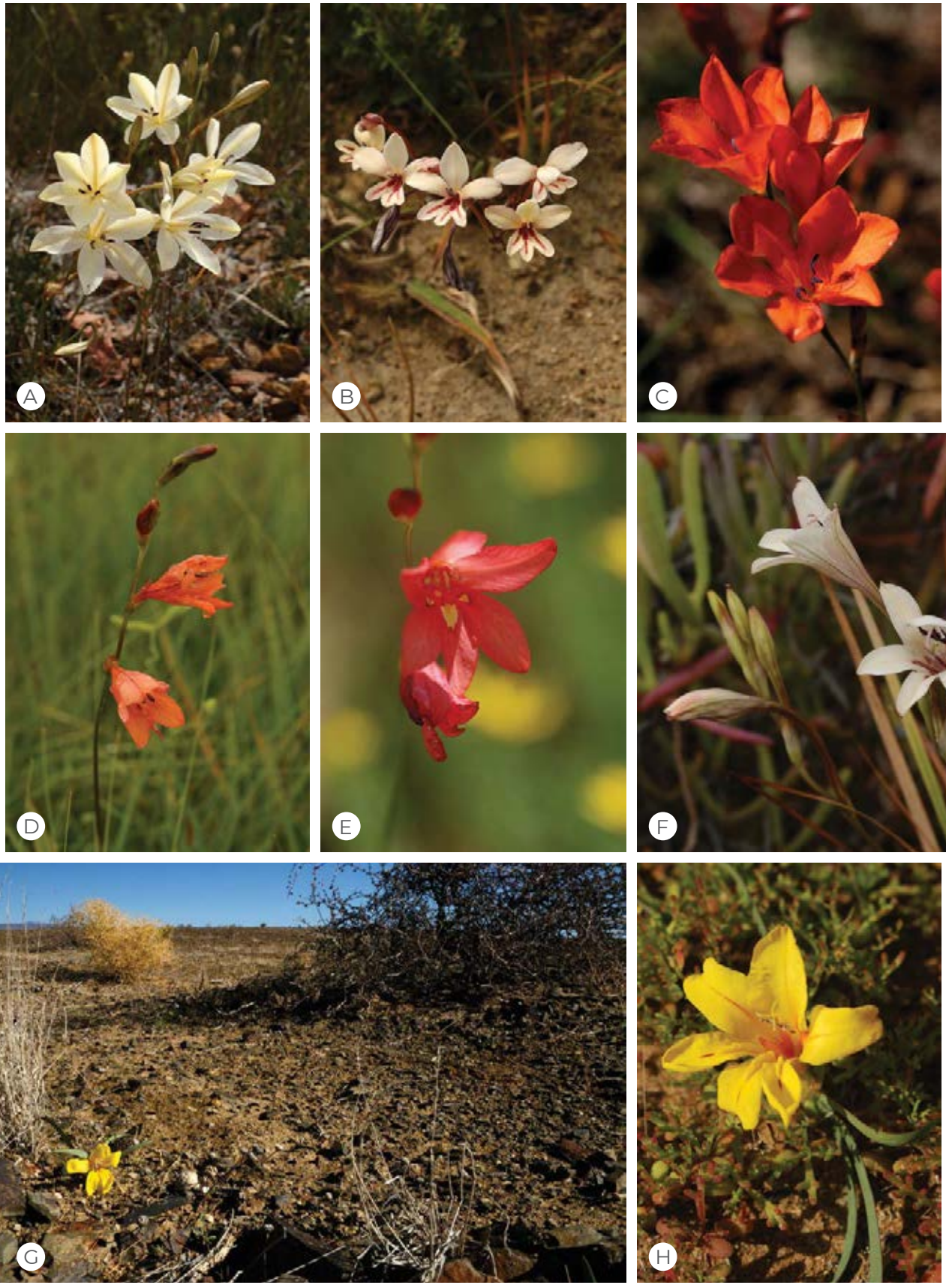


Plate 57. A, ***Tritonia bakeri*** subsp. ***bakeri***, Avontuur, EC; B, ***T. cooperi***, Malmesbury, WC; C, ***T. crocata***, Riversdale, WC; D, ***T. districha***, Karkloof, KZN; E, ***T. drakensbergensis***, Maclear, EC; F, ***T. flabellifolia***, Worcester, WC; G & H, ***T. florentiae***, Tanqua Karoo, WC.

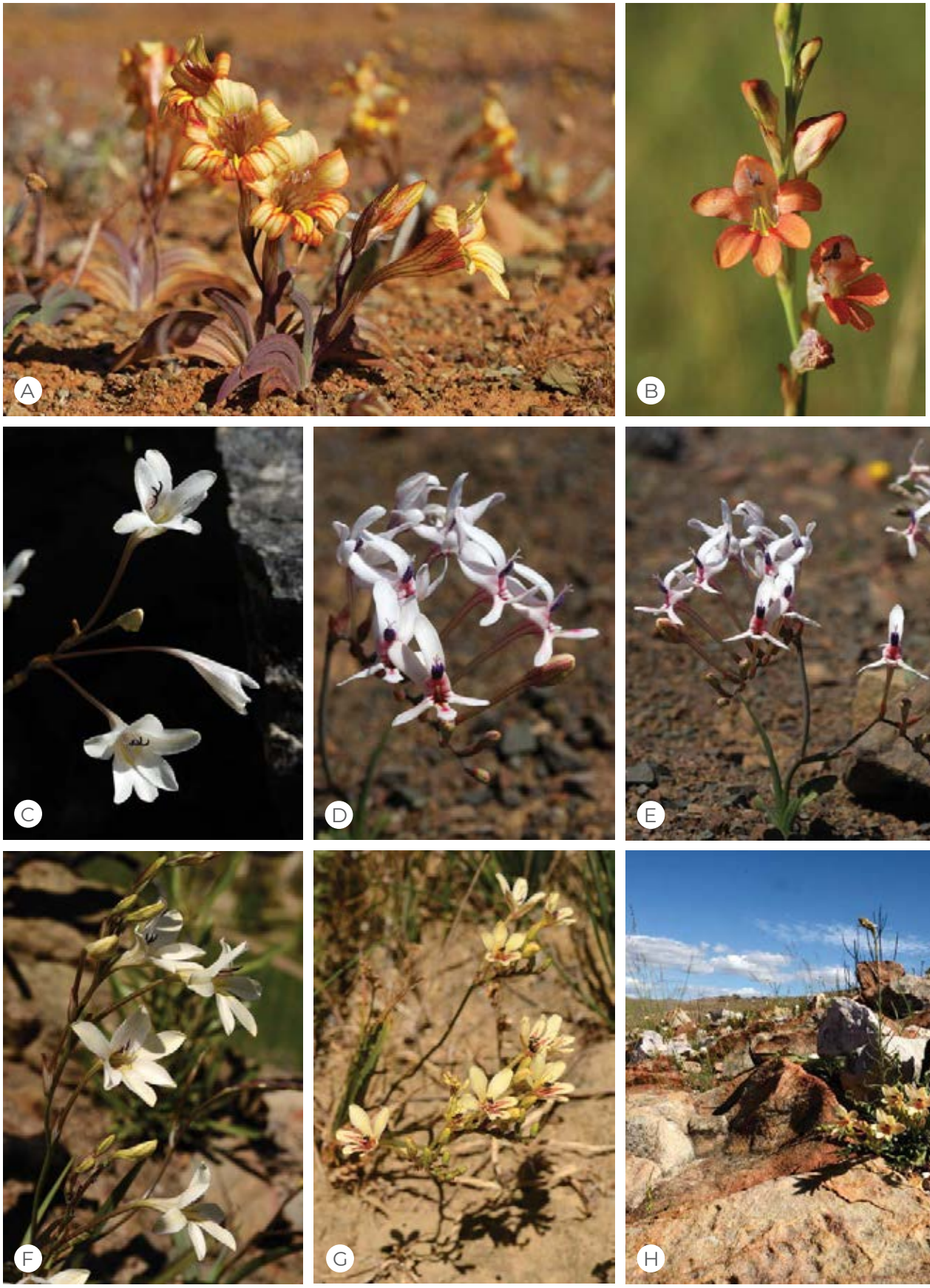


Plate 58. A, ***Tritonia karooica***, Middelpos, NC; B, ***T. laxifolia***, Somerset East, EC; C, ***T. linearifolia***, Kouga, EC; D & E, ***T. tugwelliae***, Merweville, WC; F, ***T. pallida***, Koo, WC; G, ***T. undulata***, Malmesbury ,WC; H, ***T. undulata***, Worcester, WC.

28. **Ixia**

Ixia *L.*, Species plantarum, edn. 2, 1: 51 (1762), conserved name. Type (conserved): *I. polystachya* L.

Houttuynia Houtt.: 448 (1780), rejected name, not *Houttuynia* Thunb. (1784). Type: *H. capensis* Houtt. = *Ixia paniculata* D.Delaroche

Morphixia Ker Gawl.:105 (1827). Type: *M. latifolia* (D. Delaroche) Ker Gawler = *Ixia latifolia* D.Delaroche

[*Dichone* Lawson ex Salisb.: 320 (1812), invalid name without description.]

[*Hyalis* Salisb.: 317 (1812), invalid name without description.]

Revisionary accounts: Lewis (1962); Goldblatt & Manning (2011: 83–134; 2012a: 87–110; 2016: 175–198).

From the Greek, *ixias*, the 'chameleon plant', originally the parasite *Loranthus*, possibly because of the sticky seeds, like a chameleon's tongue, but evidently applied arbitrarily by Linnaeus to an African genus of Iridaceae, at the time including species now referred to other genera.

Deciduous perennials. *Rootstock* a globose corm, rooting from below and axial in origin; tunics of fine to moderately coarse, netted fibres, sometimes with collar of fibres around base. *Stem* aerial, rarely subterranean, usually slender and wiry, terete, often branched. *Leaves* unifacial, with a definite main vein, usually plane, sword-shaped, falcate or linear, sometimes margins thickened, occasionally crisped or rarely winged, thus blade H-shaped in transverse section; marginal anatomy with undifferentiated epidermal cells and a subepidermal strand of sclerenchyma. *Inflorescence* a spike, flowers spirally arranged or in 2 ranks, often flexuose; bracts membranous, occasionally dry, usually translucent, short, outer usually 3-veined (or 1- or 5-veined), usually 3-toothed, inner smaller, 2-veined, 2-toothed or forked at apex. *Flowers* usually actinomorphic, rarely zygomorphic, variously coloured, pink, mauve or yellow, sometimes darker in the centre, occasionally fragrant, with nectar from septal nectaries or without nectar; perianth tube funnel-shaped or cylindric, short or elongate; tepals subequal, usually spreading. *Stamens* symmetrically disposed, rarely unilateral; filaments slender or somewhat flattened, sometimes included in tube, free or partly to entirely united; anthers linear to oblong, splitting longitudinally or sometimes incompletely from base, occasionally sharply bent above base. *Ovary* globose, sessile; style filiform, dividing into short to long, undivided, slender branches, either channelled and slightly broadened above, or tubular and stigmatic apically. *Capsules* globose, cartilaginous, smooth or slightly warty. *Seeds* globose or slightly angled, smooth or wrinkled, hard and shiny, with raphal vascular trace excluded. *Pollen grains* monosulcate-operculate with 1-banded operculum, exine perforate-scabrate. *Basic chromosome number x* = 10.

Species 100, South Africa, mainly in the winter-rainfall zone in the southwest but extending north into Namaqualand and east to Grahamstown.

Almost restricted to the southern African winter-rainfall region, *Ixia* is distinguished by the translucent, membranous floral bracts, the outer usually darkly 3-veined and 3-toothed, radially symmetric flowers except in a few instances and mostly narrow leaves and slender stems. The style branches are undivided, typical of Ixieae, but the pollen grains are exceptional in the tribe in having a 1-banded operculum (2-banded in all but a few species in related genera) and a basic chromosome number of $x = 10$, shared with the closely related genera *Dierama* and *Sparaxis*. Molecular studies show that these genera plus *Tritonia* are most closely related to *Ixia*. Within the genus important variation includes leaf number, consistent for species, perianth tube length and inclusion or not of the filaments or stamens within the perianth tube. Species are divided among four sections.

Sect. *Ixia* is distinguished by the narrow perianth tube, the walls clasping the style, and filaments inserted at the top of the tube and occluding the mouth. Most species of the section have contrasting, usually dark markings, at the bases of the tepals. Pollination is predominantly by hopliine beetle species. Sect. *Dichone* has the perianth tube like that of sect. *Ixia* but is separated by the tubular style branches with margins involute and stigmatic surfaces confined to tips. Several species of the section have short, ovoid anthers sometimes dehiscing incompletely from the base. So-called buzz-pollination has been recorded for *I. scillaris*.

Species of the remaining sections, *Hyalis* and *Morphixia* have a conventional hollow tube containing nectar at the base. Sect. *Hyalis* is distinguished by the presence of several leaves, the uppermost not entirely sheathing. Among its species, several have elongate perianth tubes, notably *Ixia paniculata*, and are pollinated by long-proboscid flies. Most members of sect. *Morphixia* have two basal leaves with expanded blades and a third one almost, or entirely sheathing the stem. Species of the *I. rapunculoides* group are distinguished in sect. *Morphixia* by the short stamens, the filaments and often the anthers included in the perianth tube. Most species are pollinated by large anthophorine bees or honey bees.

Key to sections

Notes: care must be taken in measuring floral parts of preserved specimens: depending on method of drying, the perianth can shrink as much as 30%. Presence of stolons is difficult to establish as they often become detached during collection unless corms are removed from the ground with particular care.

Measure filaments from point of insertion on perianth tube to base of anther, not to point of insertion above the anther base. For bracts measure those in the middle portion of the main spike (those at the base and near the apex of the spike are often longer or shorter than normal).

1a Style branches tubular with margins involute and stigmatic surfaces confined to tips of style branches; perianth tube filiform throughout and blocked by the style; anthers ovoid and short, sometimes dehiscing incompletely from base; flowers pink to mauve, pale violet (or white). . . . . 4. sect. *Dichone*
1b Style branches channelled with margins conduplicate below and stigmatic surfaces extending along distal half of style branches; perianth tube either filiform throughout and blocked by the style or funnel-shaped to cylindric and hollow above or throughout; anthers ± linear, dehiscing completely; flowers variously coloured:
2a Perianth tube filiform throughout with filaments inserted at mouth of tube; filament bases often expanded (tepals sometimes connate basally for a short distance); perianth brightly coloured, usually with dark centre. . . . . 2. sect. *Ixia*
2b Perianth tube funnel-shaped to cylindric and hollow throughout or filiform in lower part with filaments inserted within tube and decurrent; filament bases not expanded; perianth usually shades of pink or pale blue to white, occasionally brilliantly coloured and rarely with a dark centre:
3a Leaves 4 to 6(–10), with upper leaves partly sheathing stem and not sharply differentiated from lower leaves; plants sometimes acaulescent; perianth tube sometimes blocked by style in lower part . . . . . 1. sect. *Hyalis*
3b Leaves mostly 3 (sometimes 4 or 5, rarely only 2), with upper 1 (or 2) leaves almost or entirely sheathing and usually clearly differentiated from lower leaves; plants never acaulescent; perianth tube always hollow to base . . . . . 3. sect. *Morphixia*

Sect. 1. *Hyalis*

1a Plants acaulescent with flowers borne at ground level; leaves falcate or prostrate, without evident midrib:
2a Flowers uniformly yellow; perianth tube hollow, 15–20 mm long; style dividing opposite bases of free filaments . . . . . 7. *I. acaulis*
2b Flowers yellow with red-brown centre; perianth tube filiform, 35–45 mm long with apex blocked by bases of united filaments; style dividing opposite middle of anthers. . . . . 8. *I. macrocarpa*
1b Plants with an aerial stem; leaves falcate to upright, usually with evident midrib; flowers usually shades of white or pink to orange, rarely red or yellow but then not as above:
3a Floral bracts with 3(–5) subequal major veins and ± equally 3-lobed to 3-dentate:
4a Anthers and style branches included in lower half of perianth tube; style dividing below or opposite filament bases. . . . . 13. *I. recondita*
4b Anthers and style branches exserted or partly included, tips of anthers usually emerging from tube or at least reaching beyond upper ⅓ of tube; style dividing above filament bases:
5a Corm tunics extending upward in a short collar of fibres around base; leaves ± linear and firm-textured; bracts 4–5 mm long; filaments exserted ± 6 mm from the tube. . . . . 10. *I. cochlearis*
5b Corm tunics not extending upward in a short collar of fibres around base; leaves sublinear to sword-shaped and relatively soft-textured; bracts 5–8 mm long; filaments exserted up to 5 mm or included:
6a Filaments exserted 2–5 mm from tube; style branches 2.0–2.5 mm long; flowers white to pink with red on reverse and red marks in throat . . . . . 11. *I. fucata*
6b Filaments included or exserted up to 1 mm; style branches 1.0–2.3 mm long; flowers pink. . . . . 12. *I. stohriae*
3b Floral bracts with one major vein (or no dark veins evident) and either with one prominent lobe or tooth, or 3-toothed with central tooth smaller than lateral teeth, or ± truncate with apex minutely serrated:
7a Perianth tube ± cylindric, usually elongate, 12–70 mm long:
8a Anthers fully exserted from tube:
9a Perianth tube 12–33(–35) mm long; flowers pink (rarely white spots present in pink-flowered populations); filaments 4–9 mm long, exserted up to 5 mm from tube . . . . . 3. *I. longituba*
9b Perianth tube 35–40 mm long; flowers beige, flushed pink outside; filaments ± 15 mm long, exserted 10–11 mm from tube. . . . . 4. *I. bellendenii*
8b Anthers fully to partly included in tube:
10a Anthers dark purple-black (rarely pale yellow); perianth tube 35–70 mm long; style dividing between lower ⅓ and apex of anthers, rarely shortly beyond anther tips. . . . . 9. *I. paniculata*
10b Anthers yellow to white; perianth tube 18–30 mm long; style dividing below or opposite lower ⅓ of anthers:
11a Perianth pink to brick-red; perianth tube 27–30 mm long; tepals 15–18 mm long; anthers 5–6 mm long . . . . . 5. *I. splendida*
11b Perianth white or flushed pale pink; perianth tube 18–20 mm long; tepals ± 10 mm long; anthers ± 4 mm long. . . . . 6. *I. linderi*
7b Perianth tube widely to narrowly funnel-shaped, narrow and cylindric below, obviously widening at ± middle or upper ⅓ into a flared upper part:

12a Filaments and bases of anthers included in perianth tube; flowers white with large purple blotch on lower part of each tepal; bracts large, 7–10 mm long, pellucid flushed pink or brownish . . . . . 2. *I. leipoldtii*
12b Filament apices exserted from tube; flowers and bracts not as above:
13a Perianth tube (12–)15–19 mm long; flowers light purple or yellow to orange or brick-red with dark centre:
14a Flowers yellow to orange or brick-red, with a dark centre; bracts dark rusty brown in distal half. . . .18. *I. tenuifolia*
14b Flowers light purple; bracts pale-translucent . . . . . 19. *I. purpureorosea*
13b Perianth tube 4–12 mm long; flowers white, pink to brick-red or yellow, without a dark central mark:
15a Plants 100–250 mm high; flowers brick-red, facing ± to side; bracts opaque, brownish, 7–9 mm long 1. *I. pumilio*
15b Plants 100–650 mm high; flowers yellow to orange or white to pink, suberect; bracts pellucid, 5–7 mm long:
16a Flowers white or pink to mauve; filaments 5–6 mm long; stem usually 1- to 4-branched . . . . . .14. *I. orientalis*
16b Flowers yellow to orange, rarely white but then filaments < 3.5 mm long; stem usually unbranched:
17a Plants 100–150(–350) mm high; perianth tube 4.5–6.0 mm long; style dividing between base and middle of anthers . . . . . 16. *I. esterhuyseniae*
17b Plants 180–550 mm high; perianth tube 7–15 mm long; style dividing below base of anthers:
18a Tepals yellow or white, 9–11 × ± 5 mm; leaves often linear, barely, if at all twisted distally, 2–10 mm wide; filaments relatively short, up to 3 mm long . . . . . 15. *I. odorata*
18b Tepals orange, 16–23 × 7–9 mm; leaves ± lanceolate and loosely twisted distally, (8–)10–16 mm wide; filaments longer, 5–6 mm long. . . . . 17. *I. aurea*

Sect. 2. *Ixia*

Note: Measure perianth tube from the top of the ovary to the point of separation of the tepals (usually up to 1 mm above the filiform part of the tube. In species where the tepals are connate above the tube in horizontal orientation this is not considered part of the tube (e.g. 32. *Ixia superba*).

1a Flowers shades of yellow to orange either with dark red to brown or almost black centre or ± uniformly pale yellow (but see 34. *I. abbreviata* below):
2a Flowers uniformly pale yellow; anthers elliptic with lateral thecae and connective visible abaxially . . . . . 40. *I. angelae*
2b Flowers with dark central mark; anthers linear with thecae parallel and closely set:
3a Bracts pale-translucent, uniformly pale or often flushed pink; filaments free, rarely basally connate:
4a Plants usually unbranched, when present, branches ascending; style usually yellow and dividing opposite middle of filaments to lower ⅓ of anthers; corm with moderately coarse fibrous tunics and not producing stolons. . . . . 33. *I. dubia*
4b Plants with one or more short branches diverging widely from main axis; style usually dark green or brown, dividing opposite base to middle of filaments; corm with finely fibrous or papery tunics and usually bearing slender stolons . . . . . .39. *I. sarmentosa*
3b Bracts opaque, pallid or rust-brown distally or entirely; filaments usually partly to entirely united (rarely ± free):
5a Bracts at most speckled with brown spots in upper half, but with cusps thickened, twisted and dark brown; perianth tube 10–15 mm long, exserted from bracts; corm always without stolons . . . . . .47. *I. curta*
5b Bracts rust-brown distally or entirely; perianth tube 5–8(–10) mm long, ± as long as bracts; corm always with stolons (sometimes lacking in herbarium material):
6a Tepals forming concave cup in central dark zone and spreading horizontally; central eye of perianth 6–12 mm diam., dark brown or ± black, often with star-shaped mark within; filaments yellow:
7a Flowers yellow with back centre; stolons unbranched, up to 100 mm long, bearing a single terminal cormlet, mostly > 5 mm diam.; anthers dark. . . . . 45. *I. fuscocitrina*
7b Flowers usually orange, occasionally yellow with dark brown centre, often with radiating pale lines; stolons branches, short, up to 20 mm long, bearing multiple cormlets, each up to 3 mm diam.; anthers yellow to orange . . . . . .44. *I. maculata*
6b Tepals without concave in dark zone, when fully open forming shallow cup and curved uniformly from base to apex; central eye of perianth (6–)8–20 mm diam., glossy brown or red with pale reddish halo or dull, translucent red; filaments dark red-brown (violet when dry). . . . . 46. *I. calendulacea*
1b Flowers not shades of yellow or orange (then white, beige, pink, mauve, blue, green, red or purple, usually with contrasting dark, or sometimes paler centre)
8a Filaments united at least for half their length; cusps of floral bracts thickened, blackish and twisted . . . 48. *I. monadelpha*
8b Filaments free (rarely basally connate); cusps of floral bracts not as above:
9a Tepals shorter than to as long as perianth tube; foliage leaves two or three . . . . . .25. *I. helmei*
9a Tepals at least 1.5 times and up to 3 times as long as perianth tube; foliage leaves three or more:
10a Outer bracts with three long setaceous cusps 3–4 mm long; corm bearing short, flattened, shortly branched stolons with several small cormlets. . . . . 26. *I. stolonifera*
10b Outer bracts 3- or 1-toothed but apices not drawn into long cusps; cormlets if present, only at base of parent corm or borne on unbranched stolons:
11a Bracts 4–6 mm long and as wide or wider than long; style dividing opposite base to apex of anthers:
12a Flowers white or bright red, without prominent contrasting central mark; style reaching to middle or apex of anthers . . . . . 28. *I. campanulata*
12b Flowers pale pink, mauve or light purple with small dark mark around throat; style reaching to base or middle of anthers . . . . . .29. *I. metelerkampiae*
11b Bracts (5)6–10 mm long and as long or longer than wide; style usually dividing opposite base of filaments to base (occasionally to middle) of anthers:



IXIA. ***Ixia latifolia***: A, flowering plant; B, half-flower. ***I. pavonia***: C, flowering plant; D, outer bract (left) and inner bract (right); E, half-flower.

13a Flower without conspicuous solid dark centre; style always dividing opposite middle of filaments or higher:
14a Leaves ± linear, 1.5–2.0 mm wide; flowers pale pink with white centre; anthers elliptic with connective visible on abaxial surface . . . . . 24. *I. roseoalba*
14b Leaves lanceolate to almost linear, mostly 6–12 mm wide (rarely 1.5–2.0 mm); flowers white, red or pink, sometimes white to pale yellow at tepal bases; anthers linear or oblong with thecae parallel and closely set:
15a Tepals red to deep pink, ± 20 × 10 mm. . . . . 21. *I. patens*
15b Tepals uniformly white or white to pale pink except sometimes with darker longitudinal streaks in lower half:
16a Filaments often thickened in lower half; tepals white to pink with dark longitudinal lines in lower half; flowers strongly scented . . . . . .20. *I. flexuosa*
16b Filaments uniformly filiform; tepals uniformly white or pink without markings; flowers unscented or faintly scented:
17a Flowers white, pale yellow in throat . . . . . 22. *I. leucantha*
17b Flowers pink, white in throat . . . . . .23. *I. alticola*
13b Flower with conspicuous solid darker centre:
18a Style dividing opposite upper ⅓ of filaments or base to apex of anthers (rarely exceeding anthers):
19a Tepals connate basally into a shallow cup ± 3 mm deep, spreading distally . . . . . 32. *I. superba*
19b Tepals ± free from base without basal cup:
20a Leaf margins undulate to crisped; flowers red with dark centre. . . . . .27. *I. vanzijliae*
20b Leaf margins straight; flowers white to pink or purple with dark centre:
21a Plants with prominent collar of fibres around base; leaves narrowly sword-shaped, 3–9 mm wide, with veins not especially thickened . . . . . 30. *I. mostertii*
21b Plants without collar of fibres around base; leaves linear to narrowly sword-shaped:
22a Leaves linear, 1.2–2.0(2.5) mm wide, with prominently thickened veins . . . . . 31. *I. longistylis*
22b Leaves narrowly lanceolate or sometimes linear, mostly 3–8 mm wide and usually without prominently thickened veins or margins . . . . . 38. *I. polystachya*
18b Style dividing opposite base to lower ⅓ (rarely to middle) of filaments:
23a Lowermost leaves exceeding spike; plants with fibrous collar around base. . . . . 43. *I. vinacea*
23b Leaves reaching to between middle of stem and ± base of spike; plants with or without fibrous collar around base:
24a Bracts dry-papery and usually rust-brown distally . . . . . .34. *I. abbreviata*
24b Bracts ± membranous, pale, sometimes speckled brown distally:
25a Perianth dark red with blackish centre . . . . . 35. *I. gloriosa*
25b Perianth blue, green, pink or white with dark centre:
26a Leaf margins thickened, cartilaginous, ± arching over leaf surface at edge, thickenings crenulate or crisped; stamens with anthers erect, occasionally connivent at tips . . . . . 42. *I. versicolor*
26b Leaves plane with margins straight, thickened or not but thickenings not arching over leaf surface:
27a Anthers with connective visible between thecae on abaxial (outer) surface; tepals (usually weakly) narrowed ± into claws in lower part, thus gapped between bases:
28a Anthers ± arrow-shaped with thecae dehiscing laterally; corms without stolons . . . . . 36. *I. atrandra*
28b Anthers ± linear with thecae dehiscing outward; branches often present and diverging ± at right angles to main stem and ascending distally; corms with stolons . . . . . .37. *I. rouxii*
27b Anthers narrow, ± linear with sides parallel and connective not exposed on abaxial surface; tepals ovate, not claw-like below, thus contiguous or slightly overlapping below:
29a Open flowers laxly arranged in an elongate spike (not crowded apically):
30a Flowers green, blue-green or pale blue . . . . . 41. *I. viridiflora*
30b White or pink, occasionally pale blue but never green. . . . . 38. *I. polystachya*
29b Open flowers crowded at spike apex (bracts usually about as long as spike internode):
31a Anthers suberect; plants of marshy ground; corm bearing long stolons with single terminal cormlet . . . . . .39. *I. sarmentosa*
31b Anthers ± horizontal when flowers fully open; plants of dry habitats; corms not bearing stolons. . . . . 38. *I. polystachya*

Sect. 3. *Morphixia*

1a Leaf blades linear-filiform and up to 2 mm (and usually less than 1.5 mm) wide when alive:
2a Leaves ovate-elliptic in cross section; perianth tube ± 5 mm long. . . . . 59. *I. teretifolia*
2b Leaves not as above, either with a slightly to prominently thickened main vein ± in centre of blade or margins raised into narrow fleshy wings and main vein obscure or with main vein not evident when alive unless held to the light, lying closer to abaxial margin, when dry, main vein and margins become evident and appear thickened due to collapse of mesophyll between them; perianth tube 4–22 mm long:
3a Leaf margins raised into narrow fleshy wings and main vein obscure; perianth tube ± 5 mm long . . . . 60. *I. linearifolia*
3b Leaves with margins not raised and with main vein either slightly to prominently thickened or main vein not raised when alive:
4a Leaf with main vein slightly to prominently thickened; flowers with perianth tube cylindric throughout, (12–)15–20 mm long and uniformly ± 2 mm diam. . . . . .69. *I. stenophylla*
4b Leaf with main vein not evident when alive unless held to light and lying closer to abaxial margin (when dry, main vein and margins become evident and appear thickened due to collapse of tissue between them); perianth tube funnel-shaped to cylindric, 4–22 mm long:

5a Perianth tube 4–10 mm long; filaments included or exserted up to 2 mm from tube; anthers symmetrically arranged in a column enclosing style:
6a Perianth tube 4–8 mm long; tepals 11–15 mm long, thus ± twice as long as tube; filaments exserted 1–2 mm and anthers fully exserted; anthers (3–)4–5 mm long . . . . . 79. *I. capillaris*
6b Perianth tube 8–10 mm long; tepals 8–10 mm long, thus ± as long or slightly longer than the tube; filaments included and bases of anthers held within tube; anthers 3.5–4.0 mm long . . . . . 80. *I. exiliflora*
5b Perianth tube 12–22 mm long; filaments included or well exserted from tube; anthers either symmetrically arranged or unilateral and facing upward and style then lying below anthers:
7a Stamens symmetrically arranged; filaments included, 3–6 mm long; anthers 2.5–3.5 mm long, bases usually included in tube. . . . . 81. *I. dieramoides*
7b Stamens usually (?always) unilateral and horizontal to declinate; filaments 12–15 mm long, exserted 2–10 mm from tube; anthers 4–5 mm long, fully exserted from tube:
8a Filaments exserted 2–6 mm from tube; stem simple or with 1 or 2(3) lateral branches, branches subtended by attenuate bracts and prophylls; cataphylls chestnut-brown above ground . . . . . 82. *I. pauciflora*
8b Filaments exserted 8–10 mm from tube; stem with 1 to 3 lateral branches, branches subtended by truncate bracts and prophylls; cataphylls green with ± membranous margins . . . . . 83. *I. reclinata*

1b Foliage leaves 1 to 4, blades linear to lanceolate or falcate, rarely linear-filiform but then with a moderately to prominently thickened central vein, usually > 2 mm wide in mature plants; main vein evident when alive, ± central or slightly displaced toward abaxial margin:
9a Foliage leaves with margins broadly winged, thus H-shaped in cross section; ovary and capsules warty:
10a Flowers pale pink with white to pale yellow throat; perianth tube 5–6 mm long; anthers ± 5 mm long . . . . . 62. *I. alata*
10b Flowers pale blue-mauve, white in throat; perianth tube 8–10 mm long; anthers ± 6 mm long . . . . . 63. *I. thomasiae*
9b Foliage leaves plane, sometimes with margins heavily thickened but never winged; ovary and capsules smooth, rarely surface obscurely roughened:
11a Perianth tube cylindric or subcylindric; tepals shorter than tube:
12a Perianth tube 12–18 mm long; flowers pale lilac to white flushed lilac. . . . . 65. *I. dolichosiphon*
12b Perianth tube 20–34 mm long; flowers pale beige, white or pale cherry-red:
13a Corm tunics of coarse, woody fibres; flowers pale beige, usually purple outside; tepals oblong, 11–15 × 3.0–4.5 mm . . . . . 64. *I. paucifolia*
13b Corm tunics of fine, pale fibres; tepals ovate, 10–16 × 5–6 mm:
14a Flowers white, sometimes flushed mauve to pink outside, and sweetly scented; lower two leaves subequal, both 2–4(5) mm wide . . . . . 66. *I. cedarmontana*
14b Flowers pale cherry-red, unscented; lower two leaves unequal with lowermost 6–8 mm wide . . . . . 67. *I. seracina*
11b Perianth tube broadly or narrowly funnel-shaped; tepals usually as long as or longer than tube:
15a Filaments reaching mouth of perianth tube or exserted (sometimes for only 1 mm); anthers always completely exserted:
16a Foliage leaf solitary, linear; stem usually unbranched. . . . . 50. *I. saundersiana*
16b Foliage leaves 2 to 4, linear to lanceolate; stem simple or branched:
17a Perianth tube (2.5–)3.0–5.0 mm long; lateral branches usually several and always short, bearing 1 to 3(4) flowers:
18a Filaments pale blue to white, 5–7 mm long; lateral branches mostly 2- or 3-flowered . . . . . 58. *I. marginifolia*
18b Filaments purple-black, ± 4 mm long; lateral branches mostly 1-flowered . . . . . 59. *I. pavonia*
17b Perianth tube 6–18 mm long; lateral branches various:
19a Lateral branches mostly 3 to 6, short and thread-like, each bearing 1 or 2(3) flowers; perianth deep maroon-purple, magenta-pink, blue-mauve or white with yellow cup . . . . . 54. *I. ramulosa*
19b Lateral branches mostly 1 to 3, or plants unbranched, branches typically well developed, straight or twisted, bearing 1 to 6 or more flowers:
20a Branches straight and bearing 2–several flowers in distal half or plants unbranched:
21a Leaves soft textured, linear, up to 3 mm wide; margins not raised and thickened . . . . . 55. *I. nutans*
21b Leaves firm and leathery, usually falcate, > 5 mm wide; margins somewhat to strongly thickened:
22a Leaves (5–)10–18 mm wide, with moderately to heavily thickened margins; perianth tube 14–23 mm long; tepals 15–18 mm long; bracts 8–10 mm long; perianth usually deep pink to cherry-red . . . . . 51. *I. latifolia*
22b Leaves mostly narrowly sword-shaped to falcate, usually < 5 mm wide, with slightly thickened margins; perianth tube 8–11 mm long; tepals 11–14 mm long; bracts 5–7 mm long; perianth white, pale pink or purple:
23a Branches 0 to 2, short, wiry and suberect; corm with papery, onion-skin-like, pale brown tunics not persisting; perianth tube ± 10 mm long; tepals 12–17 mm long . . . . . 52. *I. monticola*
23b Branches nearly always present, diverging; corm with fibrous, medium to coarse fibres; perianth tube 8–11 mm long; tepals 11–14 mm long:
24a Branches mostly held at more than 45° from main axis, sometimes nearly horizontally; perianth tube 8–11 mm long; filaments exserted (1–)2 mm or included in tube; anthers 4.0–5.5 mm long . . . . . 49. *I. divaricata*
24b Branches ascending; perianth tube 12–14 mm long; filaments exserted ± 4 mm from tube; anthers ± 6 mm long . . . . . 68. *I. arenosa*
20b Branches and main spike always 1-flowered or branches twisted and flexuose, with flowers not obviously crowded in distal half:
25a Perianth tube 11–23 mm long; tepals 13–23 mm long; bracts pale, ± translucent with dark veins evident. . . . . 51. *I. latifolia*

25b Perianth tube (5–)6–11 mm long; tepals 10–15 mm long; bracts with veins ± obscured:
26a Bracts pale; stem with (1)2 or 3 short, wiry twisted branches 5–8 mm long, each bearing a solitary flower . . . . . 56. *I. ecklonii*
26b Bracts purple to glossy brown and veins obscured; stem branching not as above:
27a Plants mostly < 10 mm high; bracts 5–6 mm long, flushed purple; cormlets when present borne at base of corm . . . . . 53. *I. parva*
27b Plants mostly 250–450 mm high; bracts 7–10 mm long, glossy dark brown; cormlets borne on long, slender stolons . . . . . 57. *I. brunneobracteata*
15b Filaments not reaching mouth of perianth tube; anthers partly to entirely included in tube:
28a Main spike long, straight and erect, lateral spikes ascending to spreading, with upright flowers crowded in distal half . . . . . 49. *I. divaricata*
28b Inflorescence not as above:
29a Plants up to 150 mm high; flowers upright, purple with pale yellow cup; main spike and branchlets twisted and flexuose, inclined to nearly horizontal . . . . . 78. *I. contorta*
29b Plants usually taller; flowers not as above:
30a Perianth tube (12–)13–20 mm long; anthers partially or fully included in perianth tube:
31a Anthers half exserted from perianth tube; cormlets borne at base of main corm . . . . . 75. *I. namaquana*
31b Anthers fully included in the perianth tube; cormlets borne at ends of flattened stolons . . . . 76. *I. oxalidiflora*
30b Perianth tube 5–12(–14) mm long; anthers partially included in perianth tube:
32a Leaf blades of lower two or three leaves 8–15 mm wide (rarely 3–7 mm); filaments 2–4 mm long:
33a Bracts and prophylls subtending branches attenuate, up to 5 mm long, often deflexed distally; leaves (1)2 with well-developed blades; perianth tube (10–)12–14 mm long; outer bracts with (4)5 major veins, 5-toothed . . . . . 73. *I. lacerata*
33b Bracts and prophylls subtending branches short, obtuse to truncate, < 2 mm long; leaves 2 or 3(4) with well-developed blades; perianth tube 5.5–8.0(–10.2) mm long; outer bracts with 3 major veins, 3-toothed or 3-lobed:
34a Foliage leaves 2(3), blades usually falcate; base of stem rarely with fibrous collar; anthers 2.3–3.5 mm long. . . . . 70. *I. rapunculoides*
34b Foliage leaves 3(4); blades usually sword-shaped; base of stem covered by a collar of fibres; anthers 3.5–4.0 mm long . . . . . 71. *I. robusta*
32b Leaf blades mostly 2.0–3.5 mm wide; filaments 3–4 mm long:
35a Plants of streambanks and marshes, often growing in water; perianth tube 8–9 mm long; flowers white with yellow throat . . . . . 72. *I. rivulicola*
35b Plants of hillsides and flats; perianth tube 5–10 mm long; flowers white (rarely flushed pale blue), or pale pink, slate-blue with white or yellow throat, horizontal to nodding:
36a Corm tunics of firm, fine to medium-textured, netted fibres accumulating with age; corms bearing sessile cormlets at base (and rarely a slender stolon); perianth whitish or flushed palest blue with white throat; style dividing opposite middle of anthers, style branches extending between them. . . . . 74. *I. mollis*
36b Corm tunics of soft, ± papery (not fibrous) layers, not accumulating significantly; corms bearing flattened, ribbon-like stolons; perianth pink, blue-grey, slate-blue or white; style dividing opposite anther tips, rarely beyond them, style branches extending beyond anthers . . . . . 77. *I. sobolifera*

Sect. 4. *Dichone*

1a Plants 0.9–1.2 m high; perianth tube funnel-shaped with flared upper portion ± 2 mm long and ± as long as filiform lower half; style dividing opposite middle of filaments . . . . . 84. *I. altissima*
1b Plants 0.2–0.6 m high; perianth tube cylindric almost throughout, flared only in upper 0.5–1.0 mm if at all; style dividing opposite or just above bases of filaments:
2a Flowers radially symmetric, upright to half nodding; stamens erect with anthers parallel or diverging:
3a Perianth tube very short, 2.0–2.5 mm long; stem with short, stiffly erect lateral branches held close to main axis, each with up to 8 flowers . . . . . 85. *I. rigida*
3b Perianth tube 2.5–6.0 mm long; stem simple or with 1(–several) suberect to spreading branches:
4a Leaves ± terete or filiform, rarely more than 1 mm wide; corm tunics of fine fibres extending upward in a collar around the stem base:
5a Style branches straight and extending outward below anthers, 3–5 mm long; filaments filiform; outer floral bracts with 3 main veins and several secondary veins, acutely 3-toothed . . . . . 92. *I. micrandra*
5b Style branches falcate, recurved at tips, up to 2 mm long; filaments flattened and wider in middle; outer floral bracts with 3 main veins but lacking secondary veins, usually shallowly 3-toothed or 3-lobed . . . . 93. *I. minor*
4b Basal and sometimes other leaves linear to sword-shaped or lanceolate, usually at least 1.5 mm wide, blades plane with main vein and sometimes multiple veins ± equally prominent; corm tunics fine to coarse-textured, with or without fibrous collar around the stem base:
6a Anthers 4–5 mm long, oblong and > twice as long as wide; spike nodding in bud, becoming erect as flowers open:
7a Anthers yellow; perianth pink, tepals darker at base and yellow in throat; foliage leaves (2.5–)5.0–12.0 mm wide; style branches 4–5 mm long . . . . . 86. *I. trifolia*
7b Anthers purple; perianth light purple with small dark centre; foliage leaves 1.5–2.0 mm wide; style branches up to 2 mm long . . . . . 87. *I. brevituba*
6b Anthers 1.5–3.0 mm long, suborbicular to broadly oblong and < twice as long as wide; spike erect in bud:

8a Leaves 2, basal leaf with expanded, ± lanceolate blade, upper leaf entirely sheathing:
9a Basal leaf with 3 ± equally prominent, thickened veins; style branches falcate to recurved (white drying ± white); tepals 12–15 × 6–8 mm when fully open; spike mostly 7- to 12-flowered . . . . . 89. *I. trinervata*
9b Basal leaf with 1 prominent vein (translucent when alive, appearing raised when dry); style branches ascending, ± straight (pink, often drying purple); tepals remaining slightly cupped, 12–14 × 5–7 mm; spike mostly 4- to 7-flowered . . . . . .90. *I. bifolia*
8b Leaves 2 to 4, with no visible veins or only main vein prominent:
10a Leaves (3)4 or 5, often drying at anthesis; foliage leaf blades lanceolate, mostly 4–9 mm wide . . . . . .94. *I. stricta*
10b Leaves (2)3 or 4; foliage leaf blades linear, mostly 1.5–4.0 mm wide . . . . . 91. *I. confusa*
2b Flowers usually half to fully nodding, facing to side; stamens unilateral with anthers held horizontally or pendent:
11a Anthers dehiscing completely by longitudinal slits . . . . . 88. *I. curvata*
11b Anthers dehiscing by short slits from base to middle, not reaching apex:
12a Foliage leaf usually single, sometimes 2 (uppermost leaf ± entirely sheathing), blade ± linear, 1.0–4.5 mm wide; flowers usually 4 to 8 per spike; perianth tube ± 4.5 mm long . . . . . 99. *I. simulans*
12b Foliage leaves 3 to 7, blades lanceolate to falcate, mostly 4–20 mm wide, or closely undulate and then only 2–4 mm wide; flowers mostly 6 to 20 per spike; perianth tube 2.5–4.0 mm long:
13a Leaves 2–4(5) mm wide; corm tunics of fine, soft fibres; perianth tube 2–3 mm long:
14a Leaf margins strongly undulate and crisped; anthers ± 1.5 mm long . . . . . 95. *I. erubescens*
14b Leaf margins plane; anthers 2–3 mm long:
15a Corms producing slender stolons from base, terminating in a single, large cormlet; anthers ± 3 mm long . . . . . 98. *I. flagellaris*
15b Corms not producing stolons; anthers 2.0–2.5 mm long . . . . . .97. *I. tenuis*
13b Leaves 4–25 mm wide and margins plane or sometimes undulate(–crisped); corm tunics of firm, medium-textured to coarse fibres; perianth tube 2.5–5.0 mm long:
16a Plants rarely more than 600 mm high, simple or branched, with branches ascending to suberect; filaments ± uniformly filiform, < ½ as wide as anthers; style branches not noticeably flared at tips . . . . . 96. *I. scillaris*
16a Plants up to 900 mm high, often branched, with branches held at right angles to main axis, becoming suberect distally; filaments expanded toward apex and becoming as wide as anthers; style branches widely flared at tips . . . . . 100. *I. collina*

Sect. 1. **Hyalis** *(Baker) Diels* in Engler & Prantl, Die natürlichen Pflanzenfamilien, edn. 2, 15a: 486 (1930). Goldblatt & Manning: 92 (2011). *Ixia* subg. *Hyalis* Salisb. ex Baker: 161 (1892); Goldblatt & Manning: 63 (1999). Type: *I. paniculata* D.Delaroche, lecto., effectively designated by Lewis: 149 (1962).

Leaves usually at least 4, sometimes up to 10, in a loose fan with uppermost leaves not sharply distinct from lower and usually not entirely sheathing but distal portion with a produced blade. *Spike* with outer bracts usually dry-membranous and opaque, outer with 1(or 3) prominent veins and with 1 or sometimes 3 teeth, the central usually longest. *Flowers* variously coloured, rarely pale blue-mauve, usually erect or ascending; perianth tube hollow to base or walls of tube clasping style in proximal half, funnel-shaped to cylindric; tepals subequal, spreading. *Stamens* symmetrically arranged in a ring around central style and contiguous, rarely unilateral, then horizontal or declinate; filaments inserted at base of upper part of tube, decurrent, not expanded below, included to well exserted; anthers splitting longitudinally, exserted, partly included or rarely fully included. *Ovary* and *capsules* smooth, rarely papillate (*Ixia pumilio*); style slender, central and straight, or when stamens unilateral then displaced to lie beneath filaments.

Species 19: mainly Western Cape, South Africa.

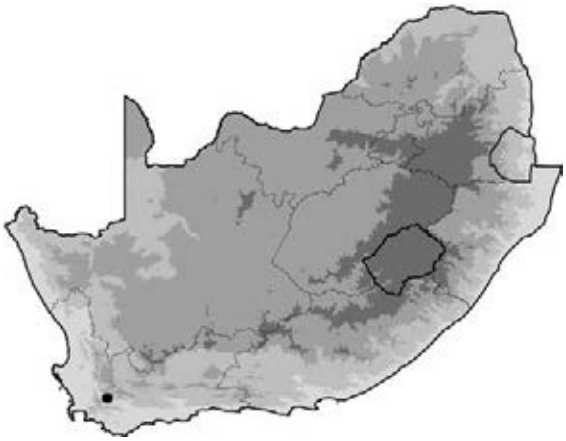
The section is recognised by an indeterminate leaf number, usually at least four, the upper leaves weakly differentiated from the lower and usually with free blades. The cylindrical or funnel-shaped perianth tube ranges from hollow throughout to filiform in the lower ⅔ and expanded above, always with decurrent filaments inserted within the tube. Nectar is normally produced and the flowers are often scented, although those pollinated by long-proboscid flies are unscented. A feature of most species is the outer bracts with usually only one prominent central vein. The section is divided into three series.

Ser. **Hyalis** *(Baker) Goldblatt & J.C.Manning,* name at new rank. *Ixia* subg. *Hyalis* Salisb. ex Baker: 161 (1892). *I.* sect. *Hyalis* (Baker) Diels in Engler & Prantl: 486 (1930). Type: *I. paniculata* D.Delaroche, lecto., effectively designated by Lewis: 149 (1962).

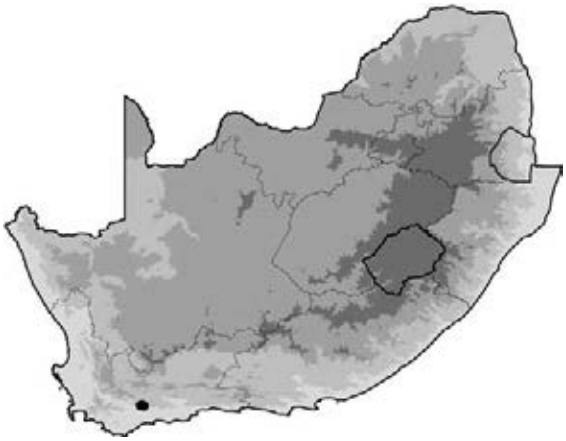
Plants sometimes acaulescent. *Flowers* red, pink, white or yellow, rarely with dark centre; perianth tube elongate or short and funnel-shaped. *Filaments* sometimes barely exserted.

1. **Ixia pumilio** *Goldblatt & Snijman* in South African Journal of Botany 51: 68 (1985); Goldblatt & Manning: 93 (2011). Type: South Africa, [Western Cape], banks of Breede River south of Worcester, Farm Reiersrus, 30 Aug. 1983, *Snijman 737* (NBG, holo.; K, MO, PRE, iso.).

Plants mostly 120–160 mm high. *Corm* 7–12 mm diam.; tunics of fine netted fibres. *Stem* simple or with 1,



Distribution of ***Ixia pumilio***.



Distribution of ***Ixia leipoldtii***.

rarely 2 or 3 short branches subtended by dry, attenuate, translucent bracts and prophylls ± 3 mm long. *Leaves* 3 or 4, upper 1 or 2 partly sheathing stem, blades narrowly sword-shaped to sublinear, reaching to base or middle of spike, 2–5 mm wide, main vein slightly thickened. *Spike* elongate, mostly 6- to 10-flowered, branches with fewer flowers; bracts dry-membranous, pale brown, mostly 8–9 mm long, outer with prominent central vein, acute or obscurely 3-toothed, inner 2-veined and forked apically, usually slightly exceeding outer. *Flowers* ± erect, old rose-coloured to brick-red, with conspicuously darker veins, unscented; perianth tube funnel-shaped, widening in upper half, 8–10 mm long; tepals subequal, ovate-oblong, 11–13(–16) × 5.5–6.0 mm, spreading horizontally. *Filaments* 5–6 mm long, exserted ± 3 mm from tube; anthers 4.0–5.5 mm long, yellow. *Style* dark purple, dividing opposite middle of anthers, branches ± 1.5 mm long, ovary surface minutely warty. *Flowering time*: mid-August to mid-September.

Distribution and ecology: an extremely local endemic, known only from near Moordkuil and the foot of the Sandberg south of Worcester in Western Cape, South Africa; in alluvial sand close to the Breede River.

Diagnosis: *Ixia pumilio* is distinguished by its low stature, the plants seldom exceeding 150 mm, and unusually coloured dull reddish flowers with pale brown, opaque bracts. The filaments are exserted ± 4 mm from the perianth tube and the dark purple style divides opposite the middle of the anthers. The ovary and capsules are unusual in the genus in their minutely warty surface. The relationships of *I. pumilio* are uncertain.

2. **Ixia leipoldtii** *G.J.Lewis* in Annals of the South African Museum 40: 121 (1954); Goldblatt & Manning: 93 (2011). Type: South Africa, [Western Cape], Eikekraal, east of Prince Albert (but locality probably wrong), 27 Sept. 1935, *Leipoldt s.n.* (BOL 21808, holo.; SAM, iso.).

Plants mostly 150–200 mm high. *Corm* 1.0–1.4 mm diam., with tunics of medium-textured fibres. *Stem* simple or with 1 or 2 short branches subtended by dry, translucent brown, attenuate bracts and prophylls 3–5 mm long. *Leaves* usually 3 or 4, lower 2 (or 3) with expanded blades, lanceolate to falcate, ± half as long as stem, upper leaf sheathing stem in lower ⅔, free in upper ⅓. *Spike* erect, 2- to 4(–6)-flowered; bracts dry-membranous, translucent brown with dark veins, 8–9 mm long, outer 3-veined, with 3 subacute teeth, central tooth longest, inner 2-veined and forked at apex, slightly shorter than outer. *Flowers* salver-shaped, white with large dark red-purple centre and plale greenish tube, unscented; perianth tube funnel-shaped, ± 11 mm long; tepals ascending below, spreading above, ovate, (17–)20–22 × 11–13 mm. *Filaments* 3–4 mm long, included in tube; anthers 4–5 mm long, yellow, bases included in tube. *Style* dividing opposite lower third of anthers, branches ± 2 mm long. *Flowering time*: September.

Distribution and ecology: known with certainty only from the heights at the top of Op-de-Tradouw Pass, west of Barrydale in Western Cape, South Africa; on stony clay loam.

Diagnosis: a striking plant in full bloom, *Ixia leipoldtii* has large, predominantly white flowers with tepals up to 22 mm long, and a dark purple central blotch with pale greenish throat. Apart from the unusual flower colouring, *I. leipoldtii* is readily distinguished by the translucent brown bracts, broadly ovate to almost orbicular tepals, and filaments included in the perianth tube. The relatively short perianth tube, a weak distinction between lower and upper leaves, and outer floral bracts with a single or prominent central cusp conform to its placing in sect. *Hyalis*.

3. **Ixia longituba** *N.E.Br.* in Journal of the Linnean Society, Botany 48: 44 (1928); Goldblatt & Manning: 94 (2011). Type: South Africa, without precise locality, illustration in Ker Gawl.: t. 589 (1802a).

Plants (180–)250–450 mm high. *Corm* depressed-globose; tunics of pale, fine fibres. *Stem* simple or more

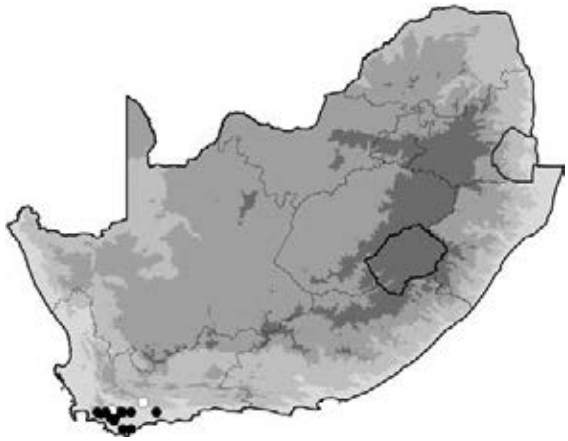
often 1- or 2-, rarely 3-branched, branches subtended by pale, membranous, attenuate bracts and prophylls 3–5 mm long. *Leaves* mostly 4 to 8, ± sword-shaped to lanceolate, usually reaching to ± base of spike, 5–15 mm wide, firm-textured; margins moderately to heavily thickened, sometimes crisped. *Spike* densely 7- to 12-flowered, branches, when present, with fewer flowers; bracts pale and ± translucent, often flushed pink distally, outer with a single prominent vein and 1- or obscurely 3-toothed, inner forked at tips, 2-toothed, ± as long or slightly longer than outer. *Flowers* salver-shaped, ± suberect to almost horizontal, pale to deep pink (except for rare white sports), darker pink at tepal bases, pale green to yellow in mouth of tube, unscented; perianth tube slender, widening slightly near mouth, (10–)12–33(–35) mm long, 3–4 mm wide at mouth; tepals subequal, spreading horizontally, 16–22 × 7–11 mm, inner narrower than outer. *Filaments* 5–10 mm long, inserted 2–3 mm below mouth of perianth tube, thus exserted 3–7 mm; anthers 4–6 mm long, yellow. *Style* mostly dividing opposite top of filaments or lower to middle third of anthers, rarely shortly beyond anther tips, branches 3–5 mm long. *Flowering time*: mid-September to late October.

Distribution and ecology: endemic to the Caledon and Bredasdorp Districts of Western Cape, South Africa, extending from Bot River in the west to Swellendam and Bredasdorp in the east and south; usually at low elevations on heavy clay soils, also on dry, stony, sandstone slopes.

Diagnosis: *Ixia longituba* is distinguished among the longer-tubed species of sect. *Hyalis* by the pink flowers with filaments exserted 5–7 mm, anthers 4–6 mm long, and well-developed style branches 3–5 mm long. Perianth tube length is remarkably variable, mostly 12–33 mm long, but as short as 10 mm and occasionally as long as 35 mm. Two subspecies are recognised, subsp. *longituba* for plants with a perianth tube (10–)12–23 mm and subsp. *macrosiphon* for those with a tube 25–35 mm long. Subsp. *macrosiphon* comprises the northern populations of the species, all close to the foot of the Riviersonderend Mtns. However, plants from the south of its range, near Bredasdorp may have a perianth tube 22–23 mm long. There appears to be pattern of tube length across the range from south to north. Historically, *Ixia longituba* was confused with *I. bellendenii* but this species has white flowers, a longer perianth tube 35–40 mm long and filaments exserted up to 11 mm. Observations on the pollination biology of a long-tubed population of *Ixia longituba* show the species is pollinated by the long-proboscid horsefly, *Philoliche gulosa*.

Key to subspecies

1a Perianth tube (10–)12–23 mm long; filaments 5–9 mm long and exserted 3–6 mm from tube; anthers 4–5 mm long. . . . . 3a. subsp. *longituba*
1b Perianth tube 25–33(–35) mm long; filaments 8–10 mm long and exserted 6–7 mm from tube; anthers 5–6 mm long. . . . . 3b. subsp. *macrosiphon*



Distribution of ***Ixia longtituba*** subsp. ***longituba***, ●; subsp. ***macrosiphon***, ○.

3a. subsp. **longituba**

Flowers with perianth tube (10–)12–23 mm long; tepals 14–18 × 6–9 mm. *Filaments* 5–9 mm long, exserted 3–6 mm from mouth of tube; anthers 4–5 mm long. *Style* dividing opposite middle third to apex of anthers, rarely at apex of filaments.

Distribution and ecology: subsp. *longituba* extends from Bot River in the west to Swellendam in the east and as far south as Bredasdorp, thus in the central and southern part of the range of *Ixia longituba*.

3b. subsp. **macrosiphon** *Goldblatt & J.C.Manning* in Bothalia 41: 95 (2011). Type: [Western Cape], hills 6 km SW of Greyton, 8 Oct. 1995, *Goldblatt & Manning 10341* (NBG, holo.; MO, iso.).

Flowers with perianth tube 25–33(–35) mm long, tepals 16–22 × 8–11 mm. *Filaments* 8–10 mm long, exserted 6–7 mm from mouth of tube; anthers 5–6 mm long. *Style* usually dividing between base and middle of anthers.

Distribution and ecology: subsp. *macrosiphon* is known from a few populations in heavy clay ground at the foot of the Riviersonderend Mtns and near Barrydale, in the northern parts of the range of *Ixia longituba*.

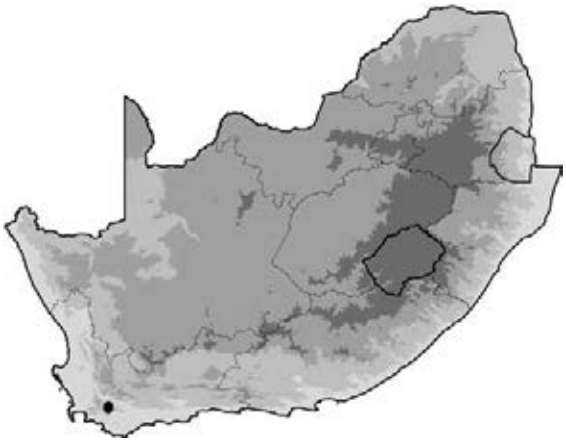
4. **Ixia bellendenii** *R.C.Foster* in Contributions from the Gray Herbarium of Harvard University 114: 47 (1936), as replacement name for *Tritonia rochensis* Ker Gawl.: t. 1503 (1812a); Lewis: 155 (1962, in part); Goldblatt & Manning: 95 (2011). *T. rocheana* Sweet: 398 (1826), orthographic variant for '*rochensis*' Ker Gawl. *Waitzia rochensis* (Ker Gawl.) Heynh. : 855 (1841). *Montbretia rocheana* (Ker Gawl.) Heynh.: 418 (1847), orthographic variant for '*rochensis*'. *Crocosmia rochensis* (Ker Gawl.) Klatt in Peters: 516 (1864). *Morphixia*

paniculata var. *rochensis* (Ker Gawl.) Baker: 97 (1877). *Ixia paniculata* var. *rochensis* (Ker Gawl.) Baker: 166 (1892). *I. rochensis* (Ker Gawl.) L.Bolus: 133 (1929a), illegitimate homonym, not *I. rochensis* Ker Gawl. (1803c) (= *Geissorhiza radians* (Thunb.) Goldblatt). *I. longituba* var. *bellendenii* (R.C.Foster) M.P.de Vos: 63 (1999). Type: South Africa, without precise locality, illustration in Ker Gawler: t. 1503 (1812a).

Plants 400–550 mm high. *Corm* globose 18–22 mm diam.; tunics of fibrous layers. *Stem* simple or with 1 to 3 short branches subtended by pale translucent, deltoid-apiculate bracts 5–6 mm long and long-awned prophylls 7–8 mm long. *Leaves* mostly 4 or 5, lower 3 or 4 with fully developed blades, firm-textured, ± sword-shaped to lanceolate, reaching to ± middle of stem, (2–)5–10 mm wide, dry at flowering, margins moderately to heavily thickened, sometimes crisped. *Spike* mostly 6- to 12-flowered; bracts ± opaque-whitish, tinged pink distally, 6–9 mm long, veins slightly darkener distally, outer with a single prominent vein, subacute or with a short apical tooth, inner 2-toothed, 1–2 mm longer than outer. *Flowers* salver-shaped, spreading horizontally, ± white with pink to purple veins outside, more pronounced with age, yellow in tube and greenish yellow at tepal bases, unscented; perianth tube slender, widening slightly toward mouth, 35–40 mm long, ± 2.5 mm wide at mouth; tepals subequal, spreading at right angles to tube, 18–22 × 6–10 mm. *Filaments* ± 15 mm long, exserted ± 11 mm; anthers 5–6 mm long. *Style* dividing opposite upper half of anthers, sometimes up to 6 mm beyond anthers, branches 1.5–2.0 mm long. *Flowering time*: mid-November to early December.

Distribution and ecology: restricted to the northern slopes of the Riviersonderend Mtns in Western Cape, South Africa; in loamy sand among sandstone rocks on lower middle slopes, flowering late in the season.

Diagnosis: *Ixia bellendenii* is readily recognised by the almost white flowers suffused pale pink outside, an elongate perianth tube 35–40 mm long, filaments ± 15 mm long and exserted ± 11 mm, and prominent anthers 5–6 mm long. Blooming late in the season, the leaves are usually withered and dry when flowering commences. Shorter-tubed, pink-flowered *I. longituba,* has shorter filaments exserted 5–7 mm.



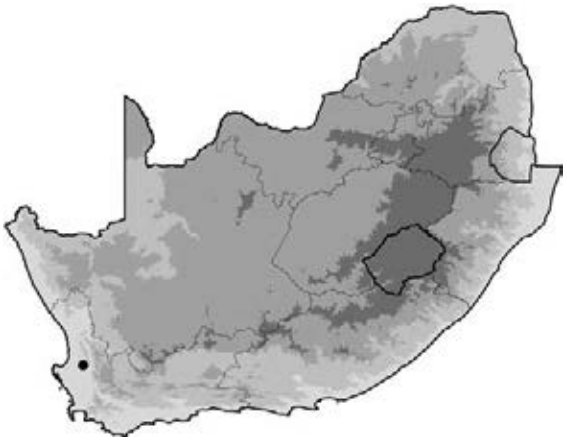
Distribution of ***Ixia bellendenii***.

5. **Ixia splendida** *G.J.Lewis* in Journal of South African Botany 4: 9 (1938); Lewis: 153 (1962); Goldblatt & Manning: 97 (2011). Type: South Africa, [Western Cape], Piketberg, Zebra Kop, near stream, 10 Nov. 1934, *Pillans 7183* (BOL, lecto. [as holo.], designated by De Vos: 65 (1999); BOL, PRE, SAM, isolecto.).

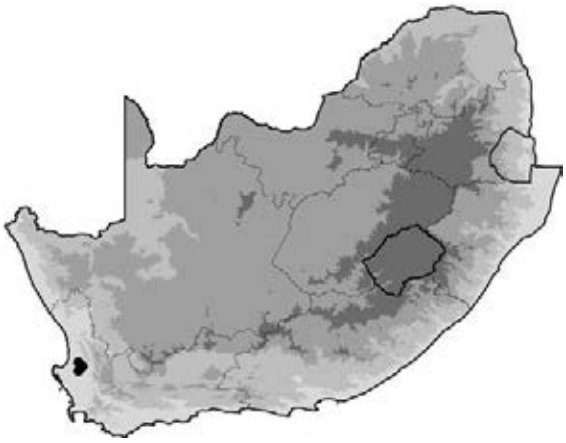
Plants 300–600 mm high. *Stem* simple or with a single short branch subtended by acute, translucent bracts and prophylls ± 1 mm long. *Corm* 14–18 mm diam., with tunics of fine, netted fibres. *Leaves* 5 to 7, all with expanded blades, narrowly sword-shaped to sublinear, 2–5 mm wide, reaching to ± middle of stem, upper 2 leaves sheathing stem for ½–⅔ their length. *Spike* densely 5- to 7-flowered; bracts membranous and translucent, evidently dry and turning brown near tips, 6–7 mm long, outer weakly 3-veined, truncate or obscurely 3 lobed, inner 2-veined and forked apically, ± as long as outer. *Flowers* salver-shaped, pale brick-red or pink, evidently unscented; perianth tube subcylindric, slightly expanding from base to apex, 27–30 mm long; tepals subequal, oblong, obtuse to emarginate, 15–18 × 6–8 mm, spreading. *Filaments* 4–5 mm long, included in tube; anthers 5–6 mm long, included or tips exserted. *Style* dividing opposite lower third of anthers, branches ± 1.5 mm long. *Flowering time*: mid-October and November.

Distribution and ecology: a poorly known and rare Western Cape endemic, evidently restricted the upper slopes of Zebra Kop, highest peak of the Piketberg, South Africa; along streams and presumably on stony sandstone soil.

Diagnosis: *Ixia splendida* is distinguished by the slender perianth tube 27–30 mm long, expanding gradually and uniformly from base to apex, dull reddish or deep pink perianth, and fully included stamens. The floral bracts are unusual: the outer of the pair is truncate and obscurely 3-veined, whereas the inner is fairly typical in having 2 veins and is shallowly forked at the tip. It has been assumed to be closely related to the more widespread *I. paniculata*, which also has a long perianth tube and included stamens. Flowers of *I. paniculata* are pale yellow to beige, sometimes almost white, and also have partly to fully included stamens, but the anthers are usually dark and the perianth tube is cylindric and usually longer, up to 75 mm but only 35–50 mm at the southern end of its range, compared to the gradually flared tube 27–30 mm long and yellow anthers of *I. splendida*. In addition, the outer floral bracts of the two differ substantially. Those of *I. paniculata* are elongate and attenuate, with a single prominent vein, whereas



Distribution of ***Ixia splendida***.



Distribution of ***Ixia linderi***.

those of *I. splendida* have 3 veins and are truncate or obscurely 3-lobed apically. The bract differences suggest that the two species may not be immediately related.

The long-tubed flowers of *I. splendida* resemble those of other species of *Ixia* adapted for pollination by long-proboscid flies and they are inferred to have the same pollination system.

6. **Ixia linderi** *Goldblatt & J.C.Manning* in Bothalia 41: 97 (2011). Type: South Africa, [Western Cape], Piketberg, Zebra Kop, east-facing ledges near water, ± 1 100 m, 7 Nov. 1973, *Linder 103* (BOL, holo.).

Plants 300–450 mm high, base enclosed by a poorly developed fibrous collar. *Corm* 8–10 mm diam.; tunics of fine fibres. *Stem* unbranched. *Leaves* 3 or 4, ± linear, 1.5–3.0 mm wide, main vein prominent, margins slightly thickened. *Spike* 2- to 6-flowered; bracts membranous, evidently dry near tips, ± 5 mm long, outer without dark veins, truncate, inner 2-veined, veins pale, forked apically, slightly longer than outer. *Flowers* suberect, white or faintly pink, tepals flushed pale pink outside, presence of scent unknown; perianth tube subcylindric, gradually expanding from base to apex, 18–20 mm long; tepals subequal, oblong, obtuse, ± 10 × 4 mm, spreading horizontally. *Filaments* ± 1.5 mm long, inserted ± 6 mm below mouth of tube; anthers ± 4 mm long, apices just reaching mouth of tube. *Style* dividing shortly below anther bases, branches ± 1 mm long, reaching lower third of anthers. *Flowering time*: November.

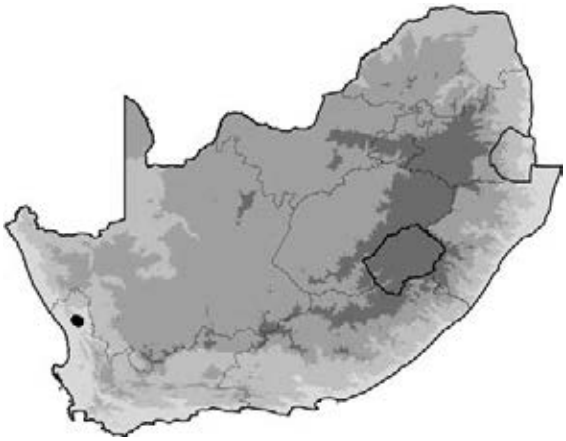
Distribution and ecology: known from just two collections from Zebra Kop, highest peak of the Piketberg in Western Cape, South Africa; on moist sandstone slopes and rock ledges near water.

Diagnosis: the white flowers with a relatively long, narrow perianth tube, 18–20 mm long, with the stamens and style included in the tube immediately set *Ixia linderi* apart in sect. *Hyalis*. The filaments, only 1.5 mm long, are inserted ± 6 mm below the mouth of the tube and the anthers, ± 4 mm long, just reach the mouth. The style divides just below the anther bases and the short style branches ± 1 mm long are retained within the tube. The species most closely resembles a second Piketberg endemic, *I. splendida*, but this species is a more robust plant with leaves up to 5 mm wide and larger, brick-red to pink flowers with a perianth tube 27–30 mm long. Like *I. linderi*, the flowers of *I. splendida* have the stamens and style included in the tube. Both species have distinctive, translucent, ± truncate outer floral bracts with minute terminal teeth.

7. **Ixia acaulis** *Goldblatt & J.C.Manning* in Novon 3: 152 (1993); Goldblatt & Manning: 98 (2011). Type: South Africa, [Western Cape], Vanrhynsdorp, Knersvlakte, farm Rooiberg, low limestone ridge, 19 May 1992, *Snijman & Manning 1249* (NBG, holo.; MO, PRE, iso.).

Plants acaulescent, leaves and flowers reaching 20–30 mm above ground, often in small clumps, occasionally branched. *Corm* narrowly cone-shaped, ± 3–4 mm wide near base, tapering above, ± 15 mm long; tunics moderately to finely fibrous, accumulating with age in a dense mass. *Stem* unbranched. *Leaves* 3 to 5, linear to narrowly lanceolate, 1.5–2.0 mm wide, prostrate or inclined, leathery, without thickened margins or main vein. *Spike* 1- or 2-flowered; bracts membranous, ± 10 mm long, reaching up to 5 mm above ground, outer with upper margin slightly fringed, inner 2-veined and shallowly forked apically. *Flowers* yellow, whitish in tube, usually faintly sweet-scented; perianth tube 15–20 mm long, arising below ground level, extending ± 10 mm above ground, cylindric; tepals subequal, obtuse to emarginate, 6–7 × ± 3 mm, spreading. *Filaments* arising at top of tube, ± 1.5 mm long, decurrent; anthers ± 2 mm long. *Style* dividing at or just beyond mouth of tube, branches short, ± 1 mm long, apices emerging between filaments. *Flowering time*: (April)May–June.

Distribution and ecology: restricted to the arid Knersvlakte of southern Namaqualand in Western Cape,



Distribution of ***Ixia acaulis***.

South Africa, known from four populations; on limestone ridges and outcrops.

Diagnosis: recognised by its acaulenscent habit, short leaves without thickened midrib or margins, and long-tubed yellow flowers with subterranean ovary. Corms are wedged in rock crevices and are very difficult to extract undamaged. The capsules are typical of the genus but are borne at ground level. *Ixia macrocarpa*, a second acaulescent species, is thought to be closely allied to *I. acaulis* as it has similar leaf morphology but the yellow flowers have brown markings at the base of the tepals, filaments inserted at the mouth of the tube, a longer style dividing opposite the middle of the anthers, and unusual, large capsules, ± 20 mm long and sterile in the upper third, unique for the genus.

The immediate relationships of *I. acaulis* within *Ixia* are uncertain but it has provisionally been assigned to sect. *Hyalis* because of the decurrent filaments and membranous bracts without prominent veins. Similar fringed outer bracts are found in *I. linderi* and *I. splendida*, both of which also have an elongate perianth tube but have well-developed aerial stems and anthers included in the perianth tube.

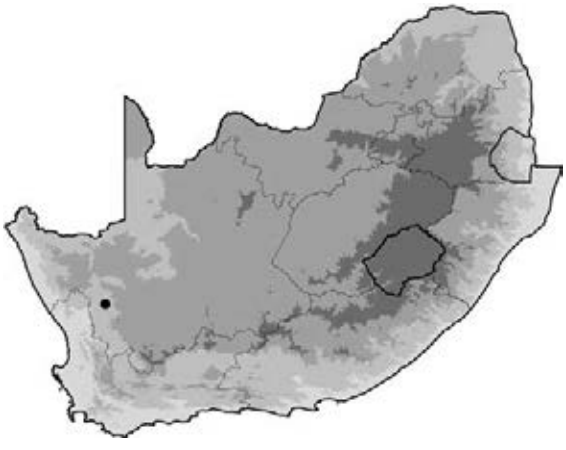
8. **Ixia macrocarpa** *Goldblatt & J.C.Manning* in South African Journal of Botany 98: 112 (2015). Type: South Africa, Northern Cape, clay flats near Loeriesfontein airstrip, 17 Aug. 2014, *Helme 8117* (NBG, holo.).

Plants acaulescent, leaves and flowers reaching 30–50 mm above ground, often in small clumps. *Corm* broadly conic, 6–8 mm diam.; tunics of pale brown, fine, netted fibres. *Stem* underground, sheathed by membranous cataphylls reaching ground level. *Leaves* 6 or 7, falcate-flabellate, basal, 5–15 × (3–)4–6 mm, obtuse, leathery, glaucous, without evident main vein, margins cartilaginous. *Spike* contracted, few-flowered, hidden in leaf bases; bracts membranous, translucent, flushed green distally, outer linear-oblong, ± 30 mm long, median vein visible only near apex, acute, inner slightly shorter with 2 veins visible distally, acute. *Flowers* salver-shaped, pale yellow with red-brown blotch at bases of tepals, presence of scent unknown; perianth tube filiform, 35–45 mm long, cylindric, occluded by walls closely clasping style; tepals spreading, subequal, elliptic, slightly spooned, 12–15 × 4–5 mm. *Filaments* inserted at mouth of tube, united in a column ± 4 mm long; anthers diverging, curving inward distally, ± 4 mm long, yellow. *Ovary* subterranean, flask-shaped, 6 mm long. *Style* dividing just below apex of filament column, ± 2.5 mm long, extending between anthers. *Capsules* largely subterranean, concealed in leaf sheaths, oblong-ellipsoid, 20 × 5 mm, sterile in upper third, splitting at ground level to release seeds. *Seeds* globose, smooth, ± 3 mm diam., reddish brown, raphal vascular trace excluded. *Flowering time*: early to mid-August, probably from mid-July.

Distribution and ecology: known from a single, small population near Loeriesfontein, Northern Cape, South Africa, mostly within the Loeriesfontein Airfield grounds; on stony, shale flats in fine-grained clay ground, in Hantam Karoo vegetation.

Diagnosis: *Ixia macrocarpa,* the second acaulescent species known in *Ixia*, has long-tubed, pale yellow flowers with dark markings at the base of the tepals. Despite the shared acaulescent habit, it may not be closely allied to *I. acaulis,* the other acaulescent species of the genus, restricted to rocky outcrops of limestone and marble in the Knersvlakte southwest of Loeriesfontein. *Ixia macrocarpa* differs in having broader, falcate leaves arranged in a tight fan, filaments united in a column enclosing the style, and diverging anthers. The pale yellow flowers have the tepals marked dark red-brown at the bases. *Ixia acaulis* has narrow, spreading to prostrate leaves, and uniformly yellow flowers with the style dividing opposite the bases of free filaments, and parallel anthers. Seeds of *I. macrocarpa* are smooth and unusually large, ± 3 mm diam.

Ixia macrocarpa is provisionally included in sect. *Hyalis* because of the membranous bracts without prominent veins and broad resemblance to *I. acaulis* but the



Distribution of ***Ixia macrocarpa***.

occluded perianth tube is anomalous in the section. Similar occluded perianth tubes define sect. *Ixia* and sect. *Dichone* and its presence in *I. macrocarpa* thus appears to be a parallel development, in this case related to the acaulescent habit, where the tube functions as a false pedicel, raising the flower above the ground. The capsules are unique in *Ixia* in being flask-shaped, ± 20 mm long and sterile in the upper third. United filaments are unusual in *Ixia* but are known in species of the *I. maculata* group of the genus and *I. monadelpha*, all sect. *Ixia*. These species all have aerial stems and seem unlikely to be closely related to *I. macrocarpa*.

9. **Ixia paniculata** *D.Delaroche*, Descriptiones plantarum aliquot novarum: 26, t. 1 (1766); Lewis: 99: (1962); Goldblatt & Manning: 99 (2011). *Morphixia paniculata* (D.Delaroche) Baker: 97 (1877). *Tritonia paniculata* (D.Delaroche) Klatt: 358 (1882). Type: South Africa, without precise locality or collector, Herb. Burman (G-DEL, holo.).

Ixia longiflora P.J.Bergius: 7, 360 (1767), illegitimate superfluous name for *I. paniculata* D.Delaroche. *Tritonia longiflora* Ker Gawl.: 228 (1804a). *Gladiolus longiflorus* Jacq. (1795), illegitimate homonym, not L.f. (1782). *Hyalis longiflora* Salisb.: 318 (1812). *Babiana longiflora* Steud.: 683 (1821). Type: South Africa, without precise locality, cultivated in Holland, *Kallstrom s.n.* (HBT, holo.).

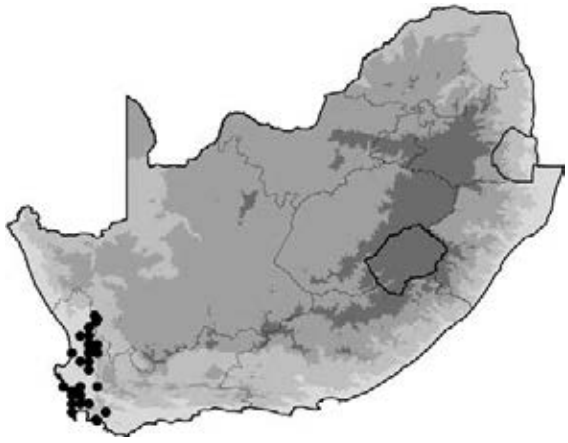
Houttuynia capensis Houtt.: 448 (1780). *Tritonia capensis* (Houtt.) Ker Gawl.: t. 618 (1803b). *Montbretia capensis* (Houtt.) Voigt: 611 (1845). *Acidanthera capensis* (Houtt.) Benth. ex Baker: 187 (1892). Type: South Africa, without precise locality, cultivated in Holland, illustration in Houttuyn: t. 85, f. 3 (1780).

Ixia longiflora Lam.: 342 (1789), illegitimate homonym, not *I. longiflora* P.J.Bergius (1767). Type: Uncertain, P (Herb. Lamarck or Herb. Jussieu).

Ixia tenuiflora Vahl: 66 (1805). *Tritonia tenuiflora* (Vahl) Ker Gawl.: sub t. 1275 (1810a). *Morphixia paniculata* var. *tenuiflora* (Vahl) Baker: 97 (1877). *Waitzia tenuiflora* (Ker Gawl.) Heynh.: 855 (1841). *Montbretia tenuiflora* (Ker Gawl.) Voigt: 611 (1845). *Crocosmia tenuiflora* (Ker Gawl.) Klatt in Peters: 516 (1864). *Morphixia paniculata* var. *tenuiflora* (Vahl) Baker: 97 (1877). *I. paniculata* var. *tenuiflora* (Vahl) Baker: 166 (1892). Type: evidently unknown, possibly Herb. Vahl: C.

Gladiolus ixioides Thunb.: 208 (1811). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS-THUNB 1035, holo.).

Tritonia concolor Sweet: 398 (1826). *Waitzia concolor* (Sweet) Heynh.: 854 (1841). *Montbretia concolor* (Sweet) Voigt: 611 (1845). Type: South Africa, without precise locality or collector, illustration in Ker Gawler: t. 1502, var. γ, *corolla ochroleuca concolor* (1812b).



Distribution of ***Ixia paniculata***.

Plants 500–650 mm high. *Corm* 15–20 mm diam., often bearing cormlets on short, thick stolons from base; tunics of fine netted fibres. *Stem* simple or often with 1 or 2 ascending to horizontal branches, subtended by dry, cuspidate, brown-flecked bracts and prophylls 1.5–3.0 mm long. *Leaves* 5 or 6 in a loose fan, lower leaves becoming dry and brown at flowering, lanceolate, often slightly twisted in upper half, mostly 4–7 mm wide, reaching to middle or to near top of stem; margins and main vein slightly thickened. *Spike* crowded, 8- to 16-flowered, branches mostly 3- to 8-flowered; bracts membranous, translucent below but sparsely to closely flecked with rust-brown distally, (7–)9–15 mm long, outer with 1 prominent vein, acute or obscurely 3-lobed with a prominent central tooth, inner 2-veined, ± as long as outer or slightly longer or shorter, 2-veined, forked apically. *Flowers* pale yellow to creamy beige, lower fifth of tepals sometimes darker, unscented; perianth tube cylindric, 35–65(–75) mm long, widened in upper 3–5 mm; tepals oblong-elliptic, 16–25 mm long, outer ± 6 mm, inner ± 4 mm wide. *Filaments* 5–6 mm long, included (rarely partly exserted), inserted 8–10 mm below mouth of tube; anthers 4.5–7.0 mm long, dark purple (rarely pale), half to fully included with tips ± 1 mm below mouth of tube, rarely fully exserted. *Style* dividing opposite lower to upper third of anthers, rarely opposite anther tips or up to 3 mm beyond them, branches ± 2 mm long. *Flowering time*: mid-November to early December.

Distribution and ecology: extending from the Bokkeveld Mtns north of Nieuwoudtville in Northern Cape through the western half of Western Cape, South Africa to the coast near Kleinmond; in both montane and lowland habitats, usually on sandy or stony sandstone ground in seasonally wet situations, in marshes, seeps, drainage lines or along streams.

Diagnosis: *Ixia paniculata* is distinctive in its fairly tall stature and remarkably long-tubed flowers, the tube usually 40–65 mm long, with the darkly coloured anthers included in the tube (sometimes partly or rarely fully exserted). The perianth is pale yellow to pale beige

with the undersides of the tepals often flushed with pink or red. Plants from inland in the north of its range, from Piketberg to the Bokkeveld Mtns, have tubes 45–65 mm long, those from the coast north of Cape Town are consistently long-tubed, 65–75 mm long, but those from the Cape Peninsula and the False Bay Coast have shorter tubes 35–55 mm long. Collections from the Cape Flats stand out in their pale anthers and style dividing ± 2 mm beyond the anther tips. In other populations the style divides between the lower and upper third of the anthers, exceptionally opposite the anther tips. The anthers, usually dark brown or almost black, are typically 5.0–6.5 mm long and half exserted but sometimes fully included. The Cape Flats plants are particularly unusual, not only in the short perianth tube and long style but the pale anthers are only 4.5 mm long. Flowers of *I. paniculata* are adapted for pollination by long-proboscid flies and along the Western Cape Atlantic Coast are pollinated by *Moegistorhynchus longirostris*. At least in the Bokkeveld Mtns plants set seed in the absence of its pollinator and are thus facultatively autogamous.

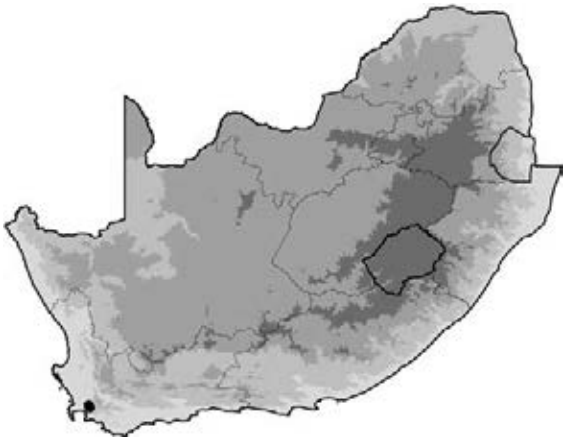
A surprising hybrid from near Kleinmond represents a cross between *Ixia paniculata* and *I. sarmentosa* (sect. *Ixia*). Extensive hybrid swarms between *Ixia paniculata* and *I. monadelpha* (also sect. *Ixia*) occur on Rondenbosch Common on the Cape Peninsula where the two species come into contact. Hybrids in *Ixia* are otherwise rare in the wild and there are no other records of intersectional hybrids in the genus.

Ser. **Fucatae** *Goldblatt & J.C.Manning*, new series. Type: *Ixia fucata* Ker Gawl.

Plants with well-developed stem. *Flowers* pink to white. *Filaments* partly exserted or included, or anthers also included.

10. **Ixia cochlearis** *G.J.Lewis* in Flowering Plants of Africa 25: t. 969 (1945); Goldblatt & Manning: 101 (2011). Type: South Africa, [Western Cape], Jonkershoek, Nov. 1943, *Wicht s.n.* (PRE 27196, holo.; BOL 39125, iso.).

Plants mostly 200–300 mm high, sheathed at base by collar of fibres. *Corm* 14–20 mm diam. with tunics of fine netted fibres. *Stem* unbranched. *Leaves* 4 to 7, upper 1 to 3 partly sheathing; blades narrowly sword-shaped to sublinear, reaching at least to base, or sometimes exceeding spike, 1.5–3.0 mm wide, main vein slightly thickened. *Spike* elongate, mostly 6- to 12-flowered; bracts membranous with dark veins, 4–6 mm long, outer 3-veined and 3-toothed, inner 2-veined and forked apically, slightly exceeding outer. *Flowers* deep pink, presence of scent unknown; perianth tube narrowly funnel-shaped, expanded in upper ⅓, (10–)12–18 mm long, ± 3 mm wide at mouth; tepals subequal, oblong, 14–17 × 6–8 mm, spreading horizontally but remaining concave. *Filaments* ± 10 mm long, usually exserted ± 6 mm; anthers ± 4 mm long, yellow. *Style* dividing opposite anther tips, branches ± 1.5 mm long. *Flowering time*: November, sometimes lasting into early December.



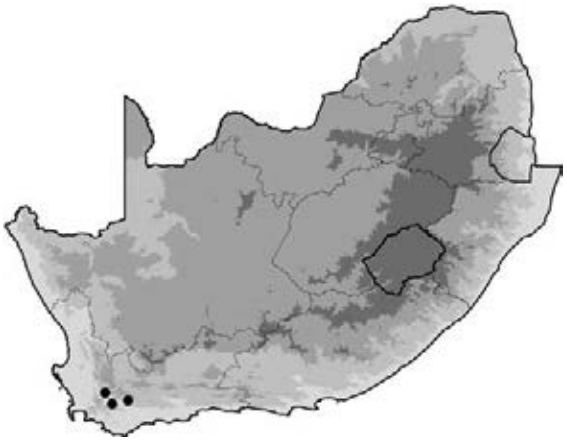
Distribution of ***Ixia cochlearis***.

Distribution and ecology: restricted to the mountains immediately east of Stellenbosch in Western Cape, South Africa; on rocky slopes at elevations of 305–550 m, at least sometimes on granite substrate, flowering well only after fire.

Diagnosis: *Ixia cochlearis* is distinctive in sect. *Hyalis* in the deep pink flowers with a narrowly funnel-shaped perianth tube mostly 12–18 mm long, at least four, and up to seven, narrow, fairly firm leaves, and in the presence of a fibrous collar around the stem base. The relatively long and narrow perianth tube is reminiscent of *I. fucata* and *I. stohriae*, also montane species, but occurring to the north and east, in the Hex River Mtns and Langeberg. These two species have broader, soft-textured leaves and shorter stamens, the filaments exserted only 2–5 mm in *I. fucata* and up to 1 mm in *I. stohriae*, compared with the longer filaments of *I. cochlearis*, which are exserted up to 6 mm.

11. **Ixia fucata** *Ker Gawl.* in Curtis's Botanical Magazine 34: t. 1379 (1811a); Goldblatt & Manning: 101 (2011). Type: South Africa, without precise locality, illustration in Ker Gawl.: t. 1379 (1811a). Epitype: South Africa, [Western Cape], Worcester District, Hex River Mtns, Milner Ridge Peak, west slopes, 5 000–6 000 ft [1 525–1 830 m], 11 Nov. 1943, *Esterhuysen 9326* (BOL, epi.).

Plants (150–)250–400 mm high, usually with weakly developed fibrous collar around base. *Corm* globose, 7–9 mm diam., with tunics of fine, soft, netted fibres. *Stem* usually unbranched, or with a single short, erect branch subtended by translucent, membranous, attenuate bracts and prophylls 2–3 mm long, these present even when branch not produced. *Leaves* (3)4 or 5, narrowly sword-shaped to sublinear, 1.5–3.0 mm wide, main vein and margins usually slightly thickened, uppermost (1)2 leaves largely or entirely sheathing. *Spike* flexuose, (2–)4- to 7(–14)-flowered; bracts 5–8 mm long, outer 5-veined and acutely 3-toothed, inner bracts as long or slightly longer than outer, 2-veined and forked



Distribution of ***Ixia fucata***.

apically. *Flowers* salver-shaped, suberect, sometimes with unilateral stamens, white to pale or deep pink with darker lines or streaks at mouth of tube and uniformly pink or red outside; perianth tube 10–15 mm long, straight, slightly flared, ± 2 mm diam.; tepals subequal, 12–14 × ± 6 mm, spreading at right angles to tube. *Filaments* 3–6 mm long, exserted ± 2–5 mm from tube; anthers 3.5–4.0 mm long, shortly tailed, often purple; pollen yellow (brown). *Style* dividing opposite lower third to middle of anthers, branches 2.0–2.5 mm long, recurved. *Flowering time*: mainly late September to early November, occasionally in early September.

Distribution and ecology: restricted to higher elevations of the Hex River Mtns, Keeromsberg and the western Langeberg as far east as Montagu in Western Cape, South Africa; on sandstone slopes and outcrops in restioid fynbos, evidently flowering well only in the years immediately following a wildfire unless in exposed situations.

Diagnosis: based on a plant of unknown provenance grown in Great Britain, the type of *Ixia fucata* is an illustration of a species of *Ixia* with a white flower, pink on the outside and with small red streaks at the base of the tepals. The yellowish tube is narrow but well developed, and there are five narrowly sword-shaped (± sublinear) leaves, the uppermost of which sheaths the stem for about ⅔ its length. The name is now associated with plants from the Hex River Mtns. *Ixia fucata* is somewhat variable: plants from the Langeberg have pink flowers, with the bases of the tepals red, the outside of the tube and tepals are dark pink, and unusual for *Ixia*, the stamens are unilateral and declinate. The parallel anthers thus lie in one plane and face upward toward the top of the spike. In contrast, plants from the Hex River Mountains have symmetrically disposed stamens.

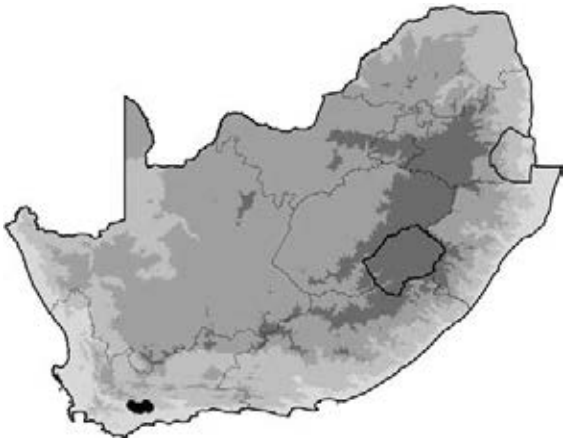
12. **Ixia stohriae** *L.Bolus* in South African Gardening and Country Life 21: 281 (1931a); Goldblatt & Manning: 102 (2011). Type: South Africa. [Western Cape], Swellendam, Tradouw Pass, 14 Sept. 1931, *Smith s.n.* (BOL 19879, lecto., designated by Lewis: 97 (1962); K, isolecto.).

Tritonixia conferta Klatt: 356 (1882) [not *Ixia conferta* R.C.Foster]. Type: South Africa, [Western Cape], Voormansbosch, Oct. ± 1830, *Zeyher 4014* (SAM, lecto., designated by De Vos: 29 (1999); K, PRE, Z, isolecto.).

Plants 180–400 mm high. *Corm* globose, 9–12 mm diam. bearing small cormlets at base; tunics of fine, netted fibres. *Stem* usually 1- to 3-branched, or simple, branches subtended by pale, membranous, darkly keeled bracts and prophylls 2–4 mm long. *Leaves* (4)5 or 6(–8), lower with well-developed blades grading partly to almost entirely sheathing above, blades narrowly sword-shaped to sublinear, usually reaching to ± base of spike, (2–)3–5(–6) mm wide, relatively firm-textured, main vein slightly raised, when dry a pair of secondary veins evident. *Spike* 5- to 10-flowered; bracts membranous, pale and translucent, ± 5 mm long, outer 3-veined and shortly 3-toothed, inner 2-veined and 2-toothed, slightly shorter than outer. *Flowers* pale pink, dark pink on reverse of tepals, tube dark red-purple outside, unscented; perianth tube widening very gradually from base to apex, (12–)14–22 mm long; tepals subequal, ovate, 12–14 mm long, spreading at right angles to tube. *Filaments* 1.5–3.0 mm long, inserted 2–4 mm below mouth of tube, included or exserted up to 1 mm; anthers 2–3 mm long, exserted or partly to entirely included in tube, yellow; pollen yellow. *Style* dividing 0.5–1.0 mm below anther bases, branches 1.0–2.3 mm long, tips reaching at least to anther bases, rarely shortly exceeding anther tips. *Flowering time*: late August to mid-September.

Distribution and ecology: endemic to the central Langeberg of Western Cape, South Africa, occurring in Protea Valley above Swellendam and Voormansbosch nearby, as well as in Tradouw Pass and Grootvadersbos to the east; on rocky sandstone slopes, flowering only in the years immediately after fire.

Diagnosis: *Ixia stohriae* is recognised by the pink flowers with a relatively long, nearly cylindric perianth tube mostly 14–22 mm long and by the partly included



Distribution of ***Ixia stohriae***.

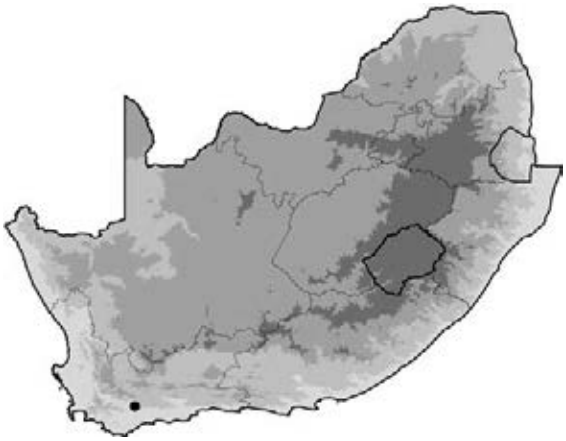
(rarely just exserted) anthers. Well-grown plants may reach as much as 400 mm high. *Ixia stohriae* appears to be most closely allied to *I. fucata* of the western Langeberg and Hex River Mtns to the west and they are virtually identical vegetatively. *Ixia fucata* has either white or pink flowers, the filaments are exserted 2–5 mm from the tube, and the style branches are consistently longer than in most collections of *I. stohriae*, 2.0–2.5 mm long.

13. **Ixia recondita** *Goldblatt & J.C.Manning* in Bothalia 41: 103 (2011). Type: South Africa, [Western Cape], Montagu, kloof at base of Leeuriviersberg [Grootberg], on sparsely vegetated sloping ledges, pale pink, 1 Sept. 1958, *Esterhuysen 27870* (BOL, holo.; K, MO, iso.).

Plants 250–750 mm high. *Corm* globose, 10–12 mm diam., bearing small cormlets at base; tunics of fine, netted fibres. *Stem* erect or inclined, rarely with 1 branch subtended by membranous, darkly keeled attenuate bracts and prophylls 2–4 mm long. *Leaves* (3)4, lower 2 or 3 with well-developed blades, uppermost partly to almost entirely sheathing, blades narrowly sword-shaped to sublinear, usually exceeding stem but trailing above, (2–)3–4(–6) mm wide, soft-textured, main vein slightly raised, when dry a pair of secondary veins evident, margins not thickened. *Spike* subsecund, crowded, suberect or inclined, 4- to 8-flowered, branches with fewer flowers; bracts membranous, pale translucent with dark veins, flushed pink distally, 5–6 mm long, outer 3-veined and 3-toothed, inner 2-veined and 2-toothed, ± as long to slightly longer or shorter than outer. *Flowers* salver-shaped, pale pink, with a small, dark purple mark at tube apex between tepal bases, flushed red outside, unscented; perianth tube 10–12 mm long, subcylindric, widening gradually from base to apex, ± 1.5 mm diam. at mouth; tepals subequal, oblong-elliptic, 10–13 × 4–5 mm, spreading at right angles to tube. *Filaments* included in tube, 2–3 mm long, inserted ± 3 mm above tube base, shortly decurrent; anthers 2.0–2.5 mm long, tips reaching 3.5–5.0 mm below tube mouth, white; pollen yellow. *Style* 1–2 mm long, dividing shortly below or opposite filament bases, branches 1.5–2.0 mm long, reaching to base or middle of filaments. *Flowering time*: late August to mid-October.

Distribution and ecology: a narrow endemic of southern Western Cape, South Africa, restricted to the Leeuriviersberg, now Grootberg, section of the Langeberg west of Swellendam, collected only twice; on stony, south-facing slopes and rocky ledges, possibly flowering well only after fire.

Diagnosis: *Ixia recondita* is distinctive in having not only the filaments but also the anthers, style and style branches included within the narrow perianth tube, and in its soft-textured leaves. It broadly resembles *I. stohriae*, which also has short filaments, either included in the perianth tube or shortly exserted up to 1 mm and the bases of the anthers sometimes partly included in the tube, but is otherwise a more robust plant and most collections consist of plants with sturdy, erect



Distribution of ***Ixia recondita***.

stems with at least one branch (rarely up to 5 branches). The style in *I. stohriae* reaches at least to the middle of the anthers and sometimes exceeds them, thus always reaching the mouth of the perianth tube. This contrasts with the condition in *I. recondita*, in which the style, just 2–3 mm long, divides opposite the filament bases in the lower half of the perianth tube and the style branches barely reach the middle of the filaments.

Like *Ixia stohriae* and closely related *I. fucata*, *I. recondita* usually has four leaves, sometimes three or five, the lower two or three with well-developed blades and the upper one or two partly to almost entirely sheathing. In the length of the perianth tube, ± 12 mm long, *I. recondita* is intermediate between its two relatives: the tube of *I. stohriae* is (12–)14–22 mm long, and that of *I. fucata* 10–15 mm long. Both *I. fucata* and *I. stohriae* are Langeberg endemics, the latter recorded from the mountains between Grootvadersbos and Swellendam, while *I. fucata* occurs further west from Montagu to Keeromsberg, as well as in the Hex River Mtns. The range of *I. recondita* thus lies between that of its two relatives.

Ser. **Angustisiphon** *Goldblatt & J.C.Manning*, new series. Type: *Ixia orientalis* L.Bolus

Plants with well-developed stem. *Flowers* mostly pale pink, white or yellow, also orange; perianth tube narrowly funnel-shaped, almost filiform below, only slightly wider above. *Filaments* sometimes barely exserted. *Style* usually dividing below or opposite bases of anthers.

14. **Ixia orientalis** *L.Bolus* in South African Gardening and Country Life 19: 27 (1929b); Goldblatt & Manning: 104 (2011). Type: South Africa. [Eastern Cape], Albany, between Seven Fountains and Sidbury, Nov. 1928, *Dyer 1684* (BOL, holo.; GRA, K, PRE, iso.).

Ixia alba Eckl.: 27 (1827), illegitimate homonym, not *I. alba* L. (= *Sparaxis bulbifera* (L.) Ker Gawl.). Type: South Africa, [Western Cape], *Ecklon & Zeyher 70.10* (PRE, S, syn.).

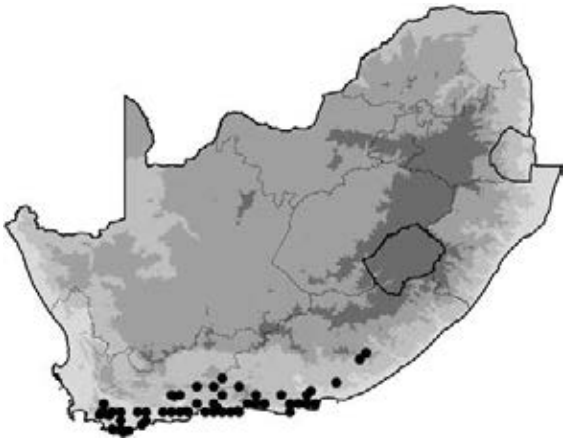
Ixia scariosa var. *longifolia* Baker: 165 (1892). Type: South Africa, [Western Cape], mountains at Avontuur, Nov. 1870, *H. Bolus 2487* (K, lecto., designated by De Vos: 33 (1999); BOL, isolecto.).

Plants usually 400–600(–800) mm high. *Corm* globose, with sessile cormlets at base; tunics of fine to medium-textured fibres. *Stem* 1- to 3(4)-branched, rarely unbranched; branches suberect, closet to main axis, subtended by membranous, attenuate bracts and prophylls mostly 3–5 mm long. *Leaves* (3)4 to 6, narrowly sword-shaped to sublinear, 1.5–6.5(–8.0) mm wide, upper 1 or 2 leaves partly sheathing. *Main spike* erect, flexuose, (2–)7- to 12(–16)-flowered, lateral spikes 2- to 8-flowered; bracts membranous, 5–8 mm long, usually ± 1 internode long, occasionally longer, outer with 1 prominent vein and prominent central cusp, sometimes with a shorter tooth either side of central cusp, inner bract 2-veined and forked apically, slightly shorter to slightly longer than outer. *Flowers* salver-shaped, pink or white, not scented; perianth tube narrowly funnel-shaped, 8–12 mm long, lower half filiform; tepals ovate, 10–14(–16) × 5–8 mm, spreading horizontally. *Filaments* 5–6 mm long, exserted 2–4 mm; anthers 4–5 mm long. *Style* dividing below base to lower third of anthers, rarely opposite upper third of anthers, branches mostly 4–5 mm long, ascending, emerging between anthers. *Flowering time*: mainly mid-September to late October, as late as December at high elevations.

Distribution and ecology: the most widespread species of the genus, extending from Bot River and Villiersdorp in Western Cape to Bathurst and the Amatole Mtns in Eastern Cape, South Africa; in a remarkably varied range of habitats, including seasonally marshy sites, stony coastal grassland, clay hills, and well-drained sandstone slopes and flats.

Diagnosis: one of only two species of the genus that extend outside the Greater Cape flora region (the other being *Ixia marginifolia*), *I. orientalis* is a relatively unspecialised species lacking any outstanding features, thus difficult to diagnose. It can be identified by the combination of branched stems, spikes often with seven or more flowers, four to six leaves (rarely only three), none completely sheathing the stem, and small, pink or white flowers. The perianth tube, 8–12 mm long, is narrowly funnel-shaped with the proximal half to two thirds always extremely narrow. Well-grown specimens have stems with 2 to 4 branches and the main spike usually bears 7 to 12, rarely up to 16 flowers, although in plants from the mountains of the southern Cape the stems may be unbranched and the spikes have fewer flowers. Typical plants from Eastern Cape have the largest flowers, with the tube 12 mm and tepals ± 14 mm long, but to the west, particularly around Caledon, flowers are smaller, sometimes with a tube only 8 mm long and tepals ± 10 mm long, but there seem to be no other differences and the pattern of variation lacks clear discontinuities so that it is impossible to recognise infraspecific taxa.

Late flowering, *I. orientalis* is seldom seen before the middle of September, although there are records as early as August. It may be most closely related to the largely montane Western Cape species, *I. odorata*, which typically has slightly smaller flowers, usually yellow, rarely white, with a strong sweet scent and distinctive, relatively short filaments up to 3 mm long (measured to the base of the anthers), and the style dividing between the base and apex of the filaments. This contrasts with longer filaments, up to 6 mm long, and a style usually dividing between the base and upper third of the anthers (rarely shortly below the filaments) in *I. orientalis*. It is also difficult to distinguish from *I. flexuosa* (sect. *Ixia*) without careful dissection. Both may have a perianth tube of similar length, with a relatively short, wider distal portion, a style often dividing opposite the bases of the anthers, and many-flowered spikes. The filaments, inserted at the base of the wider part of the tube are uniformly narrow and shortly decurrent in *I. orientalis* and although similarly positioned in *I. flexuosa*, the filaments are flattened and broader toward the bases, the feature that places it in sect. *Ixia* rather than sect. *Hyalis*.



Distribution of ***Ixia orientalis***.

Observations on pollination indicate that *I. orientalis* is a generalist: insect visitors include large butterflies, hopliine beetles and large anthophorine bees.

15. **Ixia odorata** *Ker Gawl.* in The botanist's register 7: Notes [3] (1821a); Ker Gawler: 101 (1827); Goldblatt & Manning: 106 (2011). *Morphixia odorata* (Ker Gawl.) Baker: 97 (1877). *I. erecta* var. *lutea-odorata* Ker Gawl.: t. 1173 (1809). Type: South Africa, without precise locality or collector, cultivated in Britain, illustration in Ker Gawl.: t. 1173 (1809).

Ixia erecta Thunb.: 16 (1783), illegitimate homonym, not *I. erecta* P.J.Bergius (1767). *I. avellana* R.C.Foster: 47 (1936), as replacement name for *I. erecta* Thunb. Type: South Africa, without precise locality, *Thunberg* s.n. (S, UPS-THUNB, syn.).

Ixia flavescens Eckl. ex Baker: 161 (1892). *Ixia polystachya* var. *flavescens* (Eckl. ex Baker) Baker: 78 (1896). Type: none cited in protologue but *Zeyher s.n.* from Worcerster cited by Baker (1896) and

Zeyher s.n. (TUB 006804) is a potential syntype that authenticates the name).

Ixia odorata var. *hesperanthoides* G.J.Lewis: 96 (1962). Type: South Africa, [Western Cape], Piketberg, top of ridge south of Zebra Kop, 9 Nov. 1934, *Pillans 7184* (BOL, (two sheets), PRE, SAM, syn.).

[*Ixia flavescens* Eckl.: 26 (1827), invalid name without description.]

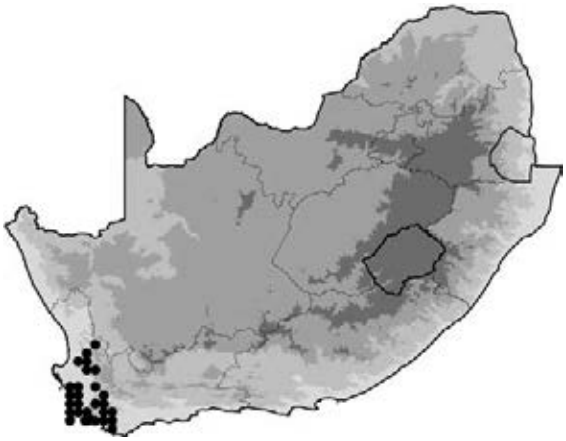
[*Agretta pallidiflavens* Eckl.: 24 (1827), genus invalid.]

Plants (200–)400–550 mm high. *Corm* 6–8 mm diam.; tunics of fine netted fibres. *Stem* slender, simple, rarely 1-branched; branches subtended by short, acute bracts and prophylls ± 1 mm long. *Leaves* (3)4 to 6(–10), lower 2 to 4 with expanded blades, reaching to ± middle of stem, narrowly sword-shaped to lanceolate, often slightly twisted distally, 2–10 mm wide, upper 1 or 2 partly sheathing. *Spike* erect, crowded, mostly 10- to 16-flowered; bracts membranous, translucent, rarely flushed pink, 6–7 mm long, usually 1.5–2.0 internodes long, sometimes longer, outer usually with a single prominent vein and 1 central cusp, or obscurely 3-lobed with central cusp prominent, inner ± as long as outer, 2-veined and shallowly forked at apex. *Flowers* clear yellow (often whitish when dry), rarely white, outer tepals sometimes flushed red to brown outside, sweetly scented; perianth tube filiform below, flared in upper third, (7–)8–12 mm long, 3–5 mm wide at mouth; tepals subequal, 9–11 × ± 5 mm, spreading horizontally. *Filaments* 2.5–3.0 mm long, exserted 1.5–2.0 mm; anthers 5–6 mm long, yellow. *Style* dividing between base and apex of filaments, thus within tube up to ± 2 mm above mouth of tube, branches (3–)4–6 mm long, arching outward below or between bases of anthers. *Flowering time*: mid-September to early November.

Distribution and ecology: extending in Western Cape, South Africa, from the Piketberg and Olifants River Mtns near Citrusdal south to the Cape Peninsula and eastward to Hermanus and Elim; largely montane and usually on sandstone slopes but also on granite-derived soils in the vicinity of Darling.

Diagnosis: *Ixia odorata* is well named for its particularly sweetly scented flowers crowded at the top of the short spike. Typical *I. odorata* has the following characteristics: bracts 6–7 mm long; perianth tube 7–12 mm long; tepals 9–11 × ± 5 mm; filaments 2.5–3.0 mm long, exserted 1–2 mm; anthers 5–6 mm long.

Populations of short, few-flowered plants from middle and upper elevations in the Hottentots Holland–Jonkershoek Mt complex are now treated as a separate species, *I. esterhuyseniae*, this very different in stature from the taller, fairly small-flowered *I. odorata*, but they share outer floral bracts with a single main vein and usually a single tooth, in contrast to the more common 3-veined and 3-dentate outer bracts of the genus. Apart from its low stature, *I. esterhuyseniae* has style branches dividing above the bases of the anthers, usually opposite



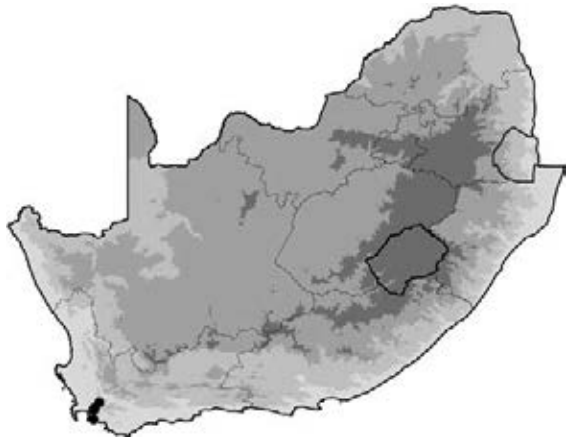
Distribution of ***Ixia odorata***.

the middle third of the anthers, thus unlike *I. odorata* in which the style divides below the anthers, sometimes within the tube and opposite the bases of the filaments.

Plants treated as *I. odorata* var. *hesperanthoides* Lewis (1962) remain puzzling. The type collection has white flowers with a perianth tube only ± 5 mm long, tepals ± 8 mm long, and anthers 3.5–4.5 mm long, all smaller than in typical *I. odorata*. Other features accord with typical *I. odorata*, although the length of the style branches is also shorter than the normal 4–5 mm of the species. The type collection was said to have flowers opening in the late afternoon, unlike ± 11:00 for typical, yellow-flowered *I. odorata*, indicating that some white-flowered populations, as the type of var. *hesperanthoides*, represent a separate race, possibly even a separate species. Additional research is needed to assess their status. *Ixia odorata* is sometimes mistaken for the southern Western Cape and Eastern Cape *I. orientalis* and the two can be confused when flower colour is not known, although the latter is almost always branched, whereas *I. odorata* is rarely so. White- or pink-flowered *I. orientalis* has a perianth tube of similar dimensions, and with a filiform lower portion but the style typically divides opposite the base of the anthers (rarely just below them), and it has longer filaments 5–6 mm long (vs. 2.5–3.0 mm) exserted 2–4 mm (vs. 1–2 mm), and unscented or only weakly scented flowers.

16. **Ixia esterhuyseniae** *M.P.de Vos* in South African Journal of Botany 54: 600 (1988); Goldblatt & Manning: 107 (2011). Type: South Africa, [Western Cape], Somerset West, peaty slope along Panorama trail, after fire, 3 000 ft [915 m], 9 Jan. 1973, *Esterhuysen 33089* (BOL, holo.; MO, iso.).

Plants mostly 100–150(–200) mm high. *Stem* simple or rarely with 1 short, suberect branch subtended by attenuate, brown-tipped bracts and prophylls, bracts 4–8 mm long and prophylls 2–3 times longer, up to 18 mm long. *Corm* depressed-globose, 8–10 mm diam.; tunics of fine fibres. *Leaves* 5 or 6, all with expanded



Distribution of ***Ixia esterhuyseniae***.

blades or uppermost largely sheathing, sword-shaped, reaching to between middle and top of stem, 4–6 mm wide, main vein slightly raised. *Spike* crowded, closely 2- to 4(–6)-flowered; bracts membranous, ± 4.5 mm long, outer with a prominent central vein, inner 2-veined and bidentate. *Flowers* rotate, upright, yellow, tepals flushed red to purple outside, lily-scented; perianth tube funnel-shaped, flared in upper half, 4.5–6.0 mm long, ± 4.5 mm wide at mouth; tepals subequal, 10–11 × 5–6 mm, spreading horizontally. *Filaments* ± 3.5 mm long, exserted ± 1.5 mm; anthers 3.5–4.0 mm long, yellow. *Style* dividing opposite lower to middle ⅓ of anthers, branches 2.0–2.5 mm long, extending between upper ⅓ of anthers. *Flowering time*: December and January.

Distribution and ecology: restricted to the Jonkershoek–Hollentots Holland Mt complex of Western Cape, South Africa; at relatively high elevations, usually over 1 000 m, in seeps and along drainage lines and flowering in midsummer, usually only in the years following a fire.

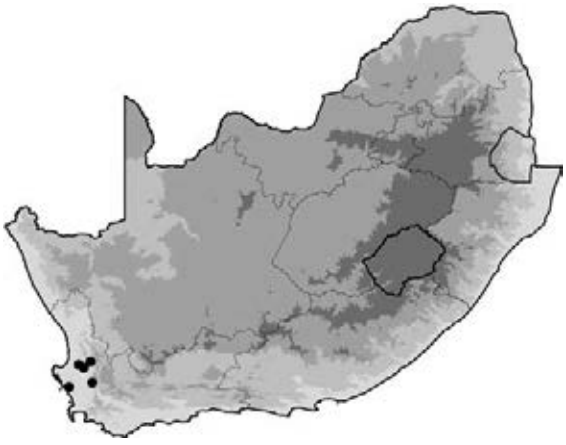
Diagnosis: *Ixia esterhuyseniae* can be confused with *I. odorata*, normally a taller plant with multi-flowered spikes, but *I. esterhuyseniae* has a shorter and sometimes wider perianth tube, 4–5 mm long and ± 4.5 mm wide at the mouth (vs. (7–)8–12 mm long and 3–5 mm wide at the mouth in *I. odorata*), the tepals thus about twice as long as the tube. The style divides opposite the middle of the anthers into branches ± 2.5 mm long, whereas in *I. odorata* the style divides below the anther bases (sometimes opposite the bases of the filaments), and the style branches are up to 5 mm long. Preliminary observations of the pollination of *I. esterhuyseniae* indicate that the only insect visitors are the short-proboscid horsefly, *Philoliche atricornis*, the likely pollinator.

17. **Ixia aurea** *J.C.Manning & Goldblatt* in Bothalia 29: 61 (1999); Goldblatt & Manning: 107 (2011). Type: South Africa, [Western Cape], Farm Wolwefontein west of Darling, rocky slope among granite boulders, 22 Sept. 1998, *Goldblatt & Manning 11029* (NBG, holo.; K, MO, PRE, S, WAG, iso.).

Plants 200–400 mm high. *Corm* globose, ± 10 mm diam., often with a few small cormlets at base; tunics of fairly fine netted fibres. *Leaves* 5 or 6, all basal, narrowly lanceolate, usually reaching to ± middle of stem, (8–)10–16 mm wide, lightly twisted in upper half, uppermost leaf usually entirely sheathing, margins and main vein not or hardly thickened. *Stem* usually unbranched. *Spike* flexuose, crowded, (6–)12- to 20-flowered; bracts dry, translucent, outer ± 7 mm long, with prominent dark central vein, obscurely 3-toothed, central tooth cusp-like and much exceeding lateral teeth, inner ± as longer as outer, 2-keeled, each with a prominent dark vein, 2-toothed. *Flowers* salver-shaped, actinomorphic, uniformly deep yellow or light orange, scentless; perianth tube narrowly funnel-shaped, 8–11 mm long, filiform in lower ½–⅔, widening gradually above, basal part tightly clasping style, with nectar in upper third; tepals obovate-elliptic, subequal, spreading, margins slightly upcurved, 16–23 × 7–9 mm. *Filaments* inserted ± 1 mm below apex of tube, decurrent for ± 1 mm, 5–6 mm long, straight, slightly diverging; anthers 5–6 mm long (before anthesis), diverging, yellow; pollen yellow. *Ovary* ovoid, ± 3 mm long; style straight, erect, dividing opposite lower ⅓ of anthers, branches arching outward, 4.5–6.5 mm long, reaching to shortly above base of anthers. *Flowering time*: September, occasionally in early October.

Distribution and ecology: a rare endemic of the Western Cape lowlands, South Africa, extending from the lower slopes of the Olifants River Mtns south of Citrusdal to the Piketberg and Darling; on granitic, sandy gravel or sandstone derived soils.

Diagnosis: *Ixia aurea* has bright yellow-orange flowers in crowded spikes and has been confused with *I. dubia* (sect. *Ixia*), because of the general resemblance to that species, despite the lack of a dark central mark to the flowers. The flowers of *I. aurea* have a narrowly funnel-shaped tube, tightly enclosing the style in the cylindric lower half but containing nectar in the upper third unlike *I. dubia*, in which the perianth tube is cylindric and closely clasping the style almost to the apex and the filaments are basally coherent or connate, thus



Distribution of ***Ixia aurea***.

occluding the mouth of the tube. In *I. aurea* the filaments diverge from the base and do not block the tube. The relationships of *I. aurea* lie with the short-tubed species, possibly *I. odorata*, flowers of which are sweetly scented, smaller, pale yellow or white and have tepals up to 15 mm long (vs. 16–23 mm in *I. aurea*). The flowers of *I. aurea* are pollinated by a range of insects, mainly hopliine beetles but the horsefly *Mesomyia edentula* has also been reported as a visitor.

18. **Ixia tenuifolia** *Vahl*, Enumeratio plantarum 2: 62 (1805); Goldblatt & Manning: 108 (2011). Type: South Africa, without locality or collector, (C: Herb. Vahl, holo.).

Ixia pulcherrima Eckl.: 25 (1827). Type: none known but *Zeyher s.n.*, from near Klipfontein (PRE), annotated '*Ixia* sp. (*I. pulcherrima* Eckl.)', possibly by P. MacOwan, appears to authenticate the identity of the species; *Ecklon & Zeyher Irid 81* (MO, SAM) '*Ixia pulcherrima*' Groenekloof, and '*Ixia pulcherrima* Eckl.' from Klipfontein, Zwartland likewise authenticate the name.

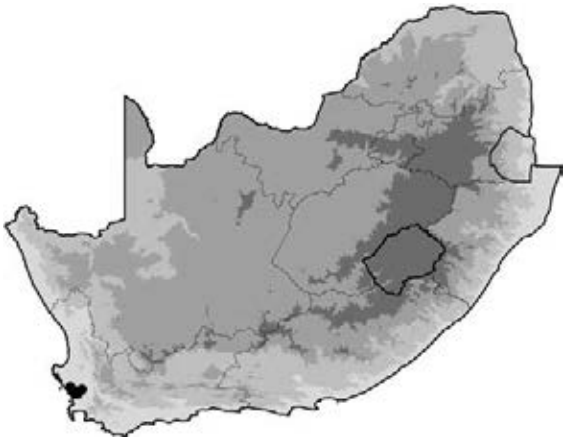
Ixia framesii L.Bolus: 368 (1931b); Lewis 91 (1962). Type: South Africa, [Western Cape], near Darling, September 1928, flowered in Cape Town, Sept.–Oct. 1931, *Ross-Frames s.n.* (BOL 19896, holo.; K, iso.).

[*Freesea mineatolateritia* Eckl.: 30 (1827), genus invalid.]

Plants 120–240 mm high. *Corm* 10–18 mm diam.; tunics of fine, soft netted fibres. *Stem* unbranched, wiry. *Leaves* mostly 3(4), reaching or shortly exceeding spike, firm-textured, linear, 1.3–2.0 mm wide, main vein ± central or displaced abaxially, uppermost leaf sheathing in lower half. *Spike* densely 3 to 8(–14)-flowered; bracts dry-membranous, 6–8 mm long, opaque, pale below, rust-brown distally, outer with 1 prominent vein, acute, inner 2-veined and 2-toothed, ± as long as outer. *Flowers* salver-shaped, salmon-pink or yellow to orange, dark red-brown in centre, unscented; perianth tube filiform below, narrowly funnel-shaped in upper third, 3–5 mm wide at mouth, (12–)15–19 mm long; tepals subequal, 15–19 × 8–10 mm, spreading horizontally. *Filaments* 4–5 mm long, exserted 1.0–1.5 mm; anthers ± 5 mm long, yellow. *Style* dividing just below or shortly above anther bases, branches 2.5–3.0 mm long. *Flowering time*: mainly mid-September to mid-October.

Distribution and ecology: endemic to the rolling plains between Cape Town and Malmesbury in Western Cape, South Africa, and common until the 1950s; on seasonally moist, loamy flats. Intense agricultural development since the 1960s has eliminated it from almost its entire range and the only known viable population occurs in the Nature Reserve at Riverlands, near Mamre Road Station.

Diagnosis: *Ixia tenuifolia* is readily identified not only by the relatively long perianth tube, (12–)15–19 mm, particularly narrow in the lower half, and short floral bracts, 6–8 mm long, but by the unbranched stem and firm, leathery, straight leaves. The floral bracts are distinctive in being ± opaque, pale in the lower half and rust-brown above. The flowers, either deep salmon-pink, orange-red or yellow to orange, usually have a dark brown or reddish centre.



Distribution of ***Ixia tenuifolia***.

Pollination studies show that *I. tenuifolia* has a bimodal pollination system, the flowers visited by the hopliine beetle, *Lepithrix ornatella* and by the horsefly *Philoliche atricornis* (Tabanidae), which presumably feeds on nectar retained in the perianth tube.

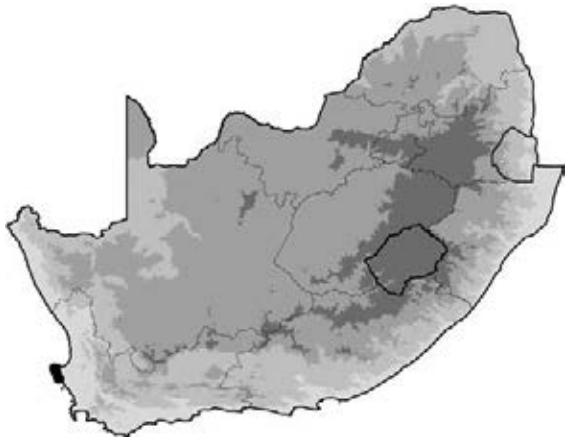
19. **Ixia purpureorosea** *G.J.Lewis* in Journal of South African Botany 28: 126 (1962); Goldblatt & Manning: 109 (2011). Type: South Africa, [Western Cape], Saldanha Bay, Postberg, 8 Sept. 1957, *Lewis 5243* (NBG, holo.).

Plants mostly 400 to 600 mm high. *Corm* up to 20 mm diam., with broad, fasciated stolons up to 60 mm long, branching distally and each branch with a small terminal cormlet; tunics of brown, membranous layers later becoming fibrous. *Stem* simple or with 1 short branch subtended by acute bracts and prophylls. *Leaves* 4 or 5, sword-shaped, often slightly twisted distally, main vein thickened, margins not raised, upper 2 leaves sheathing stem, uppermost often entirely sheathing. *Spike* fairly crowded, mostly 15- to 20-flowered; bracts translucent white turning pale straw-coloured above with age, mostly ± 8 mm long, ± reaching node above, outer obscurely 3-veined, central vein more prominent, 3-lobed, central lobe longest, acute, outer lobes ± obtuse, inner 2-veined and 2-cusped. *Flowers* salver-shaped, pink-purple, dark purple in throat, bases of tepals white sometimes edged with pale pink, tube dark red-purple to brown outside, unscented; perianth tube 13–15 mm long, ± filiform below, flaring in upper 3 mm, with nectar held in upper part; tepals ovate, 20–22 × 10 mm long spreading but remaining ± spooned. *Filaments* erect, contiguous, white, ± 4 mm long, exserted ± 2.5 mm from tube; anthers diverging, 6–8 mm long, yellow. *Style* dividing opposite or shortly above base of anthers, branches arching

outward, between anthers, white, ± 5.5 mm long. *Flowering time*: September to early October.

Distribution and ecology: an edaphic endemic, restricted to the environs of Saldanha Bay in Western Cape, South Africa; in pockets of peaty sand in crevices in rocky, limestone pavement.

Diagnosis: *Ixia purpureorosea* is recognised by the purple-pink flowers with the tepals white at the base, sometimes edged with pale pink, and a perianth tube dark red-purple to brown outside. A particularly striking feature of *I. purpureorosea* is the presence of one or more broad stolons produced from the corm base. Unique in the genus, the stolons are thick and fasciated, up to 60 mm long, branching distally with each branch bearing a small terminal cormlet.



Distribution of ***Ixia purpureorosea***.

Sect. 2. **Ixia**

Ixia [unranked] *Eurydice* Pers.: 48 (1805). *I.* subg. *Eurydice* (Pers.) Baker: 92 (1877). Type: *I. monadelpha* D.Delaroche.

Flowers with a filiform perianth tube, usually well developed and sometimes elongate; anthers linear, dehiscent along their entire length; style branches narrowly channelled, and stigmatic along the margins, sometimes only toward the tips. The stamens are always symmetrically arranged with the filaments inserted at the base of the tepals and not decurrent. Leaf number is indeterminate, but usually at least four and up to 10. The upper leaves decrease in size progressively above, becoming partly to largely sheathing, but lack a sharp distinction between basal foliage and upper sheathing leaves. Flowers are usually unscented and often brightly coloured and frequently have a dark central mark, either restricted to the tepal bases or including the filaments and sometimes the anthers and style branches.

Species 29: southwestern Western Cape, South Africa.

Ser. **Longistylae** *Goldblatt & J.C.Manning* in South African Journal of Botany 104: 180 (2016a). Type: *Ixia patens* Aiton

Flowers usually with dark markings in centre or pale in centre or uniformly coloured. *Stamens* free but filaments sometimes contiguous. *Style* dividing opposite upper half of filaments or opposite anthers (rarely above anther apices).

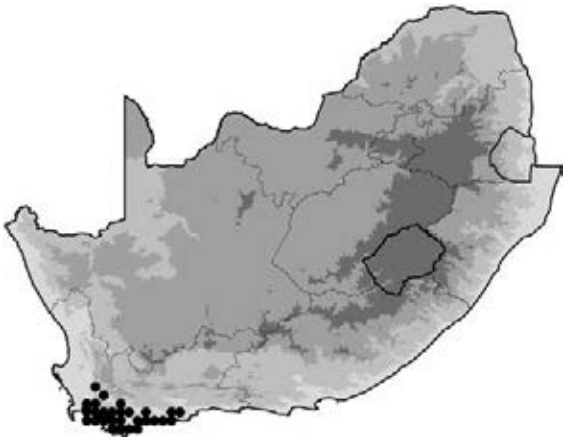
20. **Ixia flexuosa** *L.*, Species plantarum, edn. 2, 1: 51 (1762); Lewis: 110 (1962); Goldblatt & Manning: 180 (2016a). *I. flexuosa* Mill.: 3 (1768), illegitimate superfluous name based on the same type. Type: South Africa, without precise locality or collector, illustration in Miller: t. 156, f. 2 (1760).

[*Ixia pallidorosea* Eckl.: 24 (1827), invalid name without description.]

Plants 300–600 mm high. *Corm* ± globose, 8–13 mm diam.; tunics of fine, ± netted fibres. *Stem* usually with 1 to 3 short, suberect branches. *Leaves* usually 4 or 5, lower 3 or 4 linear to narrowly sword-shaped, ± as long as stem, 2–5 mm wide, firm, often slightly twisted, uppermost leaf sheathing stem with short free apex. *Main spike* crowded, mostly 6- to 12-flowered; bracts 5–7 mm long, translucent, usually flushed pink, outer with 3 prominent veins, 3-toothed, central tooth sometimes much exceeding laterals, inner 2-veined, 2-toothed. *Flowers* rotate, pale pink, mauve or ± white, usually with darker veins radiating from tepal bases, usually strongly scented; perianth tube filiform, 4–6 mm long; tepals united basally for ± 1 mm, ± elliptic, obtuse, 10–16 mm long, spreading. *Filaments* inserted at top of tube, 3.5–4.5 mm long, broader at base; anthers ± linear, 3.0–4.5 mm long, white to creamy yellow. *Style* dividing opposite upper ⅓ of filaments to middle of anthers, branches 2–4 mm long. *Flowering time*: mainly August and September.

Distribution and ecology: extending in Western Cape, South Africa, from the Cape Peninsula eastward to Swellendam, Riversdale and Still Bay; favouring clay, shale and sometimes limestone slopes. Once common, its range has been much reduced by agriculture and urban development.

Diagnosis: recognised by its small flowers, among the smallest in sect. *Ixia*, *I. flexuosa* has a perianth tube typically 5–6 mm long and tepals, mostly 10–14 mm long, thus about twice as long as the tube (occasionally perianth tube only ± 4 mm long and tepals ± 8 mm long). Coloured white to pink or light purple with fine, dark longitudinal veining on the lower half of the tepals, the flowers have a penetrating, honeysuckle-like scent. The style is relatively long, usually dividing between the base and middle of the anthers, rarely just below the anther



Distribution of ***Ixia flexuosa***.

bases. The stem may have up to four short, erect branches seldom bearing more than six flowers, whereas the main spike has up to 15 flowers. The leaves are linear to narrowly sword-shaped, mostly 2–5 mm wide and often less than a third as long as the wiry stems. Somewhat unusual in the section, the outer floral bracts usually have three prominent veins terminating in three short, sometimes acute teeth. Smaller-flowered morphs of *I. polystachya* are easily confused with *I. flexuosa* but have outer floral bracts with a single prominent central tooth and flowers almost always with a solid, darker centre.

Lacking dark pigment in the centre of the flower, *Ixia flexuosa* fits uncomfortably in sect. *Ixia*, especially as the perianth tube is slightly flared near the apex for ± 1.5 mm and the flowers are conspicuously scented. Despite its predominantly filiform perianth tube, typical of sect. *Ixia*, *I. flexuosa*, most closely resembles *I. orientalis* (sect. *Hyalis*), which has a narrowly funnel-shaped perianth tube, almost filiform in the lower half. Only close examination of the outer floral bracts and filaments makes it possible to separate the two. In *I. flexuosa* the filaments are broadened basally, whereas *I. orientalis* has uniformly slender filaments decurrent on the tube and the outer floral bracts have a single central tooth, sometimes with a shorter lobe or tooth on either side of the central cusp. The style of *I. flexuosa*, usually reaching to between the base to middle of the anthers (rarely slightly below the anther bases), also often differs from that in *I. orientalis*, where the style typically divides close to the filament apices or opposite the anther bases. *Ixia flexuosa* is the only member of sect. *Ixia* known to produce nectar. It is probably most closely related to *I. patens*, which also has slender, wiry stems, and flowers lacking a dark central stain, but this species has larger, deep pink (to dull red) flowers that lack the dark longitudinal streaking in flowers of *I. flexuosa*. Floral scent in the two species appears identical, although of weaker intensity in *I. patens*. The flowers of *I. patens* lack nectar.

21. **Ixia patens** *Aiton*, Hortus Kewensis 1: 59 (1789); Lewis: 116 (1962); Goldblatt & Manning: 180 (2016a). *I. flaccida* Salisb.: 35 (1796), illegitimate superfluous name for *I. patens* Aiton. [*I. pallens* Steud.: 453 (1821), orthographic variant?] Type: South Africa, without precise locality or collector, ex. hort. Kew (BM, holo., digital image).

Gladiolus pyramidalis Burm.f.: 2 (1768) [not *Ixia pyramidalis* Lam. 1789]. Type: South Africa, without precise locality or original collector (G: Herb. Burman, holo., not seen).

Ixia filiformis Vent.: t. 48 (1801). Type: South Africa, without precise locality or collector, illustration in Vent.: t. 48 (1801).

Ixia punicea Eckl.: 24 (1827), illegitimate homonym, not *I. punicea* Jacq. (1795). Type: South Africa, without precise locality, *Ecklon s.n.* [S, lecto., designated by Nordenstam: 283 (1972)].

Ixia patens var. *kermesina* Regel: t. 356 (1862). Type: South Africa, without precise locality or collector, illustration in Regel: t. 356 (1862).

Ixia densiflora Klatt: 397 (1882). Type: South Africa, [Western Cape], without precise locality, *Zeyher 309* (B: Herb. Lubeck, holo., probably not extant).

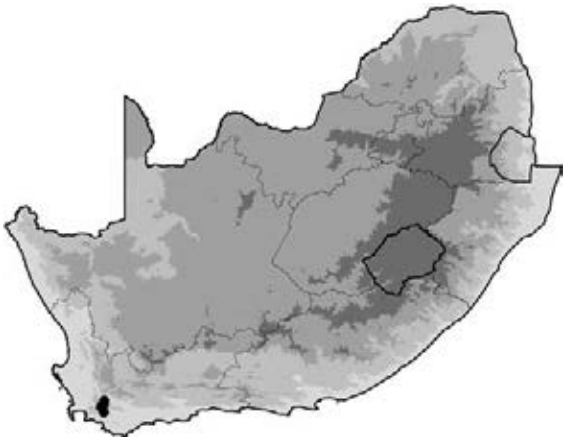
Ixia dispar N.E.Br.: 134 (1929a). Type: South Africa, [Western Cape], near Worcester, *Cooper 3611* (K, holo.).

Ixia angusta L.Bolus: 367 (1931b), illegitimate homonym, not *I. angusta* Jacq. (1795). Type: South Africa, ex Hort. Univ. Stellenbosch 661, said to be from Nieuwoudtville but cultivated there, *Buhr s.n.* (BOL, holo.).

Ixia patens var. *linearifolia* G.J.Lewis: 119 (1962). Type: South Africa, without precise locality, *Thom s.n.* (K, holo.).

Plants 200–400 mm high. *Corm* ± globose, 12–18 mm diam.; tunics of fine, netted fibres. *Stem* simple or with 1 or 2 short, suberect branches. *Leaves* usually 4 to 6, all ± basal, linear to narrowly sword-shaped, ± as long as stem, (1.5–)4.0–10.0 mm wide, firm, often slightly twisted, uppermost leaf sheathing stem with short free apex. *Main spike* crowded, mostly 5- to 12-flowered, flexuose; bracts 6–8 mm long, dry, opaque, usually flushed pink, outer with 3 prominent veins, 3-toothed, central tooth sometimes much exceeding laterals, inner 2-veined, 2-toothed. *Flowers* rotate, red to deep pink (white), usually small, greenish white centre, faintly scented; perianth tube filiform, 3–6 mm long; tepals united basally for ± 1(2) mm, ± elliptic, obtuse, 16–24 × 5–12 mm, spreading. *Filaments* inserted at top of tube, 4–6 mm long, white; anthers ± linear, 6–8 mm long, white to creamy yellow. *Style* dividing opposite base to lower ⅓ of anthers, pale yellow, branches 3–4 mm long. *Flowering time*: late August to mid-September.

Distribution and ecology: a rare and endangered species of Western Cape, South Africa, known only from the hills in the vicinity of Villiersdorp and extending some 25 km north into the Doorn River Valley; on clay slopes in renosterveld.



Distribution of ***Ixia patens***.

Diagnosis: *Ixia patens* comprises two morphs, one with narrow, almost linear leaves, a slender stem, and pink or red-purple flowers; the other has broader, lanceolate leaves with somewhat thickened margins and dull red flowers. Both have terminally crowded flowers, outspread tepals, erect filaments, yellow anthers and a style dividing opposite the bases of the anthers. Diagnostic features are the long, yellow anthers 6–8 mm long, pale yellow style dividing opposite the base or lower third of the anthers, a stem occasionally with one or two short branches, a perianth tube 3–5 mm long and tepals connate basally for up to 2 mm. The outer floral bracts are variable, sometimes prominently 3-cusped and flushed with pink in the upper third or 1-cusped and uniformly pale and opaque. Plants with narrow leaves up to 2 mm wide called var. *linearifolia* from Villiersdorp have pink flowers and a slightly shorter perianth tube ± 3 mm long (elsewhere 4–5 mm long). The variety is not currently recognised.

White-flowered, late blooming plants in flower in October and November referred to *I. patens* by De Vos (1999) from near Elim are *I. leucantha* Jacq. Typical *I. patens* flowers from late August to mid-September.

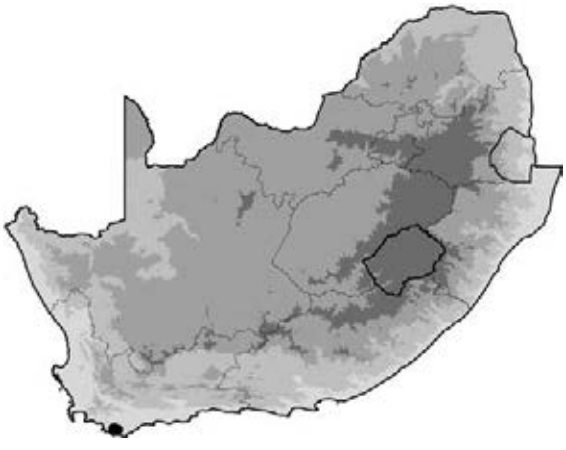
22. **Ixia leucantha** *Jacq.*, Icones plantarum rariorum 2: 7 (1795 [1788–1795]); Goldblatt & Manning: 182 (2016a). *I. patens* var. *leucantha* (Jacq.) Ker Gawl.: 98 (1827). Types: South Africa, without precise locality or collector, illustration in Jacq.: t. 278 (1795 [1788–1795]); South Africa, Western Cape, east of and near Baardskeerdersbos, 10 Nov. 1985, *De Vos 2637* (NBG, epi.).

    [*Ixia candida* Delile in Redouté: t. 426 (1814), invalid name [not accepted author], based on illustration in Redouté: t. 426 (1814), without locality or collector.]

Plants 150–650 mm high, sometimes with 1 short, suberect branch subtended by scale-like, translucent, acute bracts and prophylls 2–4 mm long. *Corm* ± globose, (10–)15–20 mm diam., bearing several cormlets at base; tunics of relatively fine, netted fibres. *Leaves* usually 5, all with expanded blades, ± ⅔ as long as stem, narrowly sword-shaped to almost linear, mostly 2–5 mm wide; margins and main vein moderately thickened, pale, hyaline and slightly raised when dry. *Spike* (3–)6- or 7-flowered, branches when present fewer-flowered; bracts membranous, translucent or flushed pink, 5–6 mm long, outer with single prominent central vein and prominent acute tooth, inner 2-veined, 2-keeled and acutely 2-toothed. *Flowers* upright, rotate, white with pale yellow throat, faintly rose-scented; perianth tube ± 5 mm long, filiform; tepals barely connate basally, obovate, 20–22 × 9–10 mm, spreading ± horizontally. *Filaments* erect, ± 4 mm long, white; anthers ± 6 mm long, suberect, yellow; pollen yellow. *Style* dividing opposite lower ⅓ of anthers, branches ± 2.3–3.0 mm long, white. *Flowering time*: late October to mid-November.

Distribution and ecology: a local endemic of the central portion of the Agulhas Plain in Western Cape, South Africa, recorded from near Elim and Baardskeerdersbos; in shale and loamy clay in renosterveld and Elim fynbos vegetation, flowering well after fire.

Diagnosis: typical of sect. *Ixia*, *I. leucantha* has the filiform perianth tube and filaments inserted at the tube mouth diagnostic for the section, but the flowers lack the dark centre of most species of the alliance. The species was included by De Vos (1999) with *I. patens*, which has larger, deep pink (rarely red) flowers usually somewhat darker in the centre and relatively narrow tepals, whereas *I. leucantha* has white flowers. It differs additionally from *I. patens* by the longer style dividing opposite the lower third of the anthers and short style branches 2.3–3.0 mm long. In *I. patens* the style typically divides opposite the anther bases and the style branches are unusually slender, ± 4 mm long. Significantly, *I. patens* flowers from late August to mid-September, whereas *I. leucantha* flowers from late October to November and possibly even into early December.



Distribution of ***Ixia leucantha***.

23. **Ixia alticola** *Goldblatt & J.C.Manning* in South African Journal of Botany 104: 182 (2016a). Type: South Africa, Western Cape, Cederberg, Farm Kalkoenfontein, Dwarsrivier, 969 m, 27 Nov. 2013, *Lane & Wheeler s.n.* (NBG, holo.; K, MO, iso.).

Plants 350–800(–1 000) mm high. *Corm* ± globose, 10–15 mm diam. bearing flat, ribbon-like stolons from base; tunics of soft to medium-textured fibres. *Stem* simple or 1(2)-branched. *Leaves* 4 or 5(6), all with expanded blades, ½–⅔ as long as stem, narrowly sword-shaped, mostly 4–8(–11) mm wide; margins, main vein and a pair of secondary veins slightly thickened, raised, pale when dry. *Spike* with up to 25 flowers, branches when present fewer-flowered; bracts pale and translucent or finely brown-speckled distally, outer 4–6 mm long, with single main vein and a few secondary veins, apex of lower bracts tricuspidate, inner 2-veined and acutely 2-toothed. *Flowers* upright, rotate, mauve-pink with small dark blue mark near base of tepals; perianth tube 6–8 mm long, filiform; tepals connate basally for ± 1 mm, ± elliptic, 10–12 × 4–5 mm, spreading ± horizontally. *Filaments* erect, 3.5–4.0 mm long, flushed purple; anthers ± 3 mm long, suberect, linear; pollen yellow. *Style* dividing opposite lower ⅓ to middle of anthers, branches ± 3.5 mm long, flushed purple. *Flowering time*: November to December.

Distribution and ecology: known only from higher elevations above 900 m in the Cederberg in Western Cape on Sneeuberg and Middelberg, South Africa; in seeps and marshy ground along streams.

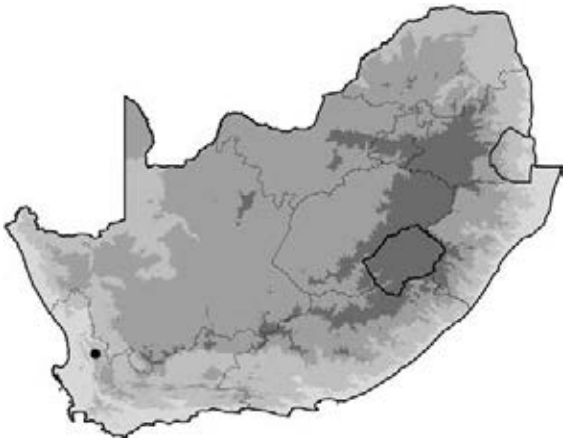
Diagnosis: with a filiform perianth tube and filaments inserted at the mouth of the narrow part of the perianth tube, *Ixia alticola* conforms closely to sect. *Ixia*. The pale mauve-pink flowers have a relatively long style, dividing opposite the lower third to middle of the anthers, indicating placement of *I. alticola* in series *Longistylae*. It stands out in the rather short, pale translucent bracts 4–6 mm long, tall stature (occasionally to 1 m tall) and spikes of up to 25 flowers.

24. **Ixia roseoalba** *Goldblatt & J.C.Manning* in South African Journal of Botany 104: 183 (2016a). Type: South Africa, Western Cape, entrance to Cogmans Kloof, just south of Montagu, 1 Sept. 2007, *Goldblatt & Manning 12941* (NBG, holo.; MO, iso.).

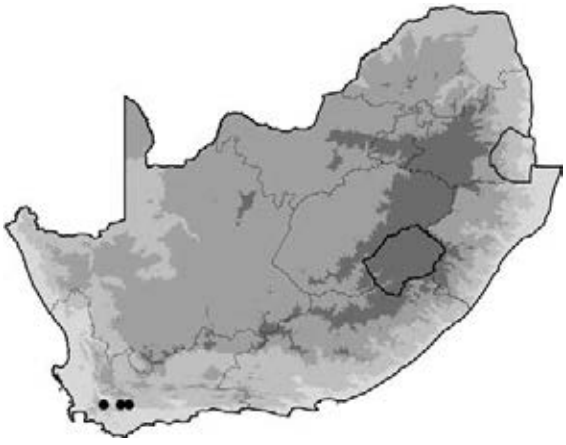
Plants 500–650 mm high. *Corm* ± globose, ± 12 mm diam. with tunics of medium-textured, mostly vertical fibres. *Stem* simple or with 1 short, filiform branch subtended by scale-like, translucent, acute bract and prophylls 2–3 mm long. *Leaves* 3 or 4, all with expanded blades, ± ⅔ as long as stem, linear, 1.5–5.0 mm wide; margins and main vein moderately thickened, pale, hyaline, raised when dry. *Spike* 8- to 11-flowered, branches when present fewer-flowered; bracts membranous, translucent, 5.5–7.0 mm long, outer several veined, with only central vein or 3 veins prominent, 1- or 3-toothed with central tooth largest, inner 2-veined, 2-keeled and acutely 2-toothed. *Flowers* upright, rotate, pink, tepals white in lower ⅓, unscented; perianth tube ± 5 mm long, filiform; tepals united basally for ± 1 mm, obovate, 14–16 × 7 mm, spreading ± horizontally. *Filaments* erect, ± 3.5 mm long, white, ± 4 mm long; anthers suberect, ovoid, connective expanded, visible on abaxial surface; pollen yellow. *Style* dividing opposite lower ⅓ to middle of anthers, branches ± 3.5 mm long, yellow. *Flowering time*: mid-August to mid-September.

Distribution and ecology: a narrow endemic of Western Cape, South Africa, known only from the western Langeberg at Dassieshoek and Macgregor near Robertson and east to Cogmans Kloof, Montagu; in stony clay ground among grass at the edge of bush.

Diagnosis: with a filiform perianth tube and filaments inserted at the tube mouth, *Ixia roseoalba* is distinguished in sect. *Ixia* by the relatively small, pale pink flowers, the tube ± 5 mm long and tepals ± 16 × 7 mm. Unusual for the section, the flowers have a white centre. The filaments and anthers are pale yellow and the style divides opposite the lower third to middle of the



Distribution of ***Ixia alticola***.



Distribution of ***Ixia roseoalba***.

anthers. More important, the anthers are unusual in having the connective expanded and visible as a narrow line between the thecae on the outer (abaxial) surface, rendering the thecae almost latrorse. The bracts, typical of sect. *Ixia*, are translucent and the outer, with several veins, the central one most prominent and reaching the margin, is 3-toothed with the central tooth largest or all three teeth subequal. The long style dividing opposite the lower third to middle of the anthers recalls *I. patens* but this species, often more slender but with larger, pink or red flowers usually sometimes more darkly pigmented in the centre, has tepals ± 20 × 10 mm and conventional linear anthers without visible connective.

25. **Ixia helmei** *Goldblatt & J.C.Manning* in South African Journal of Botany 104: 183 (2016a). Type: South Africa, Western Cape, Farm Welgemoed, 12 km N of Bot River, 2 km W of Aasvoëlkop, 280 m, 26 Oct. 2000, *Helme 3429* (NBG, holo.).

Plants 150–200 mm high. *Corm* ovoid, ± 8 mm diam.; tunics of fine netted fibres. *Stem* usually with 1 or 2 short branches. *Leaves* 2 or 3, lower 1 or 2 basal, narrowly sword-shaped, ± as long as stem, 3–7 mm wide, main vein and margins slightly thickened, pale when dry, upper leaf sheathing lower ⅓–½ of stem, with a short free blade. *Main spike* 3- to 6-flowered, lateral branches 1- to 3-flowered; bracts membranous, translucent, 3.5–5.0 mm long, outer with 3 prominent light brown veins, 3-toothed, teeth attenuate, inner 2-veined and 2-toothed. *Flowers* salver-shaped, pale to bright pink with yellow throat; perianth tube filiform, 12–15 mm long, flaring in upper 1–2 mm; tepals narrowly ovate, 11–12 × 4.0–4.5 mm, inner three slightly smaller than outer. *Filaments* inserted at mouth of tube, 3–5 mm long; anthers 4–5 mm long, yellow; pollen yellow. *Style* dividing between middle of filaments and base of anthers, branches ± 4 mm long. *Flowering time*: October and early November.

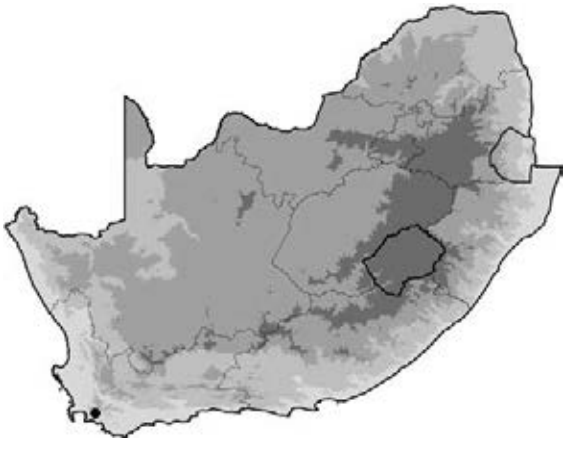
Distribution and ecology: currently known from two records in the hills north of Bot River in Western Cape, South Africa; on south trending shale slopes in renosterveld.

Diagnosis: somewhat unusual in sect. *Ixia*, *I. helmei* has a relatively long perianth tube 12–15 mm long and slightly longer than the tepals, and is readily recognised by this feature alone. The presence of two or three leaves, the uppermost almost entirely sheathing, the relatively long perianth tube, and the late flowering time in mid- to late October, combine to confirm its taxonomic isolation. The relatively long style, dividing just below or opposite the bases of the anthers, places it in ser. *Longistylae* but its immediate relationships are uncertain. The flowers are adapted for pollination by the long-proboscid fly *Philoliche gulosa* (Tabanidae).

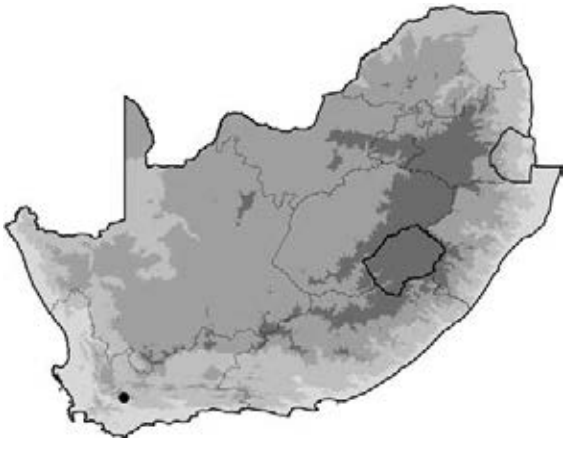
26. **Ixia stolonifera** *G.J.Lewis* in Annals of the South African Museum 40: 14 (1952); Lewis: 113 (1962). Type: South Africa, Western Cape, Montagu, Keisiesberg, 3 000 ft [915 m], Sept. 1946, *Lewis 1605* (SAM, holo.; BOL, NBG, iso.).

Plants 200–500 mm high. *Corm* globose, 5–8 mm diam., bearing short, branched stolons from base, each with small terminal cormlet; tunics of fine, almost membranous, fine netted fibres. *Stem* simple or with 1 short branch from upper third. *Leaves* 3, all basal, lanceolate, somewhat shorter than stem, 3–10 mm wide, loosely spirally twisted distally, uppermost sheathing stem in lower half. *Spike* closely 6- to 12-flowered; bracts 7–8 mm long, outer 3-veined, with 3 long dry cusps 3–4 mm long, inner 2-veined, with 2 long dry cusps. *Flowers* rotate, mauve-pink with small dark purple central mark, very faintly scented; perianth tube cylindric, 2–4 mm long; tepals cupped, ovate, 9–12 × 6–7 mm. *Filaments* ± 2 mm long, erect, purple; anthers suberect, 5–6 mm long, yellow with reddish line of dehiscence. *Style* dividing opposite base of anthers, branches ± 3 mm long, purple fading pink distally. *Flowering time*: September.

Distribution and ecology: a narrow endemic known only from the lower slopes of Keisiesberg and Burger's Pass, west of Montagu in Western Cape, South Africa; on steep, south-facing slopes in moist gulleys at an elevation of ± 900 m, in gravelly scree in renosterveld, flowering after fire.



Distribution of ***Ixia helmei*** .



Distribution of ***Ixia stolonifera***.

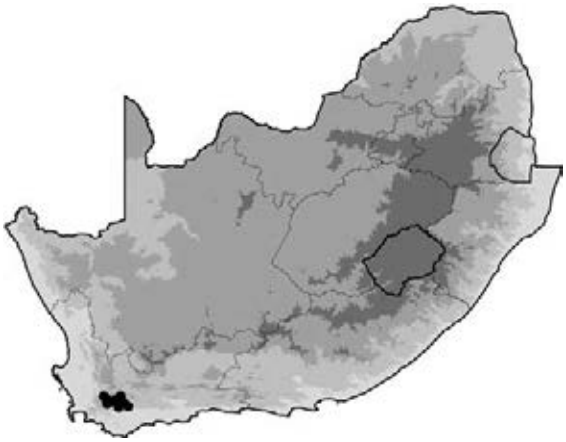
Diagnosis: *Ixia stolonifera* is recognised by the unusual floral bracts with setaceous cusps, the outer bracts with three to five veins and three ± equal cusps, and by the distinctive stolons produced from the corm bases. The stolons are broadened distally and shortly branched, each branch terminating in a tiny cormlet, at most 2 mm diam. The flowers are relatively small and cupped, with a pale mauve-pink perianth with a small, dark purple stain in the centre, a perianth tube 2–4 mm long, and tepals mostly 10–12 mm long. The style divides close to the bases of the anthers. Like almost all species of sect. *Ixia* the open flowers are crowded together, close to the spike apex.

27. **Ixia vanzijliae** *L.Bolus* in Annals of the Bolus Herbarium 4: 114 (1927); Lewis: 134 (1962). Type: South Africa, [Western Cape], without precise locality, *Van Zijl s.n.* (BOL18537, holo.).

Plants 200–400 mm high. *Corm* ± globose, 8–15 mm diam.; tunics of fine, netted fibres. *Stem* simple or with 1 short, upright branch. *Leaves* usually 5, lower 3(4) basal, < half as long as stem, lanceolate, 4–12 mm wide, spirally twisted, margins undulate to crisped, upper 1(2) leaves cauline, longer than basal, mostly sheathing with short free blades. *Spike* closely 2- to 7-flowered; bracts 9–13 mm long, outer acute or 3-toothed, inner slightly shorter, 2-toothed. *Flowers* salver-shaped, brick-red to pink to mauve-pink with small dark central mark; perianth tube filiform, 8–10 mm long; tepals spreading, united basally for 1–2 mm, obovate to elliptic, 13–20 × 8–11 mm. *Filaments* ± 3 mm long; anthers 6–7 mm long, yellow. *Style* dividing opposite middle of anthers, branches ± 2.5 mm long. *Flowering time*: mainly September.

Distribution and ecology: a rare species of the dry karroid hills between Worcester and Bonnievale in Western Cape, South Africa; on clay ground among low succulent vegetation or in renosterveld.

Diagnosis: distinctive in the twisted blades of the three or four basal leaves with tightly undulate to crisped margins, *Ixia vanzijliae* has attractive brick-red to salmon-pink flowers with a small, dark central eye. Plants



Distribution of ***Ixia vanzijliae***.

are usually relatively short, up to 200 mm high but may reach up to 400 mm under favourable conditions. The filiform perianth tube is 8–12 mm long and the dark purple style divides opposite the lower to middle third of the anthers. The floral bracts are pale except for a brown flush toward the tips.

28. **Ixia campanulata** *Houtt*., Natuurlijke historie 12: 42, t. 78 f. 4 (1780); Lewis: 127 (1962). Type: South Africa, without precise locality or collector [G: Herb. Burman, lecto. (as holo.), designated by Brown: 133 (1929)].

Ixia aristata Thunb.: 14 (1783) [misapplied to *I. patens* by Schneev.: (1793) and to *I. latifolia* by Ker Gawl.: t. 589 (1802c) and later authors]. *I. leucantha* var. *aristata* (Thunb.) Baker: 162 (1892). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB '*Ixia aristata* a, b, c', syn.).

Ixia concolor Salisb.: 36 (1796). Type: unknown, identified from description.

Ixia speciosa Andrews: t. 186 (1801a). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 186 (1801a).

Ixia crateroides Ker Gawl.: t. 594 (1802d, superfluous name for *I. speciosa* Andrews (1801a). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 594 (1802d.

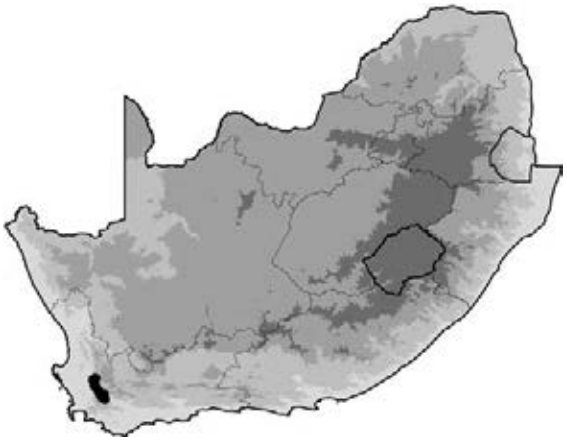
Ixia coccinea Thunb.: 241 (1811). *Gladiolus coccineus* (Thunb.) Schrank: 197 (1822). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB '*Ixia coccinea* α', holo.).

Ixia coccinea Eckl.: 24 (1827), illegitimate homonym, not *I. coccinea* Thunb. (1811). Type: unknown, identified from description.

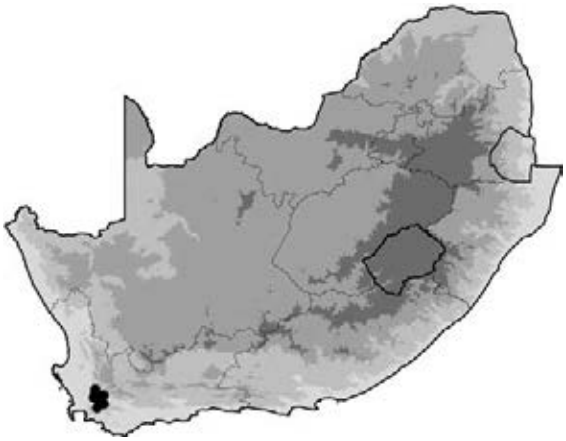
Plants 100–350 mm high. *Corm* ± globose, 10–18 mm diam.; tunics of fine, netted fibres extending upward in a collar around base. *Stem* simple or with 1 branch from near base. *Leaves* 5 to 10, ½–⅔ as long as stem, 2–5 mm wide, ± linear, ± straight, main vein and margins slightly thickened. *Spike* closely (1)2- to 9-flowered; bracts ± orbicular, 4–6 × 5–7 mm long, white or pink, outer usually 3-toothed, inner slightly shorter, 2-toothed. *Flowers* ± rotate or bell-shaped, uniformly bright red or white then often flushed red outside; perianth tube filiform, 2–3 mm long; tepals slightly ascending, united in basal 1–2 mm, obovate to elliptic, 12–25 × 8–12 mm. *Filaments* 3–5 mm long; anthers 6–8 mm long, yellow. *Style* dividing opposite middle to apex of anthers or beyond them, branches 3–4 mm long. *Flowering time*: October and November.

Distribution and ecology: restricted to the Tulbagh District and mid-Breede River Valley west of Worcester in Western Cape, South Africa; on lower mountain slopes in sandy sites.

Diagnosis: very narrow, sword-shaped to almost linear leaves, an unusually sturdy stem, relatively few flowers crowded at the spike apex and usually with uniformly brilliant red, glossy tepals are diagnostic for *I. campanulata*.



Distribution of ***Ixia campanulata***.



Distribution of ***Ixia metelerkampiae***.

The perianth tube is unusually short, 2–3 mm long, even for sect. *Ixia*. Another aid to identification is the style, which divides opposite the middle to upper third of the anthers, sometimes even exceeding them. A white-flowered form is known, evidently occurring in uniform stands. The short floral bracts, up to 3 mm long, are half as long to almost as long as the spike internodes and the outer has three short, subequal teeth. Spikes typically have 2 to 4 flowers but there are examples of white-flowered plants with up to 8-flowered spikes. Lewis (1962) regarded *I. campanulata* as most closely related to *I. metelerkampiae*, which also has a short perianth tube, 3–4 mm long, narrow leaves and obovate tepals, these however, pale pink, lilac or blue-mauve but with a dark red to purple throat and markings, and is a taller plant, reaching up to 700 mm, and colourless bracts with inconspicuous cusps. In *I. campanulata* the bracts are white or deep pink and have prominent, dark veins and usually prominent cusps. Both species usually have a well-developed collar of fibres around the base.

29. **Ixia metelerkampiae** *L.Bolus* in South African Gardening and Country Life 19: 27 (1929b); Lewis: 130 (1962). Type: South Africa, [Western Cape], Bain's Kloof, cultivated at Kirstenbosch Gardens, *Metelerkamp s.n. as Nat. Bot. Gard. 1710/26* (BOL, K, syn.).

Plants 350–750 mm high. *Corm* ± globose, 10–20 mm diam.; tunics of fine, netted fibres extending upward in a collar around base. *Stem* simple or subdivaricately 1- or 2-branched. *Leaves* 5 to 9, ± half as long as stem, 1–6 mm wide, ± linear to narrowly lanceolate, ± straight, main vein and margins slightly thickened. *Spike* closely 5- to 14-flowered; bracts ± orbicular, truncate or obtuse, pellucid, 4–5 × 5–7 mm long, outer 1- or 3-toothed, inner slightly shorter, 2-toothed. *Flowers* ± rotate or bell-shaped, pale pink to mauve or purple, tepals marked red to purple near base and in midline; perianth tube filiform, 3–4 mm long; tepals slightly ascending, united in basal 1–2 mm, obovate to elliptic, 14–22 × 6–12 mm. *Filaments* 4–5 mm long; anthers 5–6 mm long, yellow. *Style* dividing opposite apex of filaments to lower ⅓ of anthers, branches 3–4 mm long. *Flowering time*: November to early December.

Distribution and ecology: a montane species of south-western Western Cape, South Africa, recorded from Elandskloof, west of Wolseley, south to Bain's Kloof and the mountains east of Paarl; on well drained sandstone slopes, flowering well only after fire.

Diagnosis: *Ixia metelerkampiae* is recognised by the pale pink, lilac or pale to deep mauve flowers, the tepals with an irregularly shaped, small, dark red or purple mark or ring at the base surrounded by a white zone and a dark spot in the lower midline. The obovate tepals remain slightly cupped even when the flowers are fully open, showing pale, nearly white stamens with erect filaments enclosing the style, and divergent anthers. The style divides opposite the base or lower third of the anthers. Added to the flowers, which are unusual for sect. *Ixia*, the leaves are linear to narrowly lanceolate, up to 6 mm wide, and the plants may have a well-developed collar of fibres around the base (sometimes not collected when plants are not extracted with care from the ground). Plants produce one or more relatively large cormlets at the base of the main corm and/or thick, rhizome-like stolons that terminate in a large corm. *Ixia metelerkampiae* is closely allied to *I. campanulata* but differs in its taller stature, reaching up to 700 mm, and flowers differently coloured and marked (flowers usually ± uniformly red, less often white, in *I. campanulata*) and short, colourless bracts, 4–5 mm long, with inconspicuous cusps. Both also have an unusually short perianth tube for sect. *Ixia*, 2–4 mm long.

Ixia metelerkampiae is adapted for pollination by hopline beetles, with different species of beetles recorded at different sites.

30. **Ixia mostertii** *M.P.de Vos* in South African Journal of Botany 54: 598 (1988); Goldblatt & Manning: 187 (2016a). Type: South Africa, [Western Cape], Romans River, Wolseley, 5 Sept. 1986, *Mostert sub De Vos 2654* (NBG, holo.).

Plants 350–750 mm high. *Corm* ± globose, 10–20 mm diam.; tunics of fine, netted fibres extending upward in a collar around base. *Stem* simple or subdivaricately 1- or 2-branched. *Leaves* 5 to 9, ± half as long as stem, 1–6 mm wide, ± linear to narrowly lanceolate, ± straight, main vein and margins slightly thickened. *Spike* closely 5- to 14-flowered; bracts ± orbicular, truncate or obtuse, pellucid, 4–5 × 5–7 mm long, outer 1- or 3-toothed, inner slightly shorter, 2-toothed. *Flowers* ± rotate or bell-shaped, pale pink to mauve or purple, tepals marked red to purple near base and in midline; perianth tube filiform, 3–4 mm long; tepals slightly ascending, united in basal 1–2 mm, obovate to elliptic, 14–22 × 6–12 mm. *Filaments* 4–5 mm long; anthers 5–6 mm long, yellow. *Style* dividing opposite apex of filaments to lower third of anthers, branches 3–4 mm long. *Flowering time*: September to October.

Distribution and ecology: restricted to the mid-Breede River Valley in Western Cape, South Africa, recorded from near Romans River, south of Wolseley, and in the foothills of the Hex River Mtns northwest of Worcester; on relatively dry, stony clay slopes and flats in mixed renosterveld and fynbos. Much of its known range is now lost to urban development or vineyards.

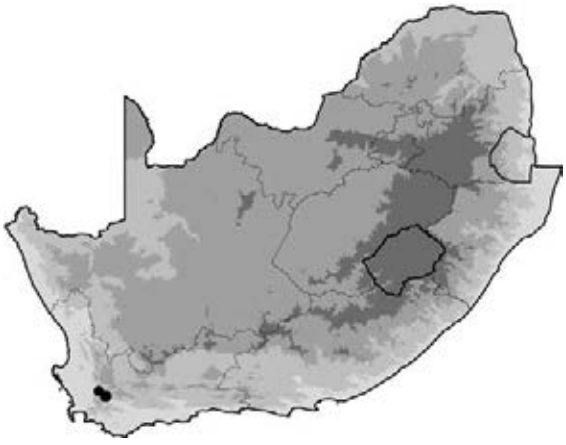
Diagnosis: recognised by the hard, coarse corm tunics, the fibres extending upward as a collar around the base of the plant, *Ixia mostertii* also has relatively large flowers, somewhat crowded apically and with a prominent dark central eye. The flowers are either pink, mauve-pink or white with the central mark dark blue or iridescent green. Notably, the style is long, dividing opposite or above the bases of the anthers. It has been suggested to be allied to *I. vinacea* on account of the coarse collar of fibres around the base and flowers with a dark centre, but *I. vinacea* has linear leaves up to 3 mm wide and exceeding the spike, very different from the shorter, broader leaves of *I. mostertii*. It also differs in the relatively few-flowered spike and short style dividing opposite or slightly above the base of the filaments. The prominent anthers, up to 9 mm long (before anthesis), remain straight and suberect as the flower ages, another important feature of *I. mostertii* and useful in distinguishing plants collected without corms from *I. polystachya*, the anthers of which spread widely, often becoming somewhat twisted and almost horizontal after anthesis.

31. **Ixia longistylis** *(M.P.de Vos) Goldblatt & J.C.Manning* in South African Journal of Botany 104: 187 (2016a). *I. polystachya* var. *longistylis* M.P.de Vos: 39 (1999). Type: South Africa, [Western Cape], Worcester–Rawsonville, Farm Pokkraal, vlakte, 11 Nov. 1986, *De Vos 2681* (NBG, holo.).

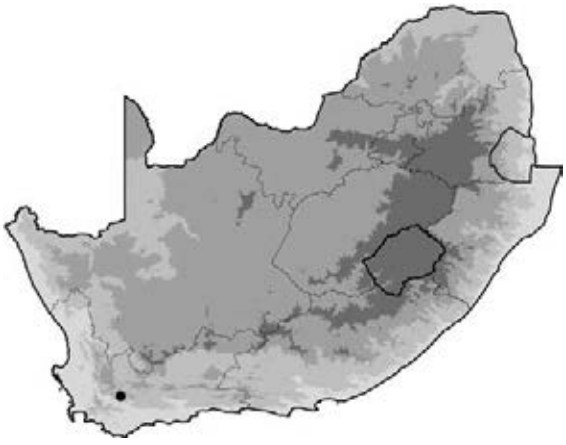
Plants 300–400 mm high, sometimes with a single, slender branch. *Corm* 12–17 mm diam.; tunics of fine, soft, netted fibres. *Leaves* linear, fibrotic, 1.2–2.0 mm wide (possibly up to 2.5 mm when alive), when dry veins prominent and main vein hyaline and strongly raised. *Spike* mostly 8- to 12-flowered, slightly flexuose; bracts translucent-opaque, outer 5.5–7.0 mm long, with a single prominent median vein, apex acute, inner slightly shorter, forked apically, apices acute, light brown. *Flowers* ± rotate, deep mauve-pink or white, dark blue-purple in centre; perianth tube 5–8 mm long; tepals ovate, 16–18 × 8–15 mm, inner smaller than outer. *Filaments* 4–6 mm long; anthers (6–)7–8 mm long, dark purple; pollen evidently yellow. *Style* dark purple, dividing 5–7 mm opposite lower to middle ⅓ of anthers. *Flowering time*: mid-August to mid-September.

Distribution and ecology: restricted to the mid-Breede River Valley in Western Cape, South Africa, known only from the area between Rawsonville and Worcester; on stony, alluvial flats.

Diagnosis: *Ixia longistylis* is distinguished from *I. polystachya* first by the long style, dividing opposite the lower third of the anthers, and the particularly long, erect anthers, (6–)7–8 mm long. Another important character is the particularly narrow leaves up to 1.5 mm wide, when dry with unusually prominent veins. *Ixia polystachya* is very different and may not even be closely



Distribution of ***Ixia mostertii***.



Distribution of ***Ixia longistylis***.

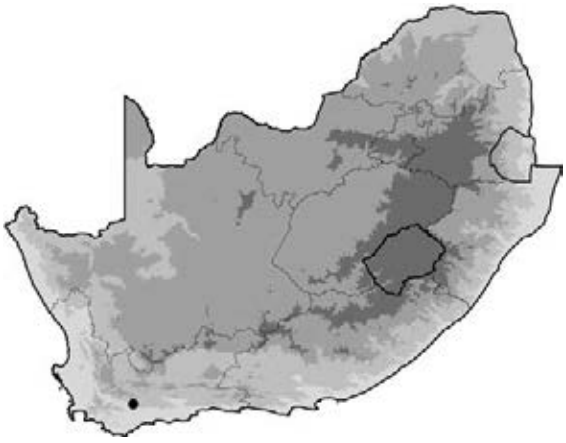
allied to *I. longistylis*. It has broader leaves, sometimes up to 8 mm wide, the stems are often branched and the flowers typically have shorter anthers, mostly 4–6 mm long, usually spreading ± horizontally when flowers are fully open and the style typically divides opposite the base or sometimes the middle of the filaments. Flowers of *I. longistylis* are deep mauve-pink (or sometimes white) with a dark purple centre, a colour rare but not unknown in *I. polystachya*. *Ixia longistylis* may be most closely allied to broad-leaved *I. mostertii*, which has similar, relatively large flowers with long, ascending anthers up to 9 mm long and a style dividing opposite or above the bases of the anthers.

32. **Ixia superba** *J.C.Manning & Goldblatt* in Novon 14: 289 (2004); Goldblatt & Manning: 188 (2016a). Type: South Africa, Western Cape, Montagu District, Klipheuwel, foot of the Langeberg, 9 Sept. 1993, *Goldblatt, Manning & Porter 12180* (NBG, holo.; K, MO, PRE, S, iso.).

Plants 200–600 mm high. *Corm* globose, 15–20 mm diam.; tunics of medium to coarsely textured fibres. *Stem* simple or with 1 to 3 straight, widely divergent branches. *Leaves* 3, all basal, lower 2 narrowly to broadly lanceolate, (3–)5–10 mm wide, usually ± half as long as stem, main vein and margins moderately thickened, uppermost leaf entirely sheathing, reaching to middle or upper third of stem, almost straight. *Spike* usually 3- to 6-flowered, lateral spikes 1- to 4-flowered; bracts membranous, translucent, outer 8–10 mm long, with 3 purple veins, shallowly 3-toothed, inner as long to slightly longer than outer, 2-veined, forked at apex. *Flowers* salver-shaped, pale to deep pink, tepals purple to blackish toward base, lightly sweet-scented; perianth tube slightly curved and cylindric for 2–3 mm, widening abruptly into a cup ± 3 mm deep; tepals obovate, spreading at ± right angles to tube, subequal, (14–)18–22 × (6–)10–12 mm, inner slightly wider than outer. *Filaments* inserted at mouth of narrow part of tube, connivent, 5–6 mm long, ± black; anthers divergent, 6–7 mm long (before anthesis), black; pollen yellow. *Style* dividing opposite anther bases, black, branches 2–3 mm long. *Flowering time*: late August to mid-September.

Distribution and ecology: a narrow endemic of the Montagu District of Western Cape, South Africa, recorded from just three farms, between 10 to 30 km east of Montagu; on loamy sandy clay along the northern foot of the Langeberg at the interface of the Table Mountain and Bokkeveld Systems.

Diagnosis: *Ixia superba* is recognised by the relatively crowded spike of large flowers and the pink perianth with a large, glossy black centre. Unusual for sect. *Ixia* the black bases of the tepals are united in a wide cup ±3 mm deep. The stamens and style branches are also darkly pigmented with the erect filaments clasping the style and the anthers diverging. Significantly, the style divides above the bases of the anthers. The lower two leaves are lanceolate and comparatively broad, up to 10 mm wide and the third leaf sheathes the stem for its entire length. It has been confused with *I. gloriosa* and was at first included in that species, perhaps due to the flower colour, although *I. gloriosa* has deep magenta flowers with a blackish centre when seen alive. Differences between the two, apart from perianth colour, include leaf width (leaves of *I. gloriosa* are linear and only up to 3 mm wide), shape of the flowers and the short, erect branches of *I. gloriosa* in contrast to the spreading branches of *I. superba*. The style of *I. gloriosa* divides opposite the bases of the filaments unlike that in *I. superba*. Both species have the outer floral bracts 3-toothed, sometimes with the central tooth somewhat more prominent.



Distribution of ***Ixia superba***.

33. **Ixia dubia** *Vent.*, Choix de plantes dont la plupart sont cultivées dans le jardin de Cels no. 10 & t. 10 (1803); Lewis: 134 (1962); Goldblatt & Manning: 188 (2016a). Type: South Africa, without precise locality or collector, illustration in Vent.: t. 10 (1803).

Gladiolus umbellatus Schrank: 202 (1822). Type: South Africa, without precise locality, probably *Brehm s.n.* (M, holo., according to Lewis (1962) but not seen by us).

Ixia frederickii M.P.de Vos: 596 (1988). Type: South Africa, [Western Cape], near Mamre, north of Bokbaai, 16 Oct. 1987, *Duckitt sub De Vos 2694* (holo., NBG as STE).

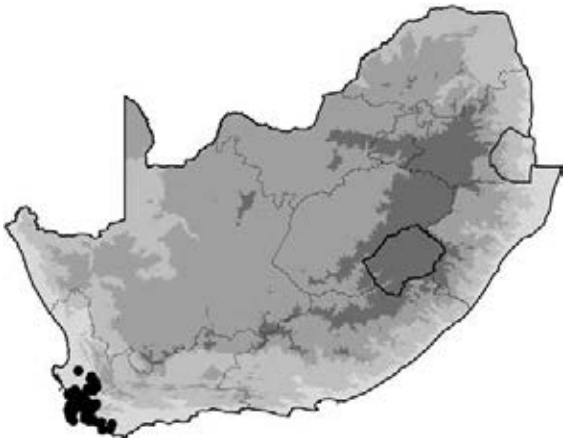
Plants 200–300(–600) mm high. *Corm* globose, 12–17 mm diam.; tunics of medium to coarsely textured, netted fibres. *Stem* simple or with 1 or 2 short branches. *Leaves* 5 to 7, narrowly to broadly lanceolate, reaching to ± middle of stem, 1.5–8.0 mm wide, main vein and margins moderately thickened, sometimes slightly twisted. *Spike* crowded, usually 3- to 15-flowered; bracts membranous, translucent pink, outer 5–9 mm long, with 1 or 3 prominent veins, 1- or 3-toothed, inner 2-veined, 2-toothed. *Flowers* salver-shaped, yellow to orange, rarely red, with small dark brown to black central eye, unscented; perianth tube cylindric, 6–12 mm long; tepals obovate to elliptic, spreading, subequal, 15–22 × 6–12 mm. *Filaments* occasionally united at base, connivent, 3–5 mm long,

brown to black; anthers divergent, 6–8 mm long, yellow; pollen yellow. *Style* dividing opposite middle to apex of filaments, branches 3–5 mm long. *Flowering time*: late September to November, rarely December.

Distribution and ecology: restricted to southwestern Western Cape, South Africa, extending from Piketberg and the Tulbagh Valley to the Cape Peninsula and east to Hermanus; on sandy and gravelly granitic slopes and flats, occasionally on clay, at elevations up to 760 m, as well as coastal lowlands.

Diagnosis: *Ixia dubia* is recognised among the species of sect. *Ixia* with yellow or orange (occasionally red as in the synonym *I. frederickii*) flowers by the pale but semi-translucent floral bracts often flushed and veined pink and a moderate-sized flower with tepals mostly 12–15 mm long. The flowers have a comparatively small, brown to purple stain in the centre about one quarter the length of the tepal. The filaments are comparatively long, 5–6 mm long, darkly coloured and the style divides at or close to the anther bases so that the yellow style branches arch outward between the lower half of the divergent anthers. The outer floral bracts either have a single prominent median tooth or three small teeth, the central one more prominent than the laterals. Filaments of *I. dubia* are typically free (or rarely basally united) and the perianth tube is usually 6–9 mm long, but ± 12 mm long in plants from the Tulbagh Valley. Plants are usually of moderate height, rarely exceeding 300 mm, are seldom branched and although the narrowly lanceolate leaves reach to about the middle of the stem, plants growing in dense undergrowth have longer and narrower, sometimes almost linear leaves. Flowers are pollinated by hopliine beetles, different species of which have been captured at different sites.

Historically *Ixia dubia* has often been confused with orange-flowered *I. maculata*, but that species has very different, large floral bracts, rust-brown in the upper half or entirely, partly to entirely united filaments and the corms bear stolons. Yellow-flowered plants with corm tunics of particularly fine fibres or papery layers and bearing stolons sometimes included in the past in *I. dubia* and also treated as *I. polystachya* var. *lutea* are *I. sarmentosa*, a species of wet habitats in Western Cape. Although superficially similar to *I. dubia*, *I. sarmentosa* typically has a larger central stain (up to one third the length of the tepals), and a short, dark style dividing at the mouth of the perianth tube so that the style branches extend between the base to middle of the filaments. The filaments diverge slightly and are relatively short, up to 2.5 mm long (3–5 mm long in *I. dubia*).



Distribution of ***Ixia dubia***.

Ser. **Ixia**

Flowers usually with dark markings in centre. *Stamens* free, filaments usually diverging. *Style* dividing between base and about middle of filaments, branches short, falcate.

34. **Ixia abbreviata** *Houtt.*, Natuurlijke historie 12: 41 (1780); G.J.Lewis: 120 (1962, as *I. conferta*); Goldblatt & Manning: 188 (2016a). Type: South Africa, without precise locality or collector, illustration in Houttuyn: t. 78 f. 3 (1780).

Ixia capitata var. *ovata* Andrews: t. 23 (1798a). *I. conferta* R.C.Foster: 47 (1936), new name for *I. ovata* (Andrews) Sweet: 399 (1826), illegitimate homonym, not *I. ovata* Burm.f. (1768). *I. lutea* var. *ovata* (Andrews) B.Nord.: 284 (1972). *I. abbreviata* var. *ovata* (Andrews) Goldblatt & J.C.Manning: 64 (2010). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 23 (1798a).

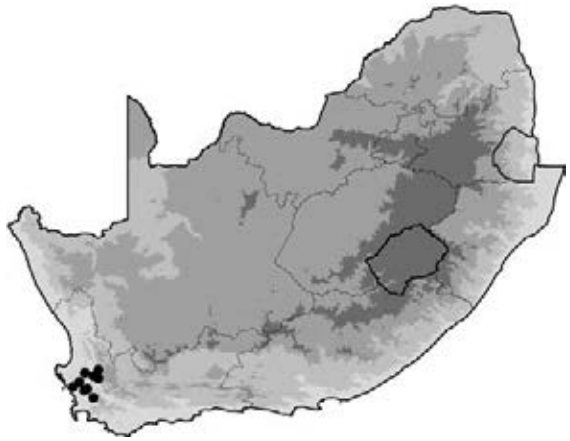
Ixia maculata var. *ochroleuca* Ker Gawl.: t. 1285 (1810b). *I. ochroleuca* (Ker Gawl.) Sweet: 502 (1830), illegitimate homonym, not Vahl (1805). *I. conferta* var. *ochroleuca* (Ker Gawl.) G.J.Lewis: 121 (1962). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 1285 (1810b).

Ixia lutea Eckl.: 24 (1827); De Vos: 51 (1999). Type: South Africa, without precise locality, cultivated in Cape Town, *Ecklon s.n.* (S, holo.).

?*Ixia alboflavens* Eckl.: 27 (1827). Type: unknown.

Ixia nigroalbida Klatt: 396 (1882). *I. maculata* var. *nigroalbida* (Klatt) Baker: 163 (1892). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 159 (1802e).

Plants 200–300(600) mm high. *Corm* globose, 10–15 mm diam.; tunics of coarse, almost woody fibres. *Stem* usually simple. *Leaves* 4 to 6, narrowly to broadly lanceolate, mostly ± ⅔ as long as stem, 3–15 mm wide, main vein and margins moderately thickened, sometimes slightly twisted. *Spike* crowded, closely 2- to 10-flowered; bracts membranous, opaque to translucent, usually flushed rust-brown in upper half, outer 7–12 mm long, with 1 or 3 prominent veins, 1- or 3-toothed, inner 2-veined, 2-toothed. *Flowers* salver-shaped, white to cream(–pale yellow) or deep pink to purple with small dark brown to purple central eye, unscented; perianth tube



Distribution of ***Ixia abbreviata***.

cylindric, 6–12 mm long; tepals ovate to elliptic, spreading, subequal, 15–26 × 8–20 mm. *Filaments* connivent, 3.5–5.0 mm long, brown or purple; anthers, divergent, 7–9 mm long, purple or brown; pollen yellow. *Style* dividing opposite base of filaments, branches falcate, 3–5 mm long. *Flowering time*: late August to October.

Distribution and ecology: extending in Western Cape, South Africa, from the Piketberg south to Darling and Paarl and inland to the Tulbagh Valley; mostly on clay or granitic flats and slopes in renosterveld.

Diagnosis: typical *Ixia abbreviata* is recognised by the relatively large flowers crowded near the top of the spike, either white to creamy yellow or deep pink to red-purple, with a dark brown to green or purple centre. The style divides at the mouth of the tube into short, curved branches, usually pale violet in colour. The floral bracts are typically brown distally, the outer with a prominent central cusp and the inner are forked to about the middle. The bracts are often relatively long, 10–12 mm, but plants from Elandsberg Nature Reserve have bracts only 7–8 mm long. Unusual for the species, a population from Darling Nature Reserve has uniformly pale bracts but with brown veins.

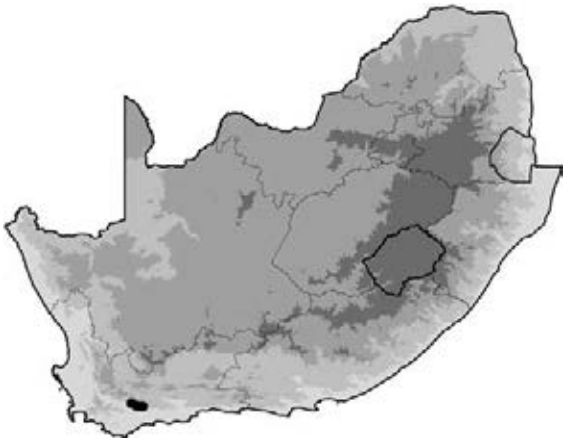
Over much of its range *Ixia abbreviata* has white to creamy yellow flowers (also described as pale yellow) with a brown central eye, but plants from Porterville and the Tulbagh Valley have deep pink to purple flowers with a dark purple centre. Although treated as separate varieties in the past, the two colour morphs are merely colour variants differing in no other features and are not recognised taxonomically. Similar shifts in flower colour are known for several species of different genera from the Tulbagh Valley and nearby.

35. **Ixia gloriosa** *G.J.Lewis* in Journal of South African Botany 28: 132 (1962); Goldblatt & Manning: 189 (2016a). Type: South Africa, [Western Cape], foot of the Langeberg near Grootberg [Leeurivierberg], *Esterhuysen 24556* (BOL, holo.; MO, iso.).

Plants 350–650 mm high. *Corm* globose, 10–13 mm diam.; tunics of fine, pale, netted fibres. *Stem* usually with 2 or 3 slender, ± erect branches held close to main stem. *Leaves* 3 or 4, linear, ½ to ± ⅔ as long as stem, 1–3 mm wide, main vein and margins moderately thickened, uppermost leaf partly sheathing stem. *Spike* laxly 4- to 6-flowered; bracts membranous, translucent, pale, outer 8–10 mm long, usually with 3 prominent veins, 3-toothed, inner 2-veined, 2-toothed. *Flowers* ± rotate, brilliant magenta with small, purple-black central mark, unscented; perianth tube cylindric, 3–6 mm long; tepals elliptic, spreading, subequal, 16–20 × 7–12 mm. *Filaments* connivent, 4–5 mm long, purple-black; anthers 5–7 mm long, dark purple-black; pollen purple-black. *Style* dividing opposite base of filaments, branches falcate, up to 5 mm long. *Flowering time*: late August to September.

Distribution and ecology: a narrow endemic of the western Little Karoo in Western Cape, South Africa, restricted to a small portion of the northern foothills of the Langeberg between the Op-de-Tradouw heights near Barrydale and Grootberg [Leeuriviersberg] east of Montagu; on clay ground in renosterveld.

Diagnosis: a striking species in bloom, *Ixia gloriosa* has a bright magenta perianth with a small, glossy, almost black centre, and purple-black stamens and style branches. The leaves are particularly narrow, typically 2–3 mm wide and the corm tunics are composed of fine fibres. The species is also distinctive in having up to three short branches held close to the main axis, each usually bearing fewer blooms than the 4 to 6 on the main spike. Plants give the illusion of having a particularly long, lax spike with flowers scattered along its entire length but some of the open flowers are borne on the branches. The pale floral bracts, ± 6 mm long, have prominent purple veins, the outer with three short, acute teeth. When described by Lewis (1962), *I. gloriosa* included *I. superba* and the original description is an amalgam of the two species. The anthers, 5–7 mm long and slightly more than twice as long as the filaments, were originally described as connivent at the tips, but



Distribution of ***Ixia gloriosa***.

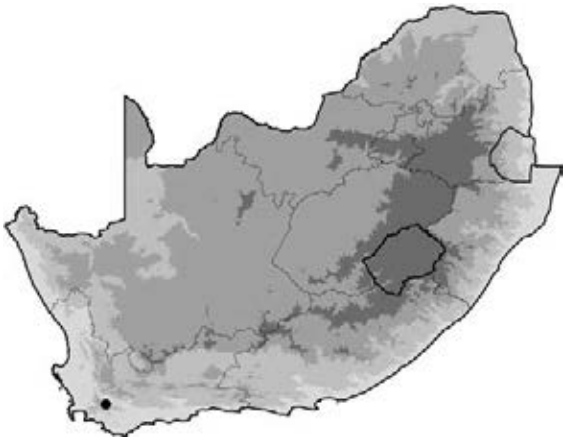
there is no evidence of this in available preserved material. The style divides at or just above the bases of the filaments and style branches are unusually long, reaching up to 5 mm and exceeding the shorter filaments. Among other differences, *I. superba* has a longer style, dividing above the bases of the anthers, but shorter style branches 2–3 mm long.

36. **Ixia atrandra** *Goldblatt & J.C.Manning* in Bothalia 31: 191 (2001); Goldblatt & Manning: 189 (2016a). Type: South Africa, [Western Cape], Villiersdorp, 5 km along Doornrivier road, Farm Die Hoek, 3 Oct. 2000, *Goldblatt 11604* (NBG, holo.; K, MO, PRE, iso.).

Plants 250–500 mm high. *Corm* globose, 15–20 mm diam.; tunics of medium-textured, wiry, netted fibres. *Stem* usually unbranched or with 1 short, ascending branch. *Leaves* usually (3)4, all basal, lanceolate, usually reaching to ± middle of stem, 6–10 mm wide, plane or lightly twisted in upper half, uppermost leaf usually entirely sheathing, main vein and margins hyaline, lightly thickened. *Spike* crowded, (3)4- to 10-flowered; bracts dry, translucent, veins ± pink above, outer 5–6 mm long, obscurely 3-toothed, inner usually slightly shorter, 2-toothed. *Flowers* salver-shaped, pink or rarely creamy white, lower third of tepals dull pink or yellowish to ochre-coloured with an outer band of deep lilac, unscented; perianth tube filiform, 6–9 mm long, widened in upper 1 mm; tepals obovate, somewhat narrowed below into a short claw, spreading with distal margins curving upward, 11–14 × 6–8 mm. *Filaments* 2.5–3.0 mm long, weakly diverging, free or united at base, blue to brownish; anthers 5–6 × 1.5–2.0 mm, with broad connective, thecae restricted to margins, dehiscing laterally, initially erect, diverging and becoming slightly twisted, black; pollen yellow. *Style* dividing opposite or shortly above base of filaments, blue, branches 3–4 mm long, ultimately reaching bases of anthers. *Flowering time*: late September to mid-October.

Distribution and ecology: a narrow endemic of the Bossiesveld region in the Hoeksrivier Valley in the south western corner of the Worcester Karoo, South Africa; on clay soils derived from shales of the Bokkeveld series in renosterveld.

Diagnosis: *Ixia atrandra* is distinctive in the terminally crowded flowers with pink or creamy white tepals with a large dark centre, tepals narrowed near the base ± into short claws and arrow-shaped, black anthers, broadest at the base, and with the connective visible on the abaxial surface. The connective bears small, rounded, blue deposits, evidently an epidermal secretion. *Ixia rouxii*, which also has an exposed anther connective, likewise has these surface deposits and also has tepals somewhat narrowed below and on these grounds they have been considered immediately allied. Both species have the style dividing at or just above the bases of the filaments and 3-toothed outer floral bracts, the teeth very short in *I. atrandra*.



Distribution of ***Ixia atrandra***.

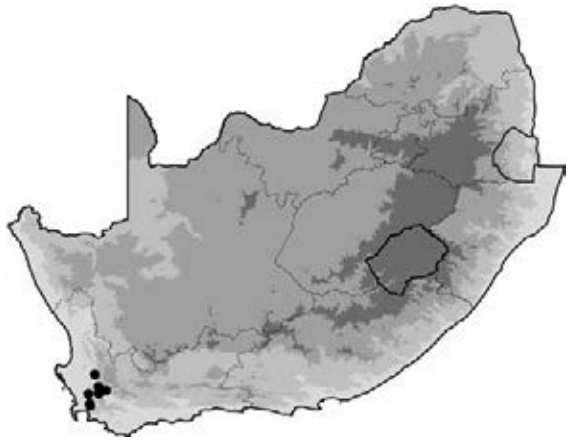
The flowers of *Ixia atrandra* display the typical adaptations for pollination by hopliine beetles: a congested, subcapitate inflorescence, brightly coloured bowl-shaped flowers with central dark marking, lack of nectar or fragrance and dark anthers.

37. **Ixia rouxii** *G.J.Lewis* in South African Gardening and Country Life 21: 368 (1931); Lewis: 125 (1962); Goldblatt & Manning: 190 (2016a). Type: South Africa, [Western Cape], near Porterville, ex hort. Kirstenbosch, *Roux s.n.* as *Natl. Bot. Gard. 209/27* (BOL 36476, lecto. (as holo.), designated by De Vos: 41 (1999); BOL, K, isolecto.).

Plants 350–550 mm high. *Corm* globose, 12–15 mm diam.; tunics of coarse, netted fibres. *Stem* usually 1 to 3 slender, short, strongly divergent branches. *Leaves* 4 to 6, linear to narrowly lanceolate, ½ to ± ⅔ as long as stem, 2–6 mm wide, main vein and margins moderately thickened, uppermost leaf partly sheathing stem. *Spike* closely 5- to 9-flowered; bracts membranous, translucent, flushed dark brown, outer 5–6 mm long, usually with 3 prominent purple veins, either 3-toothed or with one prominent tooth, inner 2-veined, 2-toothed. *Flowers* ± salver-shaped, pink to purple or blue-mauve with large, purple-black or turquoise central mark, unscented; perianth tube cylindric, 5–7 mm long; tepals obovate to elliptic, spreading, subequal, 15–20 × 7–12 mm. *Filaments* ± 5 mm long, purple-black; anthers 5–7 mm long, dark purple-black; pollen yellow. *Style* dividing opposite base of filaments, branches falcate, 4–5 mm long. *Flowering time*: October to mid-November.

Distribution and ecology: rare today and restricted to the lowlands of Western Cape, South Africa, extending from near Porterville to the Paardeberg and Stellenbosch Flats and inland in the upper Tulbagh Valley; on well-drained sandy ground, most sites under cultivation today.

Diagnosis: with narrow, sublinear leaves 2–6 mm wide, flowers crowded terminally, *Ixia rouxii* is distinguished



Distribution of ***Ixia rouxii***.

primarily by the flowers with large, dark central stain, almost black stamens and distinctive, short lateral branches extended outward almost horizontally and curving upward at the tips. The tepals range in colour from purple to deep pink or blue-mauve (rarely white), always with a dark brown to purple-black central stain covering ± one third their length. Spikes bear relatively few flowers, often only 4 to 6 on the main spike (sometimes more), and fewer on the branches and the bracts are ± papery and pale below, becoming brown distally and the outer may have one tooth or three ± equal teeth, this varying even in the same population. Somewhat unusual for sect. *Ixia*, the corms bear short, relatively slender stolons, the remains of which can be seen on most herbarium specimens. *Ixia rouxii* has been regarded as allied to *I. polystachya*, which typically has two or more ascending to upright branches, many more flowers per spike, floral bracts usually pale throughout and the corms do not produce stolons. The style in *I. rouxii* divides at or shortly above the filament bases, occasionally opposite the middle of the filaments. The central stain of dark pigment is often less pronounced in *I. polystachya*, which also usually has the style dividing opposite the filament bases. Both Lewis (1962) and De Vos (1999) remarked that the tepals are unusually narrowed below into short claws (tepals unguiculate or subunguiculate according to Lewis), but there seems little merit in this distinction.

Notable features of *Ixia rouxii* are the black anthers, the thecae of which are separated from one another to expose a narrow strip of connective on the abaxial (outer) surface. Anthers in the type from Porterville, and in a collection said to be from 'near Hopefield' have particularly prominent connectives, ovate in shape. This recalls the condition in *I. atrandra*, suggesting a possible relationship between them. The use of this feature in circumscribing *I. rouxii* is limited because anthers from the southern end of the range at Stellenbosch and nearby have nearly parallel thecae with the connective not, or barely exposed. The pollen, a bright yellow colour, contrasts with the black anther tissue in dehisced thecae.

38. **Ixia polystachya** *L.*, Species plantarum, edn. 2, 1: 51 (1762); Lewis: 102 (1962, including *I. linearifolia* and *I. sarmentosa*); Goldblatt & Manning: 190 (2016a). *I. serotina* Salisb.: 34 (1796), illegitimate superfluous name for *I. polystachya* L. (1762), *I. erecta* P.J.Berg. (1767) and *I. thyrsiflora* D.Delaroche (1766). Type: South Africa, without precise locality or collector, illustration in Mill.: t. 155 f. 2 (1760).

Ixia erecta P.J.Bergius: 5 (1767) [name misapplied to *I. odorata* by Thunb.: 16 (1783); misapplied by Jacq.: t. 18 (1797) to *I. polystachya* var. *lutea*]. Type: unknown, identity according to G.J.Lewis (1962).

Ixia polystacia Mill.: 3 (1768), illegitimate homonym and superfluous name for *I. polystachya* L. Type: South Africa, without precise locality or collector, illustration in Mill.: t. 155 f. 2 (1760).

Ixia maculata var. *caesia* Ker Gawl.: t. 530 (1821b). *I. viridiflora* var. *caesia* (Ker Gawl.) Baker: 92 (1877). Type: South Africa, without precise locality or collector, illustration in Ker. Gawl.: t. 530 (1821b).

Wuerthia [as *Würthia*] *elegans* Regel: 595 (1851). *Ixia aristata* var. *elegans* (Regel) Baker: 162 (1892). *I. elegans* (Regel) N.E.Br.: 43 (1928). Type: South Africa, without precise locality or collector, illustration in Regel: 98, t. 46, f. 2 (1853).

Watsonia campanulata Klatt: 354 (1882): Type: South Africa, without precise locality or collector, illustration in Andrews: t. 196 '*I. maculata*' (1801b).

Ixia polystachya var. *crassifolia* G.J.Lewis: 108 (1962). Type: South Africa, [Western Cape], 1 mile [1.5 km] north of Malmesbury, Sept., *Schelpe 4225* (SAM, holo.; BOL, iso.).

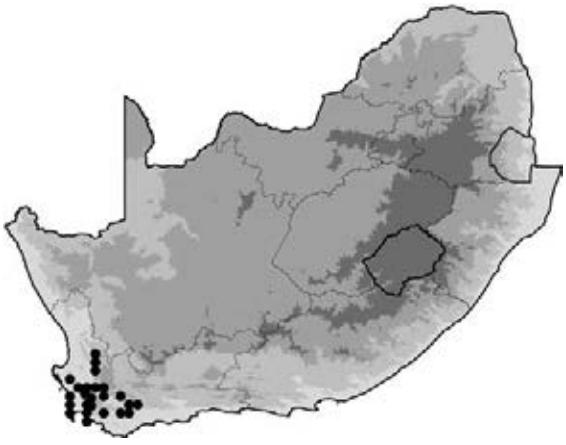
Plants mostly 300–500 mm high. *Corm* 9–20 mm diam.; tunics of fine, netted fibres. *Stem* usually 2- or 3-branched, sometimes simple. *Leaves* 5 to 8, reaching to ± middle of stem or base of spike, narrowly sword-shaped to linear, mostly 3–8 mm wide, upper leaves partly sheathing, free distally. *Spike* mostly 8- to 12-flowered, slightly flexuose; bracts pale, ± translucent, flushed pink to brown near tips, outer 4–7(–9) mm long, with a single prominent median vein, apex subacute, 1-toothed or unequally 3-lobed with longer central tooth, inner 2-veined, 2-toothed. *Flowers* rotate to ± salver-shaped, suberect, pink, blue-mauve, blue-grey or purple with small dark blue, purple, black or grey centre, often faintly scented; perianth tube 6.5–11.0 mm long; tepals ± elliptic, subequal, 9–18 × 4–8 mm. *Filaments* 2–4 mm long; blue-mauve to purple; anthers 4–7 mm long, spreading or suberect, pale mauve to ± white; pollen white or pale yellow. *Style* pale mauve, purple or white, usually dividing opposite base of filaments or opposite middle to apex of filaments, branches 3–4 mm long. *Flowering time*: late October to early December.

Distribution and ecology: restricted to the western half of Western Cape, South Africa, extending from the Olifants

River Mtns near Warm Baths to the Cape Peninsula and Cape Hangklip; on mid- to lower slopes and flats, often in cooler sites as at the edge of bush but also in renosterveld in the Swartland, on clay loam or sandy ground.

Diagnosis: *Ixia polystachya* is recognised by moderate-sized flowers crowded together at the top of the spike, and a stem typically with two or three short, ascending branches. Flowers range from white to pink or blue-mauve with a relatively small darker blue, purple or grey centre and have tepals 9–18 mm and a perianth tube 6.5–11.0 mm long and half as long as the tepals. Added to this, the floral bracts are usually pale translucent and the outer has a prominent central vein and an acute central cusp, sometimes with a pair of small lateral lobes. The style typically divides at the mouth of the perianth tube with the style branches extending between the bases of the filaments. Plants also usually have dark anthers and as the flower ages the anthers spread outward to become almost horizontal and slightly twisted. The specific epithet, *polystachya* (many-branched), is misleading for although stems sometimes have one, two or even three branches (as in the type illustration), this character is not consistent and plants are sometimes unbranched.

Curiously, plants sometimes have an unusually long style dividing shortly below to shortly above the base of the anthers. Such plants are most common on the Cape Peninsula but also occur in populations from the Olifants River Mtns. The short-styled plants are most frequent at lower elevations between Cape Town and Tulbagh. Style length may even vary within some populations. Plants referred in the past to var. *lutea* are now regarded as a separate species, *Ixia sarmentosa*, which has pale yellow to white flowers with a large central stain and corms usually bearing stolons (not present in *I. polystachya*). A second variety, var. *crassifolia*, said to have leathery leaves, slightly smaller flowers and leaf margins somewhat thickened, is not currently recognised. *Ixia polystachya* var. *longistylis* (De Vos 1999) from the mid-Breede River Valley near Rawsonville, distinguished by particularly narrow, prominently veined and fibrous leaves 2.0–2.5 mm wide and a style dividing opposite the middle of the anthers, is treated as the separate species *I. longistylis*, probably not closely related to *I. polystachya*.



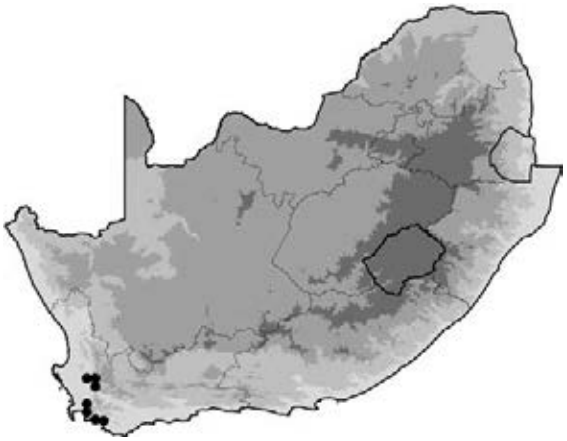
Distribution of ***Ixia polystachya***.

39. **Ixia sarmentosa** *Goldblatt & J.C.Manning* in South African Journal of Botany 104: 191 (2016a). Type: South Africa, Western Cape, Bo-Hermon, Elandsberg Reserve, marshy ground south-east of Bosplaas homestead, 11 Nov. 2011, *Goldblatt & Manning 13747* (NBG, holo.; K, MO, PRE, S, iso.).

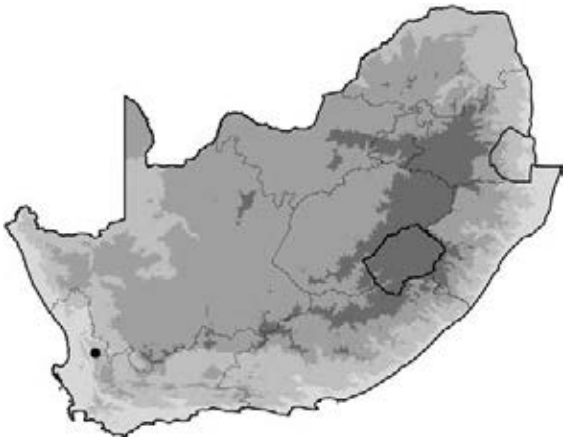
Plants mostly 250–500 mm high. *Corm* ± globose, mostly 8–10 mm diam., often with stolons from base or cormlets virtually sessile; tunics of fine, soft fibres or ± membranous to papery layers. *Stem* usually with 1 or 2(3) short, rigid, spreading branches. *Leaves* mostly 4 to 6, all with expanded blades, ± ⅔ to nearly as long as stem, linear to narrowly sword-shaped, mostly 2–5 mm wide, main vein and margins hyaline when alive (appearing thickened when dry). *Spike* closely 3- to 6(–8)-flowered, branches mostly 2- or 3-flowered; bracts membranous, translucent, sometimes dark at tips, 5.5–7.0 mm long, outer with only central vein prominent, 1-toothed or with a small tooth lateral to central tooth, inner 2-veined, acutely 2-toothed. *Flowers* upright, rotate, sulphur-yellow to white, rarely pale pink, with green to brown central zone up to ± ⅓ length of tepals, flushed red outside, unscented; perianth tube 5–9 mm long, filiform; tepals united basally for up to 1 mm, obovate, (12–)16–22 × (5–)7–10 mm, spreading ± horizontally when fully open. *Filaments* ± 2 mm long, ± coherent, usually dark green to brownish purple, rarely yellow; anthers 5–8 mm long, remaining erect or suberect, linear, yellow; pollen yellow. *Style* dividing opposite base to middle of filaments, green or yellow, branches 3.0–3.5 mm long, emerging between filaments. *Flowering time*: mostly October to late November; opening ± 10:00 and closing 13:30–14:00.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, extending from Porterville in the north to Kleinmond and Hermanus in the south; in seasonally wet habitats at the foot of mountains, usually in loamy, sandy ground.

Diagnosis: *Ixia sarmentosa* is distinguished by the narrow leaves, small corms with particularly soft tunics, either membranous or composed of fine, soft fibres and usually bearing slender stolons with a single terminal cormlet. The relatively short, stiff branches spread at a wide angle from the main stem and bear few flowers. Branches, usually produced in *I. polystachya*, in which collections of *I. sarmentosa* were often included (sometimes as var. *lutea*), are more-or-less upright and bear numerous flowers. The flowers of *I. sarmentosa* also consistently have short filaments, ± 2 mm long, and the style, pale green to pale yellow, divides opposite the base to middle of the short filaments, the style branches then extending outward between the filaments. *Ixia polystachya* has larger corms with well-developed fibrous tunics and does not produce stolons.



Distribution of ***Ixia sarmentosa***.



Distribution of ***Ixia angelae***.

Flowers of *Ixia sarmentosa* are relatively large, especially in northern populations, the tepals mostly 17–22 × 8–10 mm, but in populations from the mountains around Stellenbosch and Somerset West the tepals are 12–16 × 5–7 mm. Other than the smaller flowers there appears to be no difference between these and the larger flowered plants.

Surprisingly, given their very different flowers and different pollinators, hybrids are known between long-tubed *Ixia paniculata* (sect. *Hyalis*), pollinated by long-proboscid flies, and *I. sarmentosa* (originally reported as *I. paniculata* × *I. dubia*) (Goldblatt & Manning 2011) where the two co-occur near Kleinmond. Like most members of sect. *Ixia*, *I. sarmentosa* is evidently adapted for pollination by hopliine beetles, two species of which have been captured on the flowers.

40. **Ixia angelae** *Goldblatt & J.C.Manning* in South African Journal of Botany 104: 192 (2016a). Type: South Africa, Western Cape, Cederberg, wet cliffs along road above Algeria Forest Station, 13 Nov. 2012, *Manning & Parker 3459* (NBG, holo.; K, MO, PRE, iso.).

Plants 120–250(–400) mm high. *Corm* conical, 8–10 mm diam., sometimes producing short stolons; tunics of fine to medium-textured fibres. *Stem* usually unbranched but with up to 3 widely spreading branches curved upwards distally. *Leaves* 3 to 6, narrowly lanceolate, 3–6 mm wide. *Spike* (2)4- to 7(12)-flowered; bracts pale-translucent, ± dry in upper half, outer ± 5 mm long, without dark veins when alive, when dry with a prominent, dark, median vein reaching upper margin and several more shorter veins, 3-toothed, inner as long or slightly shorter than outer, 2-veined, forked apically. *Flowers* clear pale yellow, sometimes slightly paler in centre, often red to brown on reverse; perianth tube filiform, 6–7 mm long; tepals subequal, elliptic, spreading, 12–18 × 5–7 mm. *Stamens* with filaments ± 3.5 mm long, erect, diverging slightly distally, ± white; anthers suberect, 4.5–7.0 mm long, elliptic and with elliptic connective visible on abaxial surface, latrorse, yellow; pollen yellow. *Style* yellow, dividing opposite base of filaments but branches held together below, only diverging opposite middle to upper half of filaments, branches arching outward to reach bases of anthers, 3–5 mm long. *Flowering time*: early October to mid-November.

Distribution and ecology: currently known only from Uitkyk Pass in the central Cederberg above Algeria Forest Station in Western Cape, South Africa; on mossy seeps on relatively steep cliffs or wet banks.

Diagnosis: *Ixia angelae* is distinguished by the pale yellow flowers with nearly white, erect filaments held closely together for part of their length so that the style branches emerge between them halfway up their length, then arching outward, reaching to about the base of the anthers. Not clearly visible in dried specimens, the anthers are unusual, being elliptic with the connective visible between the thecae on the abaxial surface. The dehiscence is latrorse, unusual for *Ixia* although known in a few other species, none apparently closely related to *I. angelae.* The flowers have a relatively short perianth tube, 6–7 mm and tepals ±12 mm long, about twice as long as the tube. The corms have tunics of fine, soft fibres and produce cormlets on stolons at the base. *Ixia angelae* stands out in sect. *Ixia*, especially among the short-styled species of the section in the uniformly coloured tepals without any hint of a dark centre. *Ixia polystachya*, in which De Vos (1999) included specimens available to her, has pink to mauve or white flowers, never yellow, and always with a darker central stain, divergent spreading anthers with parallel thecae, and style branches arching outward between the bases of the filaments, thus unlike *I. angelae.* The habitat, in wet moss on cliffs and muddy banks is unusual for the genus.

41. **Ixia viridiflora** *Lam.*, Encyclopédie méthodique. Botanique 3: 340 (1789); Lewis: 114 (1962); Goldblatt & Manning: 194 (2016a). Type: South Africa, without precise locality or collector (P: Herb. Lamarck, holo.).

Ixia spectabilis Salisb.: 35 (1796). Type: unknown.

Ixia spicata var. *viridi-nigra* Andrews: t. 29 (1798b). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 29 (1798b).

Ixia maculata var. *amethystina* Ker Gawl.: t. 789 (1804b). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 789 (1804b).

Ixia viridis Thunb.: 242 (1811). Type: South Africa, [Western Cape], 'Roode Sand', *Thunberg s.n.* (S, UPS–THUNB, syn.).

Ixia maculata var. *viridis* Ker Gawl.: t. 549 (1802e). *I. pulchra* Salisb.: 320 (1812), replacement names for *I. maculata* var. *viridis* Ker Gawl. [not *I. viridis* Thunb.]. Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 549 (1802e).

Ixia cana Eckl.: 26 (1827). *I. viridiflora* var. *cana* (Eckl.) Baker: 164 (1892). Type: South Africa, without precise locality, cultivated in Cape Town, *Ecklon s.n.* [S, lecto., designated by Nordenstam: 285 (1972)].

Ixia viridifolia var. *minor* M.P.de Vos: 45 (1999). Type: South Africa, Western Cape, Wolseley, Mostertshoek, *Mostert sub De Vos 2722* (NBG [as STE], holo.).

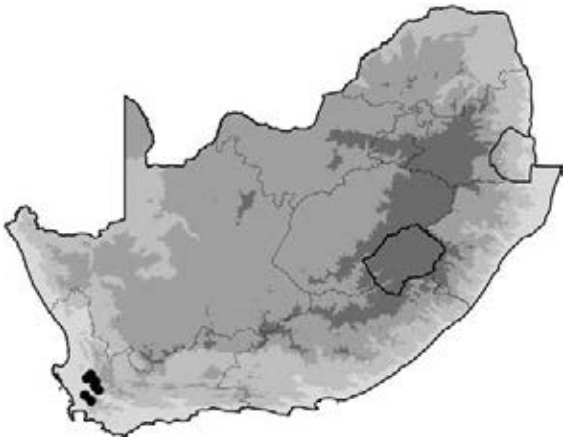
[*Ixia maculata viridis* Jacq.: t. 23 (1797), invalid name.]

[*Ixia prasina* Sol. ex Baker: 92 (1877), invalid name only cited in synonymy.]

Plants 500–950 mm high. *Corm* ± globose, 10–18 mm diam.; tunics of fine, pale, netted dark fibres. *Stem* usually with 1 or 2 short, erect branches held close to main stem. *Leaves* 5 to 7, ± linear, leathery, reaching to between middle of stem and nearly to base of spike, 2–7 mm wide, firm, with 3 or 4 prominent veins. *Spike* laxly 10- to many-flowered; bracts ± dry, straw-coloured, outer 8–10 mm long, with 1 prominent vein, mostly 1-toothed, inner slightly shorter than outer, 2-veined, 2-toothed. *Flowers* half nodding, salver-shaped, green, blue-green or grey-blue, usually with prominent, dark purple or reddish to ± black centre (rarely whitish in centre); perianth tube filiform, 6–9 mm long; tepals subequal, ± elliptic, spreading, connate in lower ± 1 mm, (10–)16–25 × (4–)7–11 mm. *Filaments* (2–)3–4 mm long, parallel, purple (rarely whitish); anthers suberect, (5–)9–13 mm long; pollen yellow. *Style* dividing opposite base (rarely middle) of filaments, purple (rarely whitish), branches falcate, ± 3 mm long. *Flowering time*: late September and October.

Distribution and ecology: a rare, relatively narrow endemic of Western Cape, South Africa, extending from near Porterville and the upper Tulbagh Valley south to the southern end of the Paardeberg; on loamy clay and gravel.

Diagnosis: this lovely plant, with its extraordinary green to turquoise, or sometimes grey-blue flowers usually with maroon to almost black centre, is unmistakeable. Added to the unique flower colour is an elongate spike with large blooms open at the same time and spaced well apart from one another. The particularly long anthers are mostly 9–13 mm long (occasionally only 5–7 mm long) and always suberect and the style divides at or shortly above the bases of the free filaments. The elongate spike is unique in the genus.



Distribution of ***Ixia viridiflora***.

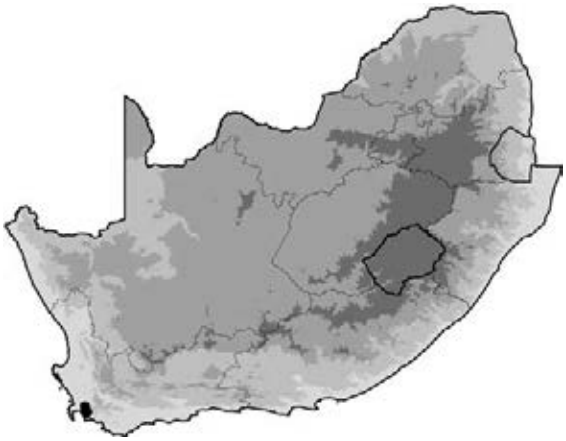
Ixia viridiflora var. *minor* was named for two collections from Romans River Farm near Wolseley that vary slightly from typical plants in a number of characters, most importantly the leaves mostly 4–7 mm wide, bracts with several veins, perianth tube 4–7 mm long, short anthers 5–7 mm long, and the style said to divide near the middle of the filaments. Typical *I. viridiflora* has leaves 2–5 mm wide, usually 1-veined bracts, perianth tube 6–9 mm long, anthers 9–13 mm long, and the style always dividing opposite the filament bases. The species is still known from very few plants, many of them derived from the same populations. Even at the time, some of the characters separating var. *minor* were problematic — the holotype of var. *minor* actually has the style branching at the top of the tube but other collections, which have a pale green perianth lacking a dark centre, are mixed for this character. More recent collections of *I. viridiflora* from additional populations have rendered the distinction between the two varieties untenable, in particular plants with flowers typical of var. *viridiflora* but with the broader leaves of var. *minor.*

Small-flowered populations with a pale centre, including the anthers, are recorded from Romans River Farm and from Weltevrede Farm near Botha, along with typical large-flowered, dark-centred populations. These anomalous populations may represent pollination ecotypes.

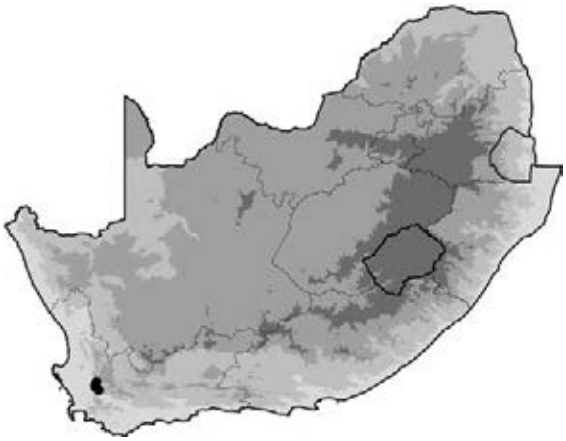
Like several other species of sect. *Ixia*, *I. viridiflora* is pollinated by hopliine beetles.

42. **Ixia versicolor** *G.J.Lewis* in Journal of South African Botany 28: 123 (1962). Type: South Africa, [Western Cape], between Gordon's Bay and Strand, *Lewis s.n.* [BOL 21758, lecto. (as holo.), designated by De Vos: 51 (1999)].

Plants 150–300 mm high. *Corm* ± globose, 10–15 mm diam.; tunics ± coarse, dark fibres, netted above. *Stem*



Distribution of ***Ixia versicolor***.



Distribution of ***Ixia vinacea***.

unbranched. *Leaves* 5 or 6, narrowly lanceolate, spirally twisted, reaching to ± the middle or upper third of stem, 3–5 mm wide, firm with prominent main vein, margins ridged, cartilaginous, ± crenate. *Spike* closely 3- to 7-flowered; bracts ± opaque, dry, 3–7 mm long, outer with prominent central cusp and short lateral teeth, inner 2-veined, 2-toothed. *Flowers* salver-shaped, white or blue-purple with dark central eye; perianth tube 8–12 mm long; tepals subequal, obovate to elliptic, spreading, 12–17 × 6–9 mm. *Filaments* ± 2.5 mm long, parallel, ± white; anthers suberect, ± 4.5 mm long, yellow; pollen yellow. *Style* yellow, dividing opposite base of filaments, branches 3–4 mm long. *Flowering time*: late September and October.

Distribution and ecology: a narrow Western Cape endemic, once common between Simondium, south of Paarl, and the flats between Gordon's Bay and Strand, South Africa, now rare as a result of urban development; on sandy gravel flats and lower mountain slopes.

Diagnosis: a relatively short plant, seldom exceeding 300 mm, *Ixia versicolor* is distinguished primarily by the narrowly lanceolate leaves, the blades somewhat twisted and with thickened and raised, partly crenulate margins. The terminally crowded flowers are purple or white with a prominent dark centre, the colour variation present even in a single population. The dark stamens are free and the anthers are erect or curving inward distally. The anthers are important in distinguishing *I. versicolor* from *I. polystachya*, which sometimes has flowers almost identically coloured, but anthers usually widely diverging and almost horizontal. Both species have outer floral bracts with only a prominent central cusp and the style dividing at the mouth of the perianth tube, the branches thus extending between the bases of the filaments (the latter feature is variable in *I. polystachya*, the style occasionally reaching the bases or lower third of the anthers).

43. **Ixia vinacea** *G.J.Lewis* in Journal of South African Botany 28: 131 (1962); Goldblatt & Manning: 194 (2016a). Type: South Africa, [Western Cape], Tulbagh, 9 Sep 1960, *Lewis 5742* (NBG, holo.; K, iso.).

Plants 350–450 mm high. *Corm* ± globose, 17–20 mm diam.; tunics of hard, coarse, mostly vertical fibres extending upward in a collar around base. *Stem* usually simple or 1-branched, branch held close to main stem. *Leaves* 3, lower 3 basal, exceeding spike, linear, leathery, firm-textured, 2–3 mm wide, uppermost leaf partly sheathing with short free blade. *Spike* closely 3- to 9-flowered; bracts ± dry, pale or flushed pink, 5–8 mm long, outer with several prominent veins, either 1-toothed or shortly 3-toothed, inner 2-veined, 2-toothed. *Flowers* rotate, ± erect, dark red with dark blue to purple centre; perianth tube filiform, 4–7 mm long; tepals subequal, ± elliptic, spreading, connate in lower ± 1 mm, 17–20 × 7–10 mm. *Filaments* erect, ± 3.5 mm long, parallel, purple-blue; anthers suberect, ± 7 mm long; pollen dark purple. *Style* dividing opposite base of filaments, purple, branches falcate, ± 4 mm long. *Flowering time*: late August and September.

Distribution and ecology: a narrow endemic of the Tulbagh Valley in Western Cape, South Africa, recorded only in the immediate vicinity of Tulbagh; on stony clay flats and slopes in renosterveld.

Diagnosis: particularly distinctive in sect. *Ixia*, *I. vinacea* has linear, firm, somewhat fibrous leaves up to 3 mm wide, the lowermost one or two of which are unusual in exceeding the spike. The corm tunics consist of coarse fibres that extend upward, forming a prominent collar around the stem base. Not only are the leaves and corm tunics unusual but the few, terminally crowded flowers are deep red with a dark purple to navy blue centre. The style divides opposite the base to middle of the filaments. On the basis of the coarse corm tunics, fibrous basal collar and dark centre of the flower *I. vinacea* has been considered closely related to *I. mostertii*, but that species differs significantly in having relatively broad leaves, differently coloured flowers and a longer style dividing opposite the lower third to middle of the anthers.

Ser. **Maculatae** *Goldblatt & J.C.Manning* in South African Journal of Botany 104: 195 (2016a). Type: *Ixia maculata* L.

Flowers yellow to orange (pink to purple or white in *I. monadelpha*), always with dark markings in centre; floral bracts often rust-coloured or dark distally. *Stamens* united near base or entirely. *Style* dividing opposite middle of anthers, branches ascending.

44. **Ixia maculata** *L.*, Species plantarum, edn. 2, 2: 1664 (1763); Lewis: 137 (1962, including *I. calendulacea* and *I. fuscocitrina*); Goldblatt & Manning: 195 (2016a). Type: South Africa, without precise locality or collector (LINN 58.21, holo., image seen).

Ixia milleri P.J.Bergius: 8 (1767). Type: South Africa, without precise locality or collector, illustration in Miller: t. 156, f. 1 (as f. 2) (1760).

?*Ixia amoena* Salisb.: 35 (1796). Type: unknown, identified by use of name by contemporaries.

Ixia conica Salisb.: 36 (1796). Type: unknown, identified from description.

Ixia capitata Andrews: t. 50 (1799). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 50 (1799).

Ixia flava Hornem.: 5 (1819), illegitimate homonym, not *I. flava* Lam. (1791). Type: unknown.

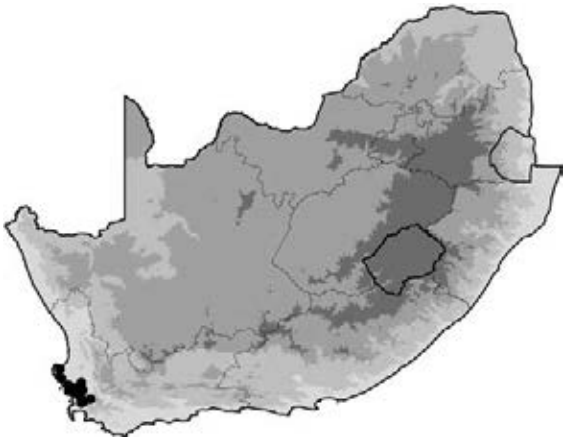
?*Ixia pallideflavens* Eckl.: 25 (1827). Type: unknown [identity uncertain].

?*Ixia vitellina* Eckl.: 25 (1827). Type: unknown [identity uncertain].

Ixia duckittiae L.Bolus: 281 (1931a). Type: South Africa, [Western Cape], Darling, *Duckitt s.n.* as Natl. Bot. Gard. *3202/15* (BOL, holo.).

Plants 300–500 mm high. *Corm* ± globose, 10–15 mm diam., bearing short, branched stolons to 20 mm long, each branch with a small cormlet up to 3 mm diam.; tunics of membranous, ± papery layers. *Stem* usually unbranched. *Leaves* mostly 4, ± linear to narrowly lanceolate, ± ⅔ as long as stem, 2–7 mm wide, uppermost sheathing lower ½ of stem, free distally. *Spike* congested, 4- to 8-flowered; bracts dry, papery, rust-brown entirely or only distally then pallid below, 8–15 mm long, outer obscurely 3-toothed or lacerate, without prominent veins, inner 2-veined and shortly forked at apex, as long or slightly shorter than outer. *Flowers* salver-shaped, deep orange (rarely yellow) with dark brown to black, star-shaped (or circular) centre 6–12 mm diam., unscented; perianth tube cylindric, 5–8 mm long; tepals elliptic, subequal, 15–22 × 8–12 mm. *Filaments* 2.5–5.5 mm long, united in lower ⅓ (rarely only at base), yellow; anthers ascending, 8–11 mm long, yellow; pollen yellow. *Style* yellow, dividing opposite base of anthers, branches 3.5–4.0 mm long. *Flowering time*: mid-September to early October.

Distribution and ecology: restricted to the Atlantic Coast of Western Cape, South Africa, extending from near Hopefield and Langebaan south to Melkbosstrand, a short distance north of Cape Town; in granite outcrops or granite-derived gravel.



Distribution of ***Ixia maculata***.

Diagnosis: *Ixia maculata* is recognised by orange or sometimes yellow flowers with a small dark brown, star-shaped or round centre. The central dark part of the flower is slightly cupped with only the distal ⅔ of the tepals outspread. The yellow filaments are united in the lower half or completely, with the style dividing above the bases of the anthers. Particularly unusual are the short, branched stolons produced from the corm base, each branch bearing a small cormlet. Similar branched stolons are also found in *I. stolonifera* of sect. *Ixia* and in *I. purpureorosea* (sect. *Hyalis*). The stem is usually unbranched and the linear to narrowly lanceolate leaves are mostly 2–7 mm wide. *Ixia maculata* is one of few species of sect. *Ixia* with large dry floral bracts rust-brown in the upper half or entirely. *Ixia maculata* was initially broadly circumscribed, thus including several species with flowers of various colours but with a dark centre.

Lewis (1962) recognised two varieties of *Ixia maculata*, one of them, var. *intermedia*, now *I. calendulacea*, differs in its larger flower, tepals not concave below, brown filaments (drying purple), broader leaves, typically 12–20 mm wide, and long, slender stolons bearing solitary terminal cormlets. Lewis's second variety, var. *fuscocitrina*, now *I. fuscocitrina*, has yellow flowers with a large, solid dark brown to almost black centre, the dark portion concave, and relatively broad, soft-textured leaves. It shares with *I. calendulacea* the production of long, flattened stolons bearing large solitary cormlets at the tips.

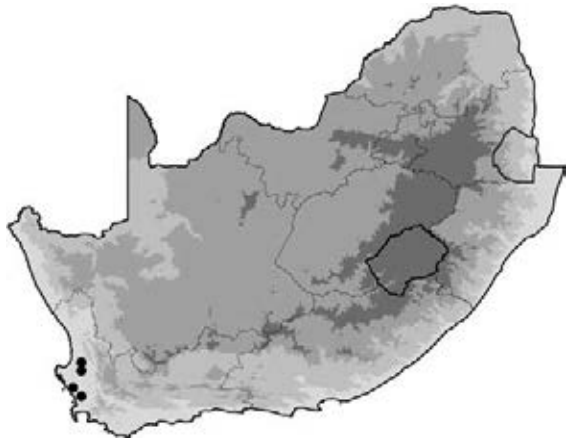
Reports in older literature of *I. maculata* on the Cape Peninsula, e.g. Lewis (1950), are for *I. dubia*, with which *I. maculata* has often been confused. The species has been documented as pollinated by several species of hopliine beetles.

45. **Ixia fuscocitrina** *Desf. ex DC.* in Redouté: t. 86 (1804); Goldblatt & Manning: 195 (2016a). *I. maculata* var. *fuscocitrina* (DC.) G.J.Lewis: 144 (1962). Type: South Africa, without precise locality or collector, illustration in Redouté: t. 86 (1804).

Plants 300–500 mm high. *Corm* globose, 12–16 mm diam. bearing long horizontal stolons ± 1.5 mm diam., up to 100 mm long, each bearing a large terminal cormlet ± 6 mm diam.; tunics fibrous, mostly oriented vertically, sometimes accumulating. *Stem* usually unbranched, robust plants sometimes with a node in upper ⅓ bearing a dry, attenuate scale, sheathing only at base, often recurved. *Leaves* mostly 4, lanceolate, somewhat fleshy and soft-textured, ± ½ as long as stem, 8–15 mm wide, uppermost sheathing lower ½ of stem, free distally, fleshy and soft-textured. *Spike* congested, 3- to 7-flowered; bracts brown above, green or becoming white to pale grey below, outer 9–12 mm long, with short acute central tooth and rounded lateral lobes, only central vein developed, inner 2-veined, shortly forked at apex, as long or slightly shorter than outer. *Flowers* salver-shaped, pale yellow with dark brown to black, shallowly concave centre, unscented; perianth tube 10–13 mm long; tepals ovate, subequal or inner slightly smaller, 21–30 × 8–15 mm. *Filaments* 3.5–5.0 mm long, united in lower ⅓ (rarely only at base), ± brown below, pale blue or yellow in upper ½; anthers ascending, 8–11 mm long, yellow; pollen yellow. *Style* dividing opposite base of anthers, branches 2.5–4.5 mm long. *Flowering time*: September to mid-October.

Distribution and ecology: restricted to the Western Cape coastal forelands from Darling to the Piketberg, South Africa; in alluvial sand in seasonally wet sites.

Diagnosis: *Ixia fuscocitrina* is recognised by the pale yellow perianth with a large, solid dark brown to black centre, the dark portion concave, partly united filaments and relatively broad, soft-textured leaves 8–15 mm wide. It shares with orange-flowered *I. calendulacea* corms that produce long, ribbon-like stolons, each bearing a single large cormlet. Closely related *I. maculata* and *I. calendulacea* also have filaments partly united and similar dry floral bracts rust-brown in the upper half. The differences between these three species are subtle and poorly preserved specimens lacking corms and their stolons can be difficult to distinguish. When seen alive they are unmistakeable as their flowers differ in colour and shape, as well as in leaf shape and texture. The stolons in *I. maculata* are short, branched and bear several small cormlets.



Distribution of ***Ixia fuscocitrina***.

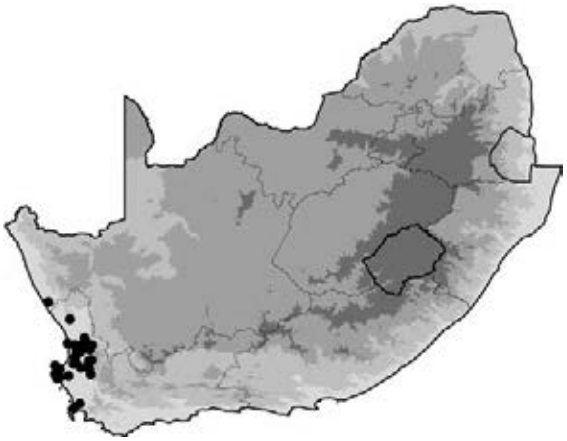
46. **Ixia calendulacea** *Goldblatt & J.C.Manning* in Bothalia 40: 61 (2010); Goldblatt & Manning: 196 (2016a). Type: South Africa, Western Cape, granite-topped hill east of Langebaan, in deep sand, 19 Sept. 2008, *Goldblatt & Porter 13152* (NBG, holo.; K, MO, PRE, iso.).

Ixia maculata var. intermedia G.J.Lewis: 142 (1962). Type: South Africa, [Western Cape], Redelinghuys, Sept., *Barker 2591* (NBG, holo.).

Plants 200–500 mm high. *Corm* depressed-globose, 12–16 mm diam., bearing horizontal stolons up to 120 mm long, ± 1.5 mm diam., each bearing a terminal cormlet 8–9 mm diam.; outer tunics fibrous with fibres mostly oriented vertically, sometimes accumulating. *Stem* usually unbranched, robust plants often with a node in upper ⅓ bearing a short branch or dry, attenuate scale sheathing only at base and often curved back against stem. *Leaves* (3)4 to 6, lanceolate, lowermost largest, ⅔–¾ as long as stem, mostly (8–)12–20 mm wide, often twisted in one or two rotations, upper leaves decreasing in size above, uppermost ± entirely sheathing. *Spike* flexuose, mostly 5- to 8-flowered; bracts (6–)8–12 mm long, dry, white-translucent below, brown in upper half or third, outer ± truncate or bilobed with a short central tooth, becoming ± lacerate, inner 2-veined, forked into attenuate cusps ± 2 mm long. *Flowers* shallowly cupped when fully open, orange with brown or dull red central marking usually with translucent reddish halo; perianth tube cylindric, 5–8(–10) mm long; tepals subequal, ascending, overlapping slightly when fully open, (18–)22–30 × 11–15 mm, outer ± 2 mm wider than inner. *Filaments* 3–4 mm long, united in lower ½ or entirely (rarely ± free), dark red-brown (often drying violet but ultimately losing colour); anthers ascending, 9–11 mm long, yellow. *Style* dividing between base and lower ⅓ anthers, branches (3–)4 mm long. *Flowering time*: mid-September to mid-October.

Distribution and ecology: the most widespread species of sect. *Ixia*, extending along the southern African Atlantic Coast and near interior in Northern and Western Cape from near Groen River mouth to the Cape Peninsula, South Africa; mostly on deep sands or limestone flats and slopes in sandveld and strandveld, but also in dry fynbos as in the Olifants River Valley.

Diagnosis: *Ixia calendulacea* is recognised by the large orange flowers with tepals slightly cupped even when fully expanded and a solid, red to brown centre, partly to entirely united filaments, also dark in colour, and dry floral bracts rust-brown in the upper half. The relatively broad leaves are usually twisted distally and the corms have softly fibrous tunics and bear long white stolons from the base, each terminating in a single, relatively large cormlet. The species was first recognised as *I. maculata* var. *intermedia* but was later was found to be



Distribution of ***Ixia calendulacea***.

a separate species with different floral and vegetative morphology and habitat preferences. *Ixia maculata* has flowers with narrower tepals and a small dark central eye, the corms produce short, branched stolons bearing small cormlets and the filaments and anthers are yellow. *Ixia calendulacea* bears a striking resemblance to *I. curta*, which has a slightly longer perianth tube, bracts usually paler but with dark brown tips and conical corms without stolons. Hopliine beetles have been recorded as pollinators.

47. **Ixia curta** *Andrews*, The Botanist's Repository 9: t. 564 (1809); Lewis: 145 (1962). *Morphixia curta* (Andrews) Klatt: 384 (1882). *I. monadelpha* var. *curta* (Andrews) Ker Gawl.: t. 1378 (1811b), invalid combination (sometimes listed as valid). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 564 (1809).

Plants 150–400 mm high. *Corm* ± globose, 10–15 mm diam.; tunics of fine, netted fibres. *Stem* simple or with 1 short, spreading branch. *Leaves* 4 to 6, lanceolate, straight or somewhat twisted, ⅔ to ± as long as stem, mostly 3–6 mm wide, decreasing in size above, uppermost largely sheathing. *Spike* closely 3- to 8-flowered; bracts 7–10 mm long, dry, pallid speckled with brown distally, outer 3-toothed with longer central tooth, inner 2-veined, 2-toothed. *Flowers* salver-shaped, orange with brown or greenish or red central marking, unscented; perianth tube cylindric, 10–15 mm long; tepals ± elliptic, subequal, spreading, 20–25 × 10–15 mm. *Filaments* 3–4 mm long, usually united entirely, brown; anthers ± erect, 9–10 mm long, yellow; pollen yellow. *Style* dividing between base and middle of anthers, branches 2–3 mm long. *Flowering time*: late September to October.

Distribution and ecology: local in the extreme southwest of Western Cape, South Africa, extending from near Hopefield to Malmesbury and Darling; in sandy habitats, often waterlogged in winter and spring (much of its range is now lost to agriculture or overrun by alien vegetation).

Diagnosis: *Ixia curta* is distinguished by the orange flowers with a brown centre often edged in green, united filaments, erect, contiguous anthers and an elongate, filiform perianth tube, 10–15 mm long, substantially exceeding the bracts, 7–12 mm long. Unlike the superficially similar *I. maculata*, which has orange or yellow flowers but a perianth tube mostly 5–8 mm long, about as long as the bracts, the corms of *I. curta* do not produce stolons and the bracts are pellucid, sometimes speckled with brown distally, rather than partly to entirely rust-brown.

48. **Ixia monadelpha** *D.Delaroche*, Descriptiones plantarum aliquot novarum: 22 (1766) [*I. monadelphia* Burm.f.: 1 (1768), orthographic variant]; Lewis: 146 (1962). *Morphixia monadelpha* (D.Delaroche) Klatt: 384 (1882). Type: South Africa, without precise locality or collector (syntypes, G: Herb. Burman; L: Herb. A. van Royen).

Ixia cartilaginea Lam.: 340 (1789). Type: South Africa, without precise locality or collector (holotype, P: Herb. Lamarck).

Ixia columnaris Salisb.: 36 (1796). Type: unknown.

Ixia columnaris var. *grandiflora* Andrews: t. 250 (1802b). *I. grandiflora* (Andrews) Pers.: 48 (1805), illegitimate homonym, not *I. grandiflora* D.Delaroche (1766). *Morphixia grandiflora* (Andrews) Klatt: 383 (1882). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 250 (1802b).

Ixia columnaris var. *latifolia* Andrews: t. 213 (1802c). *Morphixia latifolia* (Andrews) Klatt: 385 (1882). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 213 (1802c).

Morphixia purpurea Klatt: 383 (1882). *Ixia purpurea* (Klatt) Klatt: 186 (1894), illegitimate homonym, not *I. purpurea* Lam. (1789). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 203 (1802a).

Ixia columnaris var. *versicolor* Andrews: t. 211 (1802d). *Morphixia versicolor* (Andrews) Klatt: 385 (1882). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 211 (1802).

Galaxia ixiiflora DC. in Redouté: t. 41 (1803). *Ixia galaxioides* Klatt: 184 (1894), illegitimate superfluous name for *G. ixiiflora* DC. Type: South Africa, without precise locality or collector, illustration in Redouté: t. 41 (1803).

Ixia columellaris Ker Gawl.: t. 630 (1803d). *Morphixia columellaris* (Ker Gawl.) Klatt: 384 (1882). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 630 (1803d).

Ixia columnaris var. *angustifolia* Andrews: t. 392 (1804). *Morphixia angustifolia* (Andrews) Klatt:

384 (1882). *I. angustifolia* (Andrews) Klatt: 182 (1894). *I. columellaris* var. *rhodolarynx* Baker: 91 (1877), superfluous name for *I. columnaris var. angustifolia* Andrews (1804). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 392 (1804).

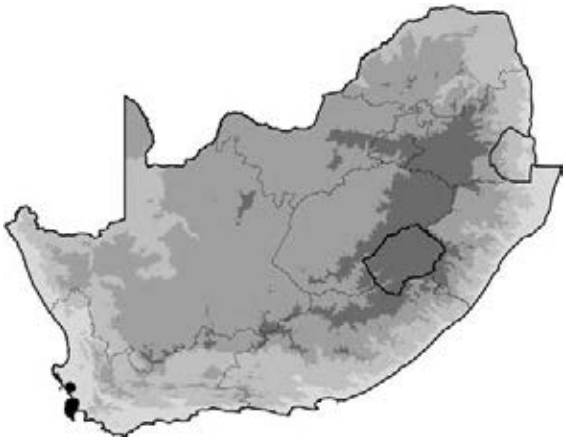
[*Ixia variegata* Banks ex Ker Gawl.: t. 630 (1803d), invalid name only in synonymy.]

[*Galaxia ramosa* DC. in Redouté: t. 41 (1803), invalid name only in synonymy.]

Plants 200–400 mm high. *Corm* ± globose, 12–20 mm diam.; tunics of soft, ± papery layers. *Stem* simple or with 1 or 2 short, spreading branches. *Leaves* 4 to 7, lanceolate, ± ½ as long as stem, mostly 3–12 mm wide, often loosely twisted, decreasing in size above, margins slightly thickened, hyaline when dry. *Spike* closely 4- to 12-flowered, flexuose; bracts 5–10 mm long, dry, pale below, spotted brown distally, in upper ½, outer ± truncate or with conspicuous dark brown, twisted central tooth and 2 smaller lateral lobes, inner with 2 dark brown, twisted cusps. *Flowers* salver-shaped, grey-blue, purple, violet, or pink (white or grey-yellow), with large, dark green, reddish, brown or purple central mark, unscented; perianth tube cylindric, 10–18 mm long; tepals ± elliptic, subequal, spreading, connate for up to 1.5 mm, 13–20 × 6–11 mm. *Filaments* 3–6 mm long, united in lower ½ or entirely, purple anthers erect, 7–8 mm long; pollen pale grey-blue. *Style* dividing between base and middle of anthers, branches 2–3 mm long. *Flowering time*: mainly September and October, occasionally later.

Distribution and ecology: restricted to a narrow stretch of the Western Cape Atlantic Coast between Darling and Hout Bay on the Cape Peninsula, South Africa, a distance of some 85 km; on seasonally wet, sandy gravel flats and lower mountain slopes, now eliminated from much of its range by urban development and farming activity.

Diagnosis: a striking species, *Ixia monadelpha* has grey-blue to light purple or even pink flowers (rarely white to grey-yellow), dark purple, iridescent green to almost black in the centre edged with a light brown to green halo. The stamens are also darkly coloured and even the pollen is blue to grey. The species was named for the united filaments, sometimes for only half their length, unusual in the genus, and even the anthers are erect and contiguous. The pale floral bracts are minutely speckled brown or red distally but are distinctive in the somewhat thickened, twisted, almost black cusps, the outer with the central cusp more prominent than the laterals. Added to these unusual features are a perianth tube 10–18 mm long and a stem usually bearing two or more branches held at right angles to the main axis and curving upward distally.



Distribution of ***Ixia monadelpha***.

Ixia monadelpha has often been associated with orange-flowered *I. curta*, which also has united filaments, contiguous anthers and an unusually long perianth tube, and the two have at times been treated as a single species. The two may well be closely related but can be separated not only by flower colour, but *I. curta* has corm tunics of fine, soft fibres, a markedly thicker perianth tube and the stem is rarely branched. The united filaments and contiguous anthers led to the recognition of subg. *Eurydice* for *I. monadelpha* by Persoon (1805). As in most species of sect. *Ixia*, *I. monadelpha* is pollinated by hopliine beetles. The species hybridises with *I. paniculata* where they co-occur on Rondebosch Common on the Cape Peninsula.

Sect. 3. **Morphixia** *(Ker Gawl.) Pax*, Die natürlichen Pflanzenfamilien 2, 5: 154 (1888); Goldblatt & Manning: 109 (2011). *Ixia* subg. *Morphixia* (Ker Gawl.) Goldblatt & J.C.Manning: 63 (1999). Type: *M. aulica* (Aiton) Ker Gawl., designated by Goldblatt & Manning: 109 (2011) = *Ixia latifolia* D.Delaroche

Leaves usually 3, sometimes up to 5, but always dimorphic, lower foliage leaves with well-developed blades and uppermost 1 (rarely 2 when basal foliage leaves more than 2) entirely sheathing. *Spike* with bracts usually membranous and translucent, rarely flushed with purple and opaque, outer with 3(5) prominent veins and 3-lobed to 3-toothed (or 5-toothed when 5-veined). *Flowers* usually actinomorphic, rarely bilateral, mostly pale blue-mauve, sometimes pink or white, occasionally deep purple, white to yellow in throat, erect, ascending or nodding, often scented; perianth tube funnel-shaped to cylindric; tepals subequal, spreading. *Filaments* contiguous around central style, rarely unilateral and then horizontal or declinate, inserted at base of upper part of tube, decurrent, not expanded below, included to well exserted; anthers dehiscing longitudinally, exserted, partly included or rarely fully included. *Ovary* and capsules usually smooth, rarely warty (*Ixia alata*

and *I. thomasiae*); style slender, central and straight, or when stamens unilateral then displaced to lie beneath filaments.

Species 35: winter-ranfall parts of Northern and Western Cape, South Africa.

Ser. **Morphixia** *Goldblatt & J.C.Manning*, new series. Type: *Ixia latifolia* D.Delaroche

Leaf blades plane, sometimes with thickened margins. Flowers mostly pale to deep pink or white; perianth tube moderately long, funnel-shaped. *Filaments* shortly to well exserted.

49. **Ixia divaricata** *Goldblatt & J.C.Manning* in Bothalia 38: 18 (2008a) as new name for *I. latifolia* var. *angustifolia* G.J.Lewis: 86 (1962); Goldblatt & Manning: 110 (2011). Type: South Africa, [Western Cape], Witzenberg, middle east face opposite Farm Rosendal, 26 Nov. 1941, *Pillans 9790* (BOL, holo.).

Ixia rapunculoides var. *rigida* G.J.Lewis: 77 (1962). Type: South Africa, [Western Cape], Hex River Valley, 1 Oct. 1893, *P. MacOwan in Herbario Normale Austro-Africana 1653* (BOL [as Hex River Pass, *Bolus s.n.* in *Guthrie 3077*], G, K [as near Hex River East, 1 500 ft (± 460 m)], MO [as Hex River Valley, De Doorns, Oct. 1893, *H. Bolus s.n.*], SAM, Z, syn.).

Ixia rapunculoides var. *subpendula* G.J.Lewis: 77 (1962). Type: South Africa, [Western Cape], between Groot River and Elandskloof, Oct. 1939, *Leipoldt 3026* (BOL, holo.).

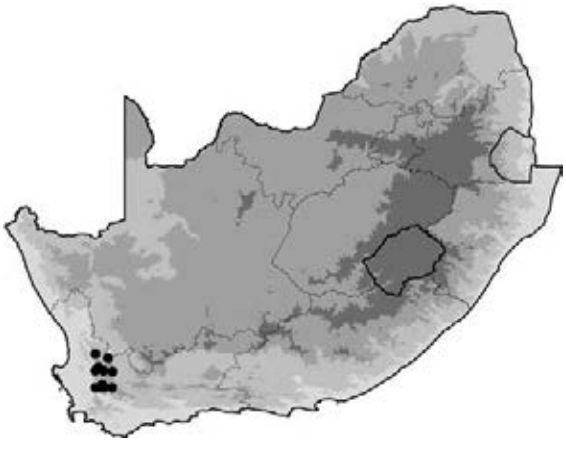
?*Ixia capitata* var. *stellata* Andrews: t. 232 (1802f). *I. stellata* (Andrews) Klatt: 396 (1882). *I. ovata* var. *stellata* (Andrews) Baker: 164 (1892). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 232 (1802f).

Plants 300–500 mm high. *Corm* subglobose, tunics of medium-textured, netted fibres, bearing 1–few sessile cormlets at base. *Leaves* 3 to 5, lower 2 to 4 narrowly sword-shaped to linear, (1.5–)3.0–5.0 mm wide, margins moderately thickened, hyaline when dry, straight, usually ± ⅓–½ as long as stem, uppermost 1 or 2 leaves sheathing stem. *Stem* with (1–)3 straight lateral branches mostly held at 30–45(–50)° to main axis, filiform, bearing flowers in upper half. *Main spike* 4- to 7-flowered, lateral spikes (1–)3- to 5-flowered; bracts translucent, outer with 3 dark veins, mostly 6–7 mm long, inner with 2 dark veins and forked apically. *Flowers* upright, whitish or pale to deep pink or light purple with pale yellow cup, unscented or with faint sweet scent; perianth tube funnel-shaped, 8–11 mm long; tepals subequal, 11–14 × 5.5–7.0 mm, proximal 3–4 mm forming part of floral cup, subpatent. *Filaments* erect, 4–5 mm long, distal 1–2 mm exserted from tube, rarely reaching only to top of tube, inserted ± 5 mm above tube base; anthers 4.0–5.5 mm long, fully exserted from tube, tips exserted from floral cup. *Style* dividing opposite middle of anthers, branches 1–2 mm long, extending between anthers. *Flowering time*: from late August at low elevations to October, November and December at higher elevations.

Distribution and ecology: scattered through the mountains of Western Cape, South Africa, extending from Elandskloof, east of Citrusdal, through the Cold Bokkeveld to Tulbagh and the Hex River Valley; in seasonally wet, stony sandstone flats and rocky sites.

Diagnosis: *Ixia divaricata* is unmistakable in its unusual branching pattern; the stiff, straight lateral branches are held at angles of 30–50° to the main axis and bear mostly 3 to 5 flowers crowded in the distal half. The white or pale pink (rarely deep pink or purple) flowers are held erect, with the tepals spreading but not fully patent. It was treated as var. *subpendula* of *I. rapunculoides* despite its distinctive branching pattern and upright flowers, not inclined or nodding. The anthers, 4.0–5.5 mm long, are usually fully exserted from the tube or rarely with the bases included. Specimens with anthers exserted 1–2 mm were sometimes included in *I. latifolia*, but typical *I. latifolia* has larger, deep pink flowers with a perianth tube 14–17 mm long, filaments ± 10 mm long, and broad basal leaves, mostly 10–18 mm wide. Plants from upper Moraine Kloof in the Hex River Mtns, flowering in January, are provisionally included here. They have a similar branching pattern but somewhat smaller, purple flowers with a tube ± 5 mm long, tepals ± 10 mm long, and anthers ± 3.2 mm long. The style divides at the top of the anthers and has branches ± 1.3 mm long that extend above the anther tips, whereas in typical *I. divaricata* the style divides opposite the middle of the anthers. The specimens lack corms and leaves without which a decision about the status of this late-flowering population cannot be made.

The immediate relationships of *Ixia divaricata* are most likely with *I. latifolia*, with which it was associated historically. Confusion with that species is due in part to some collections with a longer tube, 12–14 mm and also with relatively short, broad leaves, up to 18 mm wide



Distribution of ***Ixia divaricata***.

(also found in *I. latifolia*) but fairly slender branches (characteristic of *I. divaricata*). These are almost certainly hybrids between the two species, which sometimes grow within sight of one another, although on different soils, *I. latifolia* favouring heavy clay or loam.

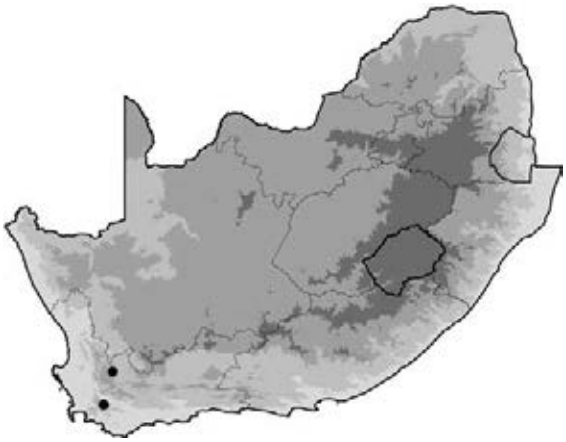
Flowers are pollinated by a range of medium-sized and large bees including *Lasioglossum* sp. (Halictidae) and *Anthophora diversipes* and *Amegilla spilostoma* (Apidae) (Goldblatt & Manning 2008a).

50. **Ixia saundersiana** *Goldblatt & J.C.Manning* in Bothalia 41: 111 (2011) Type: South Africa, Western Cape, Worcester, Milner Peak, rock cracks in humus with restios, 7 Dec. 2008, *Saunders & Saunders sub Manning 3237* (NBG, holo.).

Plants 150–200 mm high. *Corm* ovoid-conic, ± 8 mm diam.; tunics of fine netted fibres. *Stem* usually simple, rarely with up to three short, ascending branches. *Leaves* 2, lower basal, linear, 1.0–2.5 mm wide, sometimes shortly exceeding stem, central vein strongly and margins slightly thickened, pale when dry, upper sheathing the lower ½–⅔ of stem, with a short free blade. *Spike* 2- or 3(–5)-flowered; bracts membranous, translucent, outer with 3 main veins and 2 smaller lateral veins, shortly 3-toothed, inner 2-veined and 2-toothed. *Flowers* blue-mauve, yellow in throat; perianth tube funnel-shaped, ± 5 mm long; tepals ovate, ± 11 × 5.5 mm. *Filaments* erect, ± 3 mm long, reaching mouth of tube; anthers ± 4 mm long, yellow; pollen yellow. *Style* dividing opposite base to lower ⅓ of anthers, branches ± 1.5 mm long. *Flowering time*: late October to December.

Distribution and ecology: known from a few collections from the Hex River Mtns and Swartruggens some distance to the northeast in Western Cape, South Africa; in rock cracks in damp humus among restios.

Diagnosis: the high altitude *Ixia saundersiana* is immediately recognised by the single linear foliage leaf and a second, largely sheathing leaf, together with a mostly unbranched stem and spike of 2 or 3(–5) small, blue-mauve flowers yellow in the throat. Well-grown plants may have up to three, short, straight, ascending branches with up to four flowers per branch. The flowers are unremarkable and have a funnel-shaped perianth tube ± 5 mm long, spreading tepals, and relatively short filaments only 3 mm long, that reach only to the mouth of the perianth tube. We suspect that the species is most closely allied to *I. divaricata* but that species has a longer perianth tube, 8–11 mm long, filaments 4.0–5.5 mm long, usually exserted 1–2 mm from the tube and the stem is typically branched, with the long, straight branches diverging strongly from the main axis.



Distribution of ***Ixia saundersiana***.

51. **Ixia latifolia** *D.Delaroche*, Descriptiones plantarum aliquot novarum: 22 (1766); Goldblatt & Manning: 112 (2011). *Geissorhiza latifolia* (D.Delaroche) Baker: 94 (1877). *Tritonia latifolia* (D.Delaroche) N.E.Brown: 135 (1929). Type: South Africa, without precise locality or collector (G-DEL, holo.).

Ixia aulica [Soland in] Aiton: 57 (1789). *I. capillaris* var. *aulica* (Aiton) Ker Gawl.: t. 1013 (1807). *Morphixia aulica* (Aiton) Ker Gawl.: 107 (1827). Type: South Africa, 'Cape of Good Hope', cultivated in Britain, without precise locality, illustration in Ker Gawl.: t. 1013 (1807).

Ixia incarnata Jacq.: 7 (1795 [1788–1795]). *I. capillaris* var. *incarnata* (Jacq.) Ker Gawl.: t. 617 (1803a). *Morphixia incarnata* (Jacq.) Ker Gawl.: 107 (1827). *Morphixia capillaris* var. *incarnata* (Jacq.) Baker: 97 (1877). Types: South Africa, without precise locality or collector, illustration in Jacq.: t. 282 (1795 [1788–1795]); South Africa, [Western Cape], Ceres, Theronsberg Pass, 20 Oct. 1983, *Snijman 779* (NBG, epi.; PRE, iso.).

Ixia scariosa Thunb.: 243 (1811). Type: South Africa, [Western Cape], probably in the Cold Bokkeveld, Sept. 1773, but not stated, *Thunberg s.n.* [UPS-THUNB 990, lecto., designated by Goldblatt & Manning: 112 (2011)].

Ixia phlogiflora Delile in Redouté: t. 432 (1814). Type: South Africa, [Western Cape], without precise locality or collector, illustration in Redouté: t. 432 (1814).

Ixia latifolia var. *curviramosa* G.J.Lewis: 86 (1962). Type: South Africa, [Western Cape], Laingsburg Division, Tweedside, on flats, 27 Sept. 1951, *Barker 7469* (NBG, holo.; NBG, PRE, iso.).

[*Hyalis latifolia* (D.Delaroche) Salisb.: 317 (1812), genus invalid.]

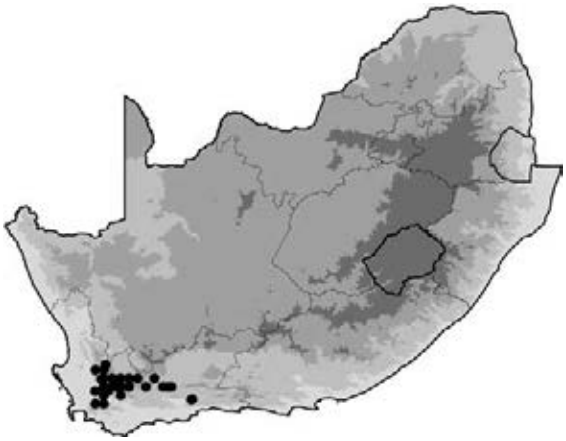
[*Hyalis aulica* (Aiton) Salisb.: 318 (1812), genus invalid.]

Plants mostly 150–350 mm high. *Corm* subglobose, mostly 15–25 mm diam.; tunics of firm, often coarsely wiry, netted fibres, bearing small cormlets at base. *Stem* usually 1- to 3-branched, rarely simple; branches either ascending, fairly long and straight or shorter and

± twisted, subtended by obscure, obtuse bracts and prophylls ± 1 mm long. *Leaves* usually 3, lower 2 lanceolate to sword-shaped, oblong or falcate, (5–)10–18 mm wide, ± ⅓ as long as stem, margins moderately to strongly thickened, sometimes slightly crisped, uppermost leaf sheathing lower ½–⅔ of stem. *Main spike* mostly 3- to 7-flowered, lateral spikes (1–)3- to 6-flowered, either ± straight or twisted; bracts translucent sometimes tinged brown, especially in fruit, outer with 3 dark veins, mostly 7–11 mm long, acutely 3-toothed, inner ± as long or slightly longer, with 2 dark veins, 2-toothed at apex. *Flowers* nodding, deep pink, pale mauve or blue-mauve, white or yellow in throat, sometimes edged darker pink or purple, unscented or with a faint rose or sour odour; perianth tube (7–)10–18(–23) mm long, narrowly funnel-shaped, flaring in upper ⅓, slightly curved near base; tepals subequal, ovate, 13–20(–23) × (6–)7–10 mm, spreading. *Filaments* 8–12 mm long, exserted 6–8 mm; anthers 3–5 mm long before splitting. *Style* dividing between base and middle of anthers, branches 1.8–3.0 mm long, extending between anthers. *Flowering time*: mainly mid-September to mid-October.

Distribution and ecology: extending in Western Cape, South Africa, from the Cold Bokkeveld and Worcester eastward to Karoo Poort at the edge of the Tanqua Karoo and southeast through the Witteberg Karoo and northern foothills of the Klein Swartberg, with isolated populations in the Little Karoo as far east as the Gamkaberg; on clay, clay loam and sandy soils in renosterveld, or occasionally dry fynbos, fairly common at higher elevations in the interior southwestern part of Western Cape.

Diagnosis: *Ixia latifolia* is recognised by the relatively large, deep pink, purple, mauve-pink or blue-mauve flowers usually with a relatively well-developed perianth tube, (7–)10–18(–23) mm long that gradually widens toward the mouth, and spreading tepals 13–20(–23) long. The long stamens have filaments exserted 6–8 mm from the tube and anthers 3–5 mm long. The floral bracts are mostly 8–10 mm long and distinctive in having narrowly acute teeth. The two basal leaves are usually fairly broad, 10–18 mm, but occasionally only 5 mm wide. The third leaf sheaths the stem for its entire length. Plants with short, somewhat twisted, rather than straight, lateral branches and slightly smaller flowers, described by G.J. Lewis (1962) as var. *curviramosa*, are now included in *I. latifolia*. The degree of twisting and length of the branches is not consistently correlated with any other character, and is often difficult to determine because plants with shorter, ± straight branches, conform to neither taxon. Flower size is unusually variable. Both the northernmost populations of *I. latifolia* in the arid Tanqua Basin and the easternmost near Oudtshoorn are exceptional: the Tanqua populations, growing in perhaps the most arid habitat for the species, have the largest flowers with a tube 20–23 mm long and tepals up to 21 × 10.5 mm. In contrast, the Gamkaberg populations have flowers with a tube 7–8 mm long and tepals 13–15 × ± 7 mm, among the smallest in the species. But plants from several other localities have flowers almost as small. The plants from the Tanqua Karoo reverse the usual trend for smaller stature and flower size in the driest habitats and merit further study.

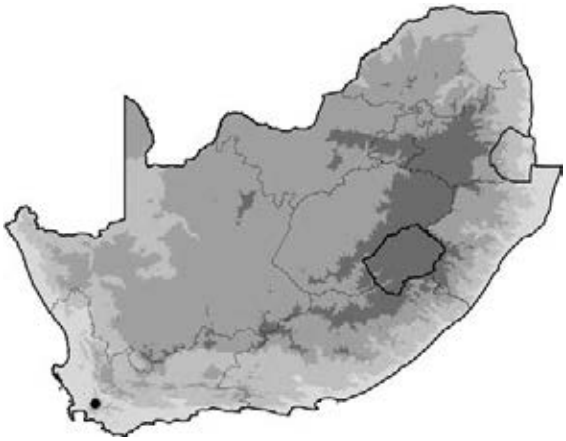


Distribution of ***Ixia latifolia***.

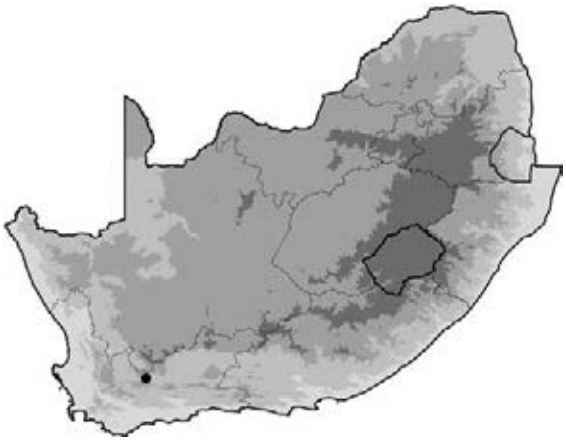
Ixia latifolia is probably most closely related to *I. divaricata*, a plant of wet, sandstone habitats in the Cold Bokkeveld and surrounding mountains, which has long, slender, straight lateral branches with flowers crowded in the upper half and a smaller perianth with a tube 8–11 mm long, tepals 11–14 mm long, and filaments 4–5 mm long reaching 1–2 mm beyond the mouth of the perianth tube or sometimes only to the mouth of the tube. *Ixia divaricata* typically has pale pink or white flowers and narrow leaves, thus very different from the larger, deep pink-mauve or purple flowers with well-exserted filaments, and broad, fairly short leaves of *I. latifolia*. Plants with broader leaves may be the result of crossing with *I. latifolia*, and plants of that species with particularly long branches may be the result of occasional crosses with *I. divaricata* at sites where the habitats of the two are close together.

52. **Ixia monticola** *Goldblatt & J.C.Manning* in Bothalia 41: 115 (2011). Type: South Africa, [Western Cape], Du Toit's Peak, rocky upper slopes and ledges, west aspect, ± 6 000 ft [1 820 m], 21 Dec. 1975, *Esterhuysen 34162* (BOL, holo.; MO, iso.).

Plants mostly 80–250 mm high, sheathed at base by pale brown cataphylls. *Corm* ± 6 mm diam.: tunics rust-brown, submembranous, not accumulating. *Stem* usually simple or 1(2)-branched, branches thread-like, suberect, often slightly twisted, 10–15 mm long, subtended by obscure, membranous bracts and prophylls ± 1 mm long. *Leaves* 2 or 3(4), lower 1 or 2(3) narrowly sword-shaped to linear, ½ as long to ± as long as stem, mostly 2.5–4.5 mm wide, uppermost leaf mostly sheathing but with a free unifacial tip. *Main spike* erect, slightly flexuose, 2- or 3-flowered, lateral spikes 1- or 2-flowered; bracts 5–6 mm long, membranous or becoming dry, flushed red-purple, outer bract shortly 3-cusped, inner forked apically. *Flowers* pink, yellow in throat, presence of scent unknown; perianth tube narrowly



Distribution of ***Ixia monticola***.



Distribution of ***Ixia parva***.

funnel-shaped, ± 10 mm long; tepals subequal, 12–17 × 6–7 mm. *Filaments* ± 6 mm long, exserted 2–3 mm from tube; anthers 3.5–4.0 mm long, yellow. *Style* dividing between base and middle of anthers, branches ± 1 mm long. *Flowering time*: December to mid-January.

Distribution and ecology: a local endemic of the mountains of Western Cape, South Africa, between Victoria Peak and Wemmershoek Peak; on sandstone rocks and cliffs, above 1 200 m elevation, evidently flowering well only after fire.

Diagnosis: *Ixia monticola* is recognised primarily by the small corm, ± 6 mm in diameter, with rust-brown, submembranous, non-accumulating, onion-skin-like tunics, often a fairly low stature and usually a simple, rarely 1(2)-branched stem. The moderate-sized pink flowers are unremarkable and have a funnel-shaped perianth tube ± 10 mm long, tepals 12–17 mm long, and short filaments exserted 2–3 mm from the mouth of the tube. The leaves are ± straight, 2.5–4.5 mm wide, and the cataphylls are typically rust-brown. *Ixia monticola* is most easily confused with the relatively small-flowered *I. divaricata*, the higher elevation populations of which often have few-branched or unbranched stems, and similar narrow, erect leaves. *Ixia divaricata* more often has white or very pale pink flowers, and while the floral proportions are similar to those of *I. monticola*, *I. divaricata* always has well-developed fibrous corm tunics.

53. **Ixia parva** *Goldblatt & J.C.Manning* in Bothalia 41: 116 (2011) as a new name for *I. latifolia* var. *parviflora* G.J.Lewis: 86 (1962) [not *I. parviflora* Salisb. (1796)]. Type: South Africa, [Western Cape], Laingsburg Division, Karoo Garden, Whitehill, 9 Sept. 1935, *Compton 5592* (NBG, holo.).

Plants mostly 70–120 mm high. *Corm* 12–16 mm diam.; tunics of medium-textured, netted fibres, bearing medium-sized cormlets at base. *Stem* usually 1- or 2-branched, branches short, twisted, subtended by membranous, attenuate bracts and prophylls 2–3 mm long. *Leaves* 3, lower 2 sword-shaped to falcate, 3–9 mm wide, margins and midrib slightly thickened, uppermost leaf sheathing lower ½–⅔ of stem. *Main spike* mostly 3- to 6-flowered, markedly flexuose, branches (1–)3- to 5-flowered; bracts 5–7 mm long, membranous or papery, opaque-purple or rust-coloured and veins hardly evident, with short acute teeth, inner ± as long or slightly longer than outer. *Flowers* nodding, bright purple-pink, yellow in throat with base of tepals edged with red, strongly scented of sweet pea; perianth tube funnel-shaped, 6–8 mm long; tepals subequal, oblong, 10–12 × ± 4 mm, spreading at right angles to tube. *Filaments* 6–7 mm long, ± 5 mm; anthers ± 4 mm long. *Style* dividing below or opposite bases of anthers, branches ± 3 mm long, spreading below anthers. *Flowering time*: mid-August to late September.

Distribution and ecology: local in the western Karoo between Laingsburg and Matjiesfontein in Western Cape, South Africa; in decomposed shale on south-trending slopes.

Diagnosis: *Ixia parva* is readily distinguished from related *I. latifolia* by its small, red-purple flowers and low stature, up to 120 mm tall. Plants also have distinctive dark purple bracts and unusually long style branches, ± 3 mm long, unexpected in a small flower with tepals 10–12 mm long. The style divides at or slightly below the apices of the filaments and the style branches extend outward beneath the anthers where they are conspicuous. The flowers are strongly scented of sweet pea, a feature unique among the species of the *I. latifolia* group where scent is lacking or weakly developed.

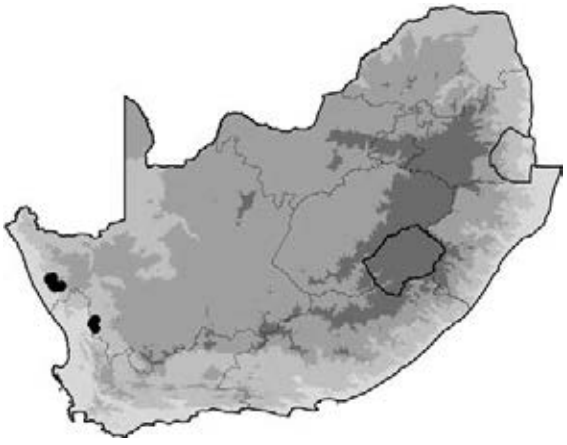
54. **Ixia ramulosa** *(G.J.Lewis) Goldblatt & J.C.Manning* in Bothalia 41: 117 (2011). *I. latifolia* var. *ramulosa* G.J.Lewis: 86 (1962). Type: South Africa, [Northern Cape], Grootvlei, Kamieskroon, Sept. 1945, *Lewis 1372* (SAM, holo.; SAM [2 sheets], iso.).

Plants mostly 150–400(–650) mm high. *Corm* with tunics of coarse, netted fibres. *Stem* with 3 to 6(–8) short,

slightly twisted branches subtended by minute, scale-like, ± truncate to obtuse bracts and prophylls 1(–2) mm long. *Leaves* 3, lower 2 sword-shaped to falcate, 4–10 mm wide, margins and main vein moderately to barely thickened, uppermost leaf sheathing lower ½–⅔ of stem. *Main spike* mostly 2- or 3-flowered, branchlets mostly 1- or 2(3)-flowered; bracts mostly 7–8 mm long, often rust-brown in distal half, with short acute teeth, inner bract ± as long or slightly longer than outer. *Flowers* deep purple, white in throat or mauve, sometimes pink, blue-mauve or white with yellow throat, presence of scent unknown; perianth tube widely funnel-shaped, 7–9(–10) mm long; tepals subequal, ovate, 10–15 × 5–7 mm, spreading at right angles to tube. *Filaments* 4–6(–8) mm long, exserted 2–4(–6) mm from tube; anthers 4–5 mm long, slightly shorter to slightly longer than filaments. *Style* dividing between lower and middle ⅓ of anthers, branches ± 1.0–1.8 mm long, apices emerging between anthers. *Flowering time*: mainly late August to early October, or early November at higher elevations.

Distribution and ecology: extending from the Kamiesberg in central Namaqualand to the Bokkeveld Escarpment in Northern Cape and adjacent Koebee Mtns in Western Cape, South Africa; in granitic sand or light clay loam.

Diagnosis: *Ixia ramulosa* has the narrowly funnel-shaped perianth tube and moderately to well-exserted anthers of its allies but is distinguished by the perianth tube 7–9(–10) mm long and several, short, wiry, lateral branchlets each bearing 1 or 2 or occasionally 3 flowers. The species normally has just three leaves, the two lowermost with well-developed blades, and the upper one largely to entirely sheathing the stem. *Ixia ramulosa* is best known from central Namaqualand in the vicinity of Kamieskroon and nearby Grootvlei and Skilpad farms where plants have brilliant, dark purple (also described as magenta) flowers with a white throat. Plants from higher elevations in the Kamiesberg east of Kamieskroon have pink or blue-mauve flowers with a yellow throat and also differ in perianth tube length, 7–8 mm long vs. 8–9(–10) mm for purple-flowered plants from lower elevations. Their later flowering, in October to early November, may be explained by the higher elevation. Among these Kamiesberg populations some consist of particularly tall, slender plants up to 650 mm high with long narrow leaves 5–6 mm wide, very different from the short-leaved populations and possibly explained by their marshy habitat. Alternatively these plants may represent a separate taxon.



Distribution of ***Ixia ramulosa***.

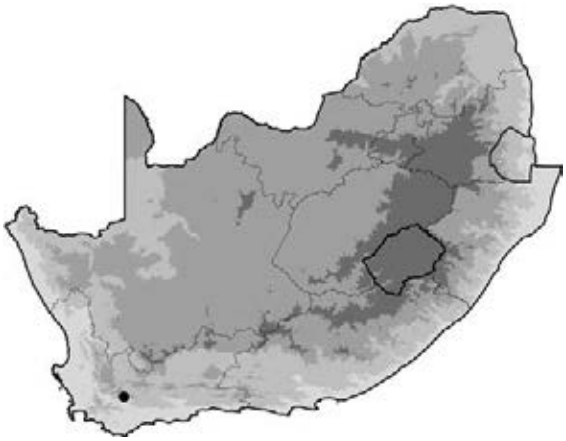
Provisionally, plants from the Bokkeveld Mtns to the south are included in *Ixia ramulosa*. Like typical *I. ramulosa*, these plants have stems with several short, filiform, few-flowered lateral branches and bracts sometimes flushed rust-brown distally, but a perianth tube 8–9 mm long and filaments ± 8 mm long (longer than in typical *I. ramulosa*), exserted ± 5 mm from the tube. These southern populations have branchlets with one to three flowers and white or pale blue-mauve flowers with a yellow cup and may be exceptionally robust, up to 750 mm high.

55. **Ixia nutans** *Goldblatt & J.C.Manning* in South African Journal of Botany 106: 194 (2016b). Type: South Africa, Western Cape, valley west of Montagu, south of Farm Pietersfontein, on stony, sandstone outcrop, 24 Aug. 2015, *Goldblatt & Porter 14109* (NBG, holo.; K, MO, PRE, iso.).

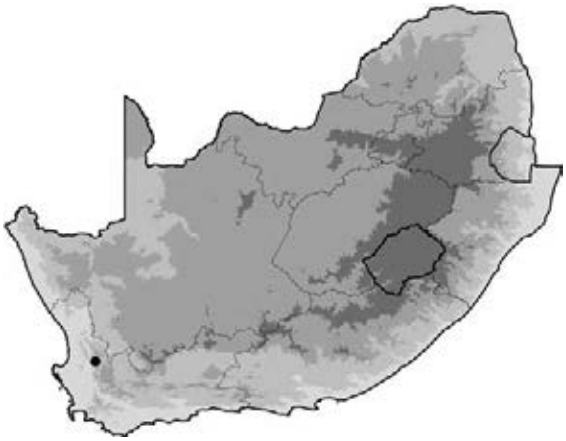
Plants 200–300 mm high. *Corm* 10–13 mm diam.; tunics of fine to medium-textured fibres. *Stem* usually with 2 or 3, short, drooping, filiform branches, subtended by scale-like, acuminate-truncate bracts and prophylls ± 1 mm long. *Leaves* 3, lower 2 basal, linear, slightly twisted (juvenile leaves loosely coiled distally), ± ⅓ as long as stem, ± 3 mm wide; main vein slightly raised, margins not thickened, uppermost leaf ± entirely sheathing with short free tip, enclosing most of stem. *Main spike* 2- or 3-flowered, lateral spikes mostly 1-flowered; bracts membranous, translucent with light brown veins, 6–7 mm long, outer 3-veined and acutely 3-toothed, inner 2-veined and 2-toothed, ± as long as outer. *Flowers* nodding to half pendent, pale mauve, faintly rose-scented; perianth tube funnel-shaped, 6–7 mm long, narrow lower part ± 3 mm long; tepals ascending below, spreading distally, obovoid-ellipsoid, 12–14 × 6–7 mm. *Filaments* ± 7 mm long, exserted ± 1.5 mm from mouth of tube; anthers ± 3 mm long, ± parallel, later weakly diverging, yellow. *Style* dividing opposite middle to upper ⅓ of anthers, 1.5(–2.5) mm long. *Flowering time*: August, probably also late July.

Distribution and ecology: known only from a single population near Farm Pietersfontein west of Montagu in Western Cape, South Africa; restricted to sandstone outcrops.

Diagnosis: *Ixia nutans* is immediately recognised by the two linear, soft-textured basal foliage leaves without thickened margins, ± 3 mm wide and slightly twisted



Distribution of ***Ixia nutans***.



Distribution of ***Ixia ecklonii***.

distally, together with short-tubed, nodding to slightly pendent flowers. The flowers conform most closely to those of the *I. latifolia* group in their perianth tube of moderate length, at least 6 mm long, and partly exserted filaments. The unusual leaf morphology does not indicate any particular close relationship to other members of the series.

56. **Ixia ecklonii** *Goldblatt & J.C.Manning* in Bothalia 41: 118 (2011). Type: South Africa, [Western Cape], Olifants River Valley, without date, *Ecklon & Zeyher Irid. 271* (MO, holo.; B–Herb. Treviranus, iso.).

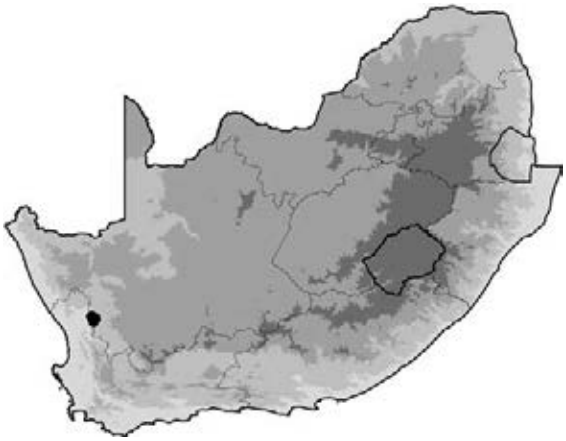
Plants 300–500 mm high. *Corm* 7–12 mm diam.; tunics of matted, ± fibrous layers. *Stem* with (1)2 or 3 short, wiry twisted branches 5–8 mm long, subtended by short, subacute bracts and prophylls ± 1 mm long. *Leaves* 3, lower 2 lanceolate, reaching to ± middle of stem, 4–8 mm wide, uppermost leaf sheathing stem almost to base of spike. *Spike* half nodding, 1-flowered, branches also 1-flowered; bracts membranous, dark translucent brown, 7–9 mm long, outer 3-veined and 3-toothed, inner 2-veined and 2-toothed, ± as long as outer. *Flowers* nodding, colour and presence of scent unknown; perianth tube narrow, flared uniformly from base, curving outward, 10–11 mm long, ± 4 mm wide at mouth; tepals ± 10 × ± 4 mm. *Filaments* exserted ± 1.5 mm from tube; anthers 3–4 mm long. *Style* dividing opposite lower ⅓ of anthers, branches ± 2 mm long. *Flowering time*: not recorded.

Distribution and ecology: evidently extremely rare, currently known from just one early 19th century collection from the Olifants River Valley in Western Cape, South Africa; habitat unknown.

Diagnosis: *Ixia ecklonii* is immediately recognised by the slender stem bearing up to three short, filiform branchlets, these as well as the main axis each bearing a single flower. The flowers have a slightly curved, narrow perianth tube 10–11 mm long, flaring uniformly from base to apex and they obviously face to the side but colour and other aspects of the perianth are not known. The filaments are exserted ± 1.5 mm from the tube and the comparatively large anthers 3–4 mm long and well-developed style branches place *I. ecklonii* among a poorly defined cluster of species allied to *I. rapunculoides*. The general appearance of the plants recalls *I. mollis* and *I. namaquana*, but both have a funnel-shaped perianth tube and the filaments and bases of the anthers included in the tube. The translucent, brown floral bracts recall the Bokkeveld Mtn species, *I. brunneobracteata*, but that species has a shorter, funnel-shaped perianth tube 5–7 mm long, the main axis bears 3 to 5 flowers, and the branches are not particularly short and usually bear 2 to 4 flowers.

57. **Ixia brunneobracteata** *G.J.Lewis* in Journal of South African Botany 28: 80 (1962); Goldblatt & Manning: 118 (2011). Type: South Africa, [Northern Cape], 5 miles [8 km] from Nieuwoudtville on Grasberg road, 16 Sept. 1961, *Barker 9555* (NBG, holo.; BOL, NBG, PRE, iso.).

Plants 200–500 mm high. *Corm* 7–10 mm diam.; tunics of medium-textured fibres, bearing short to long stolons up to 12 mm long, each with terminal cormlet. *Stem* simple or 1- or 2(3)-branched, branches subtended by ± dry, translucent brown, acute to attenuate bracts and prophylls 1.5–4.0 mm long. *Leaves* 3, lower 2 ascending to falcate, up to 4 mm wide, uppermost leaf mostly entirely sheathing stem. *Main spike* 3- to 5-flowered, lateral spikes 2- or 3(–5)-flowered; bracts membranous, dark translucent brown, 6–11 mm long, outer 3-veined and 3-toothed, inner 2-veined and 2-toothed, ± as long as outer. *Flowers* pale pink or white, pale yellow in tube, tepals sometimes flushed pink or light purple outside, scented faintly of fresh coriander; perianth tube funnel-shaped, 5–7 mm long; tepals ascending below, spreading above, ovate, 10–15 × 5–8 mm *Filaments* 6–8 mm long, exserted ± 3.5 mm from mouth of tube; anthers 4–5 mm long. *Style* dividing opposite middle ⅓ of anthers, branches 1.5–2.0 mm long. *Flowering time*: mid-September to mid-October.



Distribution of ***Ixia brunneobracteata***.

Distribution and ecology: a narrow endemic of the Bokkeveld Mtns of Northern Cape, South Africa, extending from the top of Vanrhyns Pass to the northern edge of the range; in seasonally wet or marshy sites in sandy ground.

Diagnosis: as its name suggests, *Ixia brunneobracteata* is immediately recognised by its unusually dark floral bracts, which although membranous and semi-translucent, are a glossy dark chestnut-brown. The pale pink or white flowers have a funnel-shaped perianth tube 5–7 mm long and spreading tepals 10–15 mm long. An unusual feature of the species is the production of stolons from the base of the corm, each bearing a small cormlet. The production of cormlets on stolons is relatively rare in *Ixia*; the only other species of sect. *Morphixia* that have stolons, *I. oxalidiflora* and *I. sobolifera*, both allied to *I. rapunculoides*, appear to have evolved this capacity independently and both favour heavier soils of clay or clay loam.

Ser. **Brevitubae** *Goldblatt & J.C.Manning*, new series. Type: *Ixia marginifolia* Salisb. ex G.J.Lewis

Plants with leaves plane or with margins often thickened or narrowly to broadly winged (H-shaped in section) or terete. *Flowers* nodding, pink, mauve, purple or white, dark in centre in *I. pavonia*; perianth tube short, 2–5 mm long, widely funnel-shaped. *Filaments* partly exserted.

58. **Ixia marginifolia** *Salisb. ex G.J.Lewis* in Journal of South African Botany 28: 66 (1962) [but as a combination based on *Hyalis marginifolia* Salisb.: 318 (1812), genus invalid]; Goldblatt & Manning: 119 (2011). *Ixia lancea* Jacq.: 7 (1795 [1788–1795]), illegitimate homonym, not *Ixia lancea* Thunb. (1783). *Ixia capillaris* var. *lancea* Ker Gawl.: sub t. 570 (1802b) as a new name at varietal rank for *I. lancea* Jacq. *Morphixia capillaris* var. *lancea* (Ker Gawl.) Baker: 97 (1877). *Morphixia lancea* (Ker Gawler) Klatt: 383 (1882). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 281 (1795 [1788–1795]).

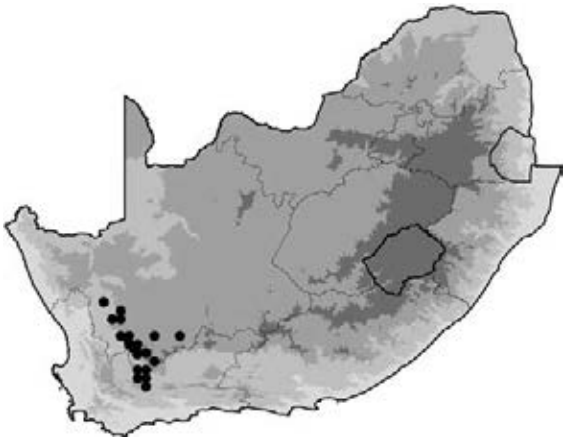
Ixia capillaris var. *stricta* Ker Gawl.: t. 617 (1803a). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 617 of *Ixia capillaris* var. *stricta* (1803a).

[*Hyalis marginifolia* Salisb.: 318 (1812), genus invalid.]

Plants 200–500 mm high, often with a collar of fibres around base. *Corm* 15–20 mm diam.; tunics of medium-textured to coarse fibres. *Stem* usually with 4–several (up to 10), short, filiform, straight or twisted branches, subtended by scale-like truncate bracts and prophylls ± 1 mm long. *Leaves* (3–)5, lower (2–)4 broadly lanceolate to falcate, ¼–⅓ as long as stem, 8–15 mm wide; margins moderately to heavily thickened, pale, hyaline when dry, uppermost 1 or 2 leaves entirely sheathing. *Main spike* 1- to 3(–5)-flowered, lateral spikes (1)2- to 4-flowered; bracts membranous, translucent with dark veins, often dry and brown distally, 6–7 mm long, subequal, outer 3-veined and obscurely 3-lobed, inner 2-veined and forked apically. *Flowers* nodding, blue-mauve, pink, or white, faintly freesia- or rose-scented, sometimes with an acrid odour or unscented; perianth tube funnel-shaped, 2.5–4.0 mm long; tepals spreading distally, ovate, (7–)10–13 × 5.5–8.0 mm. *Filaments* 5–7 mm long, exserted (1.5–)3.5–5.0 mm from mouth of tube; anthers 3.0–4.5 mm long, usually diverging at ± 30°, pale yellow. *Style* dividing opposite lower to middle ⅓ of anthers, branches 1.5(–2.5) mm long. *Flowering time*: mostly mid-August to late September, but October at higher elevations.

Distribution and ecology: a widespread and often relatively common species in the western Karoo, South Africa, extending from Kubiskou Mtn west of Loeriesfontein to Calvinia and then across the Bokkeveld Plateau south through the Roggeveld as far as Verlatekloof in Northern Cape, east to Fraserburg and the Nuweveld Mtns near Beaufort West in Western Cape, and south to interior Western Cape near Matjiesfontein; mostly in renosterveld or karroid scrub on clay and loamy ground, usually the fine-grained, pale soils derived from Ecca or Beaufort shales and sandstones or occasionally loam in Witteberg Sandstone or even on the heavy red clays derived from dolerite.

Diagnosis: distinctive in its short perianth tube, 2.5–4.0 mm long, and stem bearing several short, few-flowered, wiry branches, *Ixia marginifolia* also has unusually broad, short, leathery leaves with strongly thickened margins. It is sometimes confused in herbaria with *I. rapunculoides*, which is similar in general aspect, including flower colour and leaves with thickened margins, but the latter has short filaments included in the perianth tube, whereas *I. marginifolia* has the filaments exserted (1.5–)3.5–4.0 mm so that the anthers are prominently displayed.



Distribution of ***Ixia marginifolia***.

Ixia marginifolia displays an unusual pattern of variation in flower colour. Populations in the northeast of its range have a pink perianth, but to the southeast in the Calvinia area flowers are pale blue-mauve, the same shade as equally common *I. rapunculoides* with which it is easily confused from a distance. On the northern and central Roggeveld Escarpment plants have either blue-mauve or white flowers, occasionally both colours occurring together, but at the southern end of the escarpment populations are uniformly white-flowered, as is also reported for the Nuweveld population. Plants from the southern end of the range have violet flowers. White flowers remain open long after nightfall, whereas those of other colours close shortly after sunset.

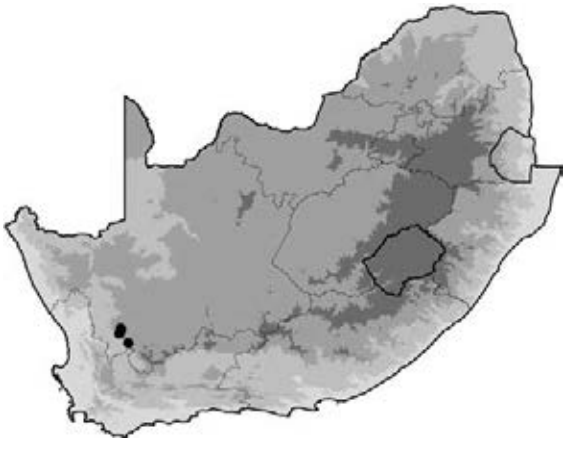
Variation in the number of flowers per branch is notable: while 2 or 3 flowers is most common, plants with predominantly or only single-flowered branches occur throughout the range of the species, perhaps a reflection of poor growing conditions rather than genetically based. A few collections, e.g. from the base of the Voetpadsberg near Pietermeintjies Siding in Western Cape, consist of plants with smaller flowers than are considered typical for *I. marginifolia*, with tepals ± 7 × 5.5 mm (vs. 10–12 × 6–8 mm), short filaments exserted ± 1.5 mm from the tube (vs. 3.5–5.0 mm). These plants also have 1-flowered branches; both this and the smaller than normal floral features may again result from of poor growing conditions that particular season. Plants from near Matjiesfontein a short distance to the east of the Pietermeintjies site and collected in another year have flowers typical in size for the species.

59. **Ixia pavonia** *Goldblatt & J.C.Manning* in Bothalia 41: 120 (2011). Type: South Africa, Northern Cape, Calvinia, Roggeveld Escarpment, opposite entrance to farm Vondelingsfontein on Vaalfontein–Nooiensrivier road, renosterveld, 15 Sept. 2009, *Goldblatt, Manning & Porter 13355* (NBG, holo.; K, MO, PRE, S, iso.).

Plants 150–500 mm high. *Corm* 15–18 mm diam.; tunics of coarse, netted fibres. *Stem* usually with 2 to 5(–12) short, filiform, branches 2–6 mm long, subtended by scale-like truncate bracts and prophylls ± 1 mm long. *Leaves* usually 4 (or 3), lower 2 with expanded blades, broadly lanceolate to falcate, ± ¼–½ as long as stem, 8–15 mm wide; margins thickened, pale, hyaline when dry; upper two leaves partly to entirely sheathing, uppermost reaching to between upper ⅓ of stem and base of spike. *Main and lateral spikes* 1- to 3-flowered; bracts membranous, translucent, becoming brown and dry distally, 8–12 mm long, outer 3-veined and shortly 3-toothed, inner 2-veined and forked at tip. *Flowers* mostly half nodding, blue-mauve, tepals dark red at base, black in wide part of tube, filaments and style dark purple, faintly acrid scented; perianth tube ± 3 mm long, funnel-shaped; tepals obovate, 12–15 × 6–8 mm, ascending to form a wide cup. *Filaments* purple, 5–7 mm long, exserted ± 3–5 mm; anthers 4–5 mm long, parallel, contiguous, yellow; pollen yellow. *Style* purple, dividing opposite middle of anthers, branches ± 2 mm long, purple below, becoming pale blue distally. *Flowering time*: September.

Distribution and ecology: a narrow endemic of Northern Cape, South Africa, restricted to a small area at the edge of the Roggeveld Escarpment south of Calvinia; on clay ground in renosterveld.

Diagnosis: based on morphological similarity, *Ixia pavonia* must be regarded as most closely allied to the widespread western Karoo species *I. marginifolia* and like that species, it has three leathery basal leaves with thickened margins and main vein, a stem bearing three or more, short lateral branches, and a flower with a short perianth tube ± 3.5 mm long. Unlike the uniformly blue-mauve, white or pink flowers of *I. marginifolia*, *I. pavonia* has a blue-mauve perianth with a black centre surrounded by a broad red zone. Accompanying the colour difference in the perianth are purple-black filaments and style. Although the perianth tube and tepals are about the same dimensions as in *I. marginifolia*, the filaments in that species are 5–7 mm long and typically exserted 3.5–5.0 mm from the tube. The short filaments of *I. pavonia*, only 4 mm long and exserted ± 1.5 mm stand in sharp contrast.



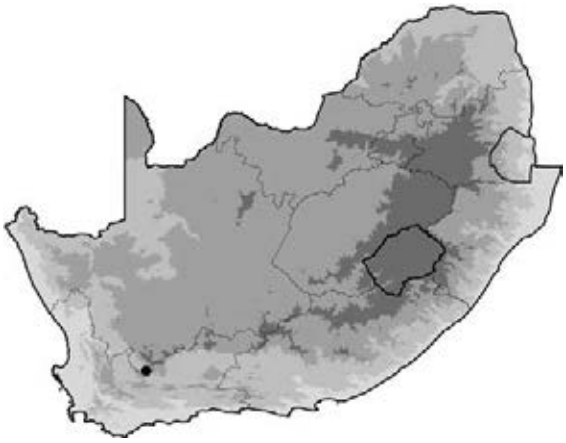
Distribution of ***Ixia pavonia***.

60. **Ixia linearifolia** *Goldblatt & J.C.Manning* in Bothalia 41: 121 (2011). Type: South Africa, Northern Cape, Sutherland, Klein Roggeveld, Farm De Hoop, Smoushoogte heights, in stony clay ground, 30 Aug. 2007, *Goldblatt & Porter 12921* (NBG, holo.; K, MO, PRE, iso.).

Plants mostly 450–900 mm high, sheathed below by prominent, pale, dry-membranous, often irregularly torn cataphylls. *Corm* 12–18 mm diam.; tunics of medium-textured fibres. *Stem* usually with 2 to 5 short branches up to 5 mm long, branches subtended by pale, dry, attenuate scale-like bracts and prophylls 2–4 mm long. *Leaves* 3, lower 2 linear ± ½ as long as stem, mostly 1.5–2.0 mm wide (when alive), leathery succulent, main vein slightly raised; margins thickened and fleshy; uppermost leaf entirely sheathing. *Main spike* 2- or 3-flowered, lateral spikes 1- or 2(3)-flowered; bracts silvery membranous, translucent with darker veins, 9–11 mm long, outer 3-veined and 3-lobed to 3 toothed, inner 2-veined, shallowly forked at apex. *Flowers* nodding, white with a pale bluish cast, with pale green marks at tepal bases, faintly rose-scented; perianth tube broadly funnel-shaped, ± 5 mm long; tepals spreading distally, ovate, 15–16 × 6.5–7.5 mm, outer tepals wider than inner. *Filaments* ± 5 mm long, exserted ± 2 mm from tube; anthers 4.5–5.0 mm long, parallel or slightly diverging when flower fully open. *Style* dividing opposite lower ⅓ of anthers, branches ± 2 mm long. *Flowering time*: mostly mid-August to mid-September.

Distribution and ecology: rare and highly localised, known only from the upper, south-facing slopes of the Smoushoogte in the Klein Roggeveld in Northern Cape, South Africa; in fairly dense mountain renosterveld, often among tufts of grasses, in light clay among rocks.

Diagnosis: the short perianth tube, ± 5 mm long, flowers with outspread tepals and exserted filaments with prominently displayed anthers, and the several short lateral branchlets closely resemble *Ixia marginifolia*, but the leaves of *I. linearifolia* are quite unlike the short, broad, falcate leaves of that species. Instead the leaves are linear and about half as long as the stems, the latter mostly 45–90 mm high. The pale white flowers have a faint blue cast and the tepals have pale green marks at their bases. Unlike *I. marginifolia* the leaf margins are not prominently thickened and hyaline but instead are raised forming slightly fleshy, ridge-like wings without hyaline edges. The flowers of *I. linearifolia* are slightly larger than those of *I. marginifolia* with tepals 15–16 × 6.5–7.5 mm compared with (7–)10–13 × 5.5–8.0 mm.



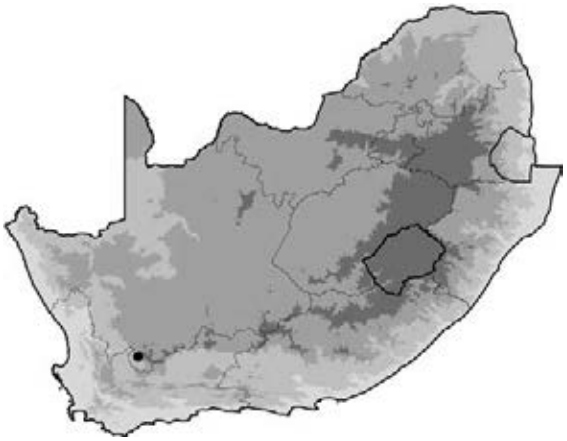
Distribution of ***Ixia linearifolia***.

61. **Ixia teretifolia** *Goldblatt & J.C.Manning* in Bothalia: 42: 140 (2012b). Type: South Africa, Northern Cape, Sutherland, Roggeveld Escarpment, Farm Blesfontein, in dense tall grass tufts below sandstone cliffs at escarpment edge, 25 Sept 2011, *Goldblatt & Manning 13671* (NBG, holo.; K, MO, PRE, iso.).

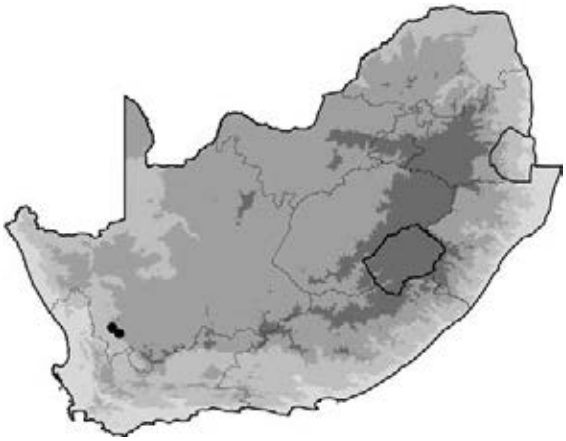
Plants mostly 1.2–1.5 m high, sheathed below by prominent, pale, dry-membranous, often irregularly torn cataphylls with age accumulating in a dense mass. *Corm* 12–18 mm diam., with tunics of relatively fine fibres. *Stem* usually with 3 to 5 short branches up to 4 mm long, branches subtended by pale, dry, attenuate scale-like bracts and prophylls 2–4 mm long. *Leaves* 3, lower 2 terete, ± ½ as long as stem, mostly 1.5–2.0 mm diam., firm-textured without evident veins when alive; uppermost leaf entirely sheathing or almost so, reaching to spike base or to lowermost branches. *Main spike* (1)2(3)-flowered, lateral spikes 1- or 2(3)-flowered; bracts silvery membranous, translucent with narrow, dark purple veins, ± 7 mm long, outer 3-veined and 3-toothed or 3-lobed; inner 2-veined, shallowly forked. *Flowers* upright to half nodding, pale blue, pale green in throat, faintly rose-scented, with bright yellow anthers prominently displayed; perianth tube broadly funnel-shaped, ± 5 mm long, narrow part ± 2 mm long; tepals spreading, patent distally, ovate, ± 12 × 6.0–6.5 mm, outer slightly wider than inner. *Filaments* ± 6 mm long, exserted ± 4 mm from tube; anthers 4–5 mm long, ± parallel, yellow; pollen yellow. *Style* dividing opposite lower ⅓ of anthers, branches ± 3 mm long, slender, extending between anthers. *Flowering time*: mostly mid-September to mid-October, possibly later.

Distribution and ecology: restricted to edge of the Roggeveld Escarpment west of Sutherland in Northern Cape, South Africa, known only from the Farm Blesfontein; at the base of sandstone cliffs among rocks, nested in dense tufts of grass.

Diagnosis: the short, widely funnel-shaped perianth tube, ± 5 mm long, flowers with outspread tepals and partly exserted filaments with prominently displayed anthers, and the several short lateral branchlets place *Ixia teretifolia* close to *I. marginifolia*. The tall stature and habitat are shared in sect. *Morphixia* with *I. alata* but the several very short branches, each with 1 or 2(3) flowers differ from that species, and recall particularly *I. linearifolia*. The centric leaves lacking visible veins are unique in sect. *Morphixia* and unusual in the genus, almost all



Distribution of ***Ixia teretifolia***.



Distribution of ***Ixia alata***.

species of which have plane, isobilateral leaves. Except for their slightly smaller size, the flowers of *I. teretifolia* differ very little from those of *I. marginifolia* and its immediate allies, which have a short, funnel-shaped perianth tube, tepals spreading distally and fully exserted anthers.

62. **Ixia alata** *Goldblatt & J.C.Manning* in Bothalia 41: 121 (2011). Type: South Africa, Northern Cape, southeastern foothills of Driefontein se Berg, SE of Calvinia, rocky, northeast-facing dolerite slope, 15 Sept. 2009, *Goldblatt, Manning & Porter 13380* (NBG, holo.; K, MO, PRE, iso.).

Plants mostly 0.7–1.1 m high, sheathed below by prominent, dry remains of cataphylls and leaf bases. *Corm* 20–25 mm diam.; tunics of medium-textured fibres accumulating in a fairly dense mass. *Stem* usually with 2 to 4 short branches up to 8 mm long; branches subtended by pale, dry, attenuate scale-like bracts and prophylls 5–7 mm long, bracts sheathing in lower part. *Leaves* 3, lower 2 linear, ± ⅓–½ as long as stem, mostly 3–4 mm wide (when alive), leathery, main vein strongly thickened, margins raised into wings held ± at right angles to blade, wings tilted to same side with one surface more exposed, uppermost leaf entirely sheathing. *Main spike* 4- to 6-flowered, lateral spikes mostly 3- to 5-flowered; bracts translucent with light brown veins drying purple, 6–8 mm long, outer 3-veined and shallowly 3-lobed, often secondary veins not reaching bract apices, inner 2-veined, shallowly 2-lobed. *Flowers* half(–fully) nodding, pale pink, white at base of tepals and in tube, with short purple lines at tepal bases and throat, unscented; perianth tube widely funnel-shaped, 5–6 mm long, narrow lower part ± 2.5 mm long; tepals laxly spreading distally but remaining slightly cupped, ovate, 13–16 × 5–8 mm, outer slightly wider than inner, indented abaxially along midline above filament insertion to a rounded median adaxial crest. *Filaments* ± 5 mm long, exserted ± 2 mm from wide part of tube, adaxial base with a flange decurrent on tepal midline; anthers 4–5 mm long, white, parallel or slightly diverging when flower fully open; pollen yellow. *Ovary* minutely warty; style dividing opposite middle to upper third of anthers, branches ± 2 mm long, suberect and extending above anther tips. *Flowering time*: mostly mid-August to mid-September.

Distribution and ecology: restricted to the northern edge of the Roggeveld Escarpment in Northern Cape, South Africa, only on a few farms south of Calvinia; locally common on heavy, red clay soils in dolerite outcrops or in light sandy ground with ferricrete and dolerite fragments.

Diagnosis: *Ixia alata* is very much like *I. thomasiae* in its tall stature, stem with half nodding branches, half to fully nodding flowers and, in particular, the long narrow leaves with broadly winged margins. The two differ, however, in flower size: the perianth tube of *I. alata* is just 5–6 mm long and the tepals 13–16 × 5–8 mm compared with a tube 8–10 mm long and tepals 14–20(–25) × 5.0–6.5(–8.0) mm. The perianth tube in particular is significantly shorter, and the tepals only slightly shorter but about as wide as those of *I. thomasiae*. Added to these differences are a main spike of 4 to 6 flowers and floral bracts 6–8(–10) mm long in *I. alata* compared with spikes of 7 to 10 flowers and floral bracts 9–12 mm in *I. thomasiae*. While *I. alata* blooms from mid-September to early October, *I. thomasiae* growing a short distance away, does not come into flower until the end of September and sometimes not until the second week of October. Both species have slightly warty capsules, not known in other species of *Ixia*.

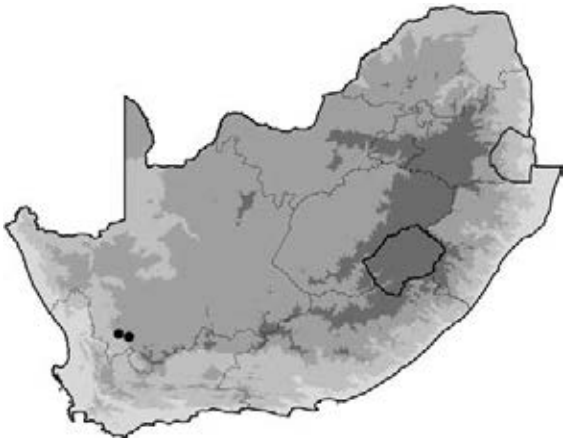
63. **Ixia thomasiae** *Goldblatt* in Journal of South African Botany 45: 87 (1979); Goldblatt & Manning: 123 (2011). Type: South Africa, [Northern Cape], Roggeveld Escarpment, Blomfontein Farm, between Middelpos and Calvinia, 30 Sept. 1976, *Goldblatt 4268* (MO, holo.; K, NBG, PRE, S, iso.).

Plants mostly 0.6–1.5 m high, with remains of old cataphylls and leaf bases persisting as a fibrous collar

around stem base. *Corm* 15–20 mm diam., with tunics of coarse netted fibres. *Stem* usually with 1 to 3 short, twisted branches subtended by acute bracts and prophylls 4–10 mm long. *Leaves* 3, lower 2 linear, reaching upper ⅓ of stem, 3–5 mm wide, main vein thickened and narrowly winged, margins forming broad wings held at right angles to blade, upper leaf sheathing stem. *Main spike* half nodding, 7- to 10-flowered, branches mostly 3- to 5-flowered; bracts membranous, translucent, becoming light brown distally, 9–12 mm long, outer 3-veined above with prominent central vein, lateral veins paired in lower part and sometimes not reaching bract apex, obtuse to obscurely 3-lobed, inner 2-veined, forked apically, slightly shorter than outer. *Flowers* half to ± fully nodding, pale blue-mauve, white in throat, presence of scent unknown; perianth tube funnel-shaped, widening in upper ½, 8–10 mm long; tepals subequal, ovate-oblong, 14–20(–25) × 5.0–6.5(–8.0) mm, spreading ± at right angles to tube, indented abaxially along midline above filament insertion to form a rounded median adaxial crest. *Filaments* ± 6 mm long, included or exserted up to 2 mm from tube; anthers ± 6 mm long, yellow. *Ovary* slightly warty; style usually dividing opposite upper ⅓ of anthers, or just above anther tips, branches ± 2.0 mm long. *Flowering time*: October, rarely late September.

Distribution and ecology: restricted to the central Roggeveld Escarpment west of Middelpos in Northern Cape, South Africa; in clay ground, flowering relatively late in the season, mainly in October.

Diagnosis: the distinctive leaves with raised and winged margins, thus ± H-shaped in cross section, combined with a perianth tube 8–10 mm long and the unusual, warty ovary and capsules make *Ixia thomasiae* unmistakable. The leaf shape and warty ovary and capsules are not known elsewhere in *Ixia* except in related *I. alata*. Flowers of *I. thomasiae* are pale blue-mauve and slightly larger than those of *I. alata* which has pale pink flowers. The two species are evidently most likely allied to the *I. marginifolia* group with which they share a funnel-shaped perianth tube and partly exserted filaments and fully sheathing uppermost leaf. The particularly large anthers of *I. thomasiae*, ± 6 mm long, and style branches, up to 2 mm long, are consistent with other species of the group.



Distribution of ***Ixia thomasiae***.

Ser. **Paucifolieae** *Goldblatt & J.C.Manning*, new series. Type: *Ixia paucifolia* G.J.Lewis

Plants with leaves plane, lanceolate to linear. *Flowers* white, cream-coloured or pink to red; perianth tube elongate, cylindric. *Filaments* shortly exserted or included.

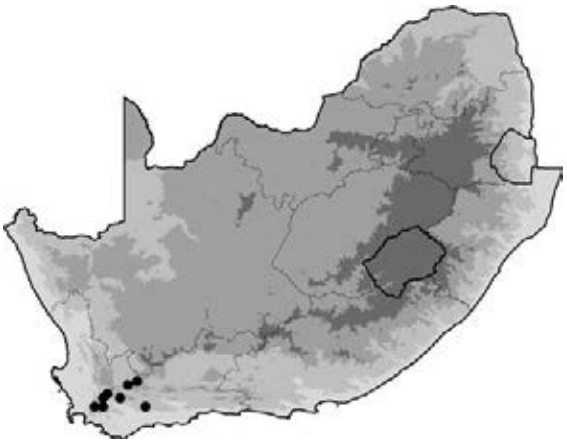
64. **Ixia paucifolia** *G.J.Lewis* in South African Gardening and Country Life 23: 213 (1933); Goldblatt & Manning: 125 (2011). Type: South Africa, [Western Cape], Vanwyksdorp, 23 Oct. 1932, [*Compton &*] *Archer 534* [BOL, lecto., designated by De Vos: 65 (1999)].

Ixia bolusii G.J.Lewis: 10 (1938). Type: South Africa, [Western Cape], Hex River Valley near De Doorns, Oct. 1907, *Bolus s.n.* (BOL 13197, holo.; PRE, iso.).

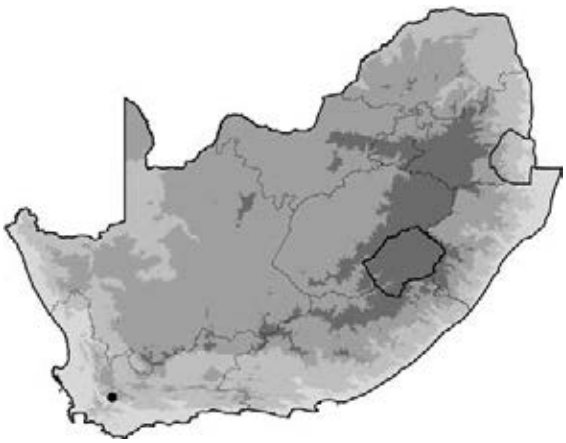
Plants 120–300 mm high. *Corm* 12–15 mm diam.; tunics of hard, coarse, netted fibres. *Stem* simple or with 1(2) ± straight branches subtended by pale, membranous, subacute to attenuate bracts and prophylls 2–5 mm long. *Leaves* 3, lower 2 basal, falcate, mostly 3–5 mm wide, margins moderately thickened, lowermost leaf usually wider and longer than next, uppermost leaf sheathing lower ½ of stem. *Main spike* mostly 4- to 10-flowered, lateral spikes 2- to 4-flowered; bracts pale and membranous, (6–)8–9 mm long, outer 3-veined and 3-dentate, inner ± 1 mm longer than outer, 2-veined, 2-toothed. *Flowers* beige to creamy white, often flushed purple outside, unscented; perianth tube 24–34 mm long, slender and cylindric, divided inside into 3 compartments by decurrent filaments; tepals oblong, 11–15 × 3.0–4.5 mm, spreading at right angles to tube. *Filaments* ± 3 mm long, exserted ± 2 mm from tube; anthers ± 4 mm long. *Style* dividing shortly below or opposite anther tips, branches ± 1 mm long, arching above anther tips, minutely forked. *Flowering time*: late September and October.

Distribution and ecology: a Western Cape, South Africa, endemic extending from Hex River Pass and De Doorns eastward to the Bonteberg, Vanwyksdorp near Ladismith and south to Koo; on exposed, fairly dry shale slopes and flowering particularly well after fire, then conspicuous among regenerating shrubby vegetation.

Diagnosis: *Ixia paucifolia* is recognised by the pale beige to creamy white flowers (sometimes described as pale yellow), a cylindric perianth tube (22–)25–35 mm long, and narrow tepals 11–15 × 3.0–4.5 mm, spooned at the tips. The filaments are ± 3 mm long and exserted ± 2 mm from the tube, and the style divides close to or opposite the anther tips so that the style branches arch over the anthers. The species is readily distinguished from *I. dolichosiphon* in herbaria by the



Distribution of ***Ixia paucifolia***.



Distribution of ***Ixia dolichosiphon***.

very coarse-textured corm tunics, longer floral bracts, (6–)8–9 mm long, longer perianth tube (15–18 mm in *I. dolichosiphon*, which has bracts 5–6 mm long, white flowers flushed pale lilac, and veined purple outside). The shorter style divides opposite the middle of the anthers with the style branches extending between them. The two species also differ in flowering time and habitat: *I. dolichosiphon* blooms in August and early September and favours south-facing sandstone slopes, whereas *I. paucifolia* grows on clay and shale slopes and blooms in late September and October. White- or pink-flowered plants from sandstone slopes in the Cold Bokkeveld and Cederberg, included by Lewis in *I. paucifolia*, are now two separate species, *I. cedarmontana* and *I. seracina*, distinguished by their finely fibrous corm tunics, as well as flower colour and leaf differences.

65. **Ixia dolichosiphon** *Goldblatt & J.C.Manning* in Bothalia 41: 126 (2011). Type: South Africa, Western Cape, Hex River Kloof, SW-facing sandy mountain slopes of Keeromsberg above De Wet, Farm Rheboksfontein, 9 Sept. 1993, *Goldblatt & Manning 9690* (NBG, holo.; K, MO, PRE, S, WAG, iso.).

Plants 120–200 mm high. *Corm* 10–16 mm diam., with tunics of medium-textured netted fibres. *Stem* (1–)3- or 4-branched, lower branches rarely also branched; branches twisted, diverging at 90° from main axis, subtended by pale, membranous, attenuate bracts and prophylls (1–)3–8 mm long. *Leaves* 3, lower 2 lanceolate to falcate, (5–)7–12 mm wide, usually reaching to ± base of or sometimes shortly exceeding spike; margins and main vein slightly thickened; uppermost leaf entirely sheathing, reaching at least to middle of stem or to base of spike. *Spike* flexuose, 4- to 10-flowered, lateral spikes somewhat contorted, 2- to 8-flowered, horizontal below first flower, then erect; bracts membranous and transparent, outer 5–6 mm long, 3-veined, slightly 3-dentate, inner slightly shorter to ± as long as outer, 2-veined and 2-toothed. *Flowers* white or flushed pale lilac, tepals sometimes each with a purple basal mark, tepals and tube veined purple outside, scentless; perianth tube ± cylindric, tapering uniformly from ± 1 mm diam. at base to 2 mm diam. at apex, 15–18 mm long, internally divided into 3 compartments by decurrent filaments extending downward nearly to base; tepals obovate, spreading at right angles to tube, subequal, 9–13 × 6–7 mm. *Filaments* ± 2 mm long, inserted ± 1 mm below tube apex, decurrent nearly to base, mostly exserted ± 1 mm; anthers ± 3 mm long before anthesis, yellow. *Style* dividing between middle and upper ⅓ of anthers, branches extending between anthers, ± 2 mm long. *Flowering time*: late August to mid-September.

Distribution and ecology: a narrow endemic of the western end of the Langberg near De Wet (east of Worcester) in Western Cape, South Africa; on lower slopes in stony sandstone, south and southwest-trending slopes, flowering only after fire.

Diagnosis: *Ixia dolichosiphon* is distinguished by its relatively long perianth tube, 15–18 mm long, white or pale lilac-flushed perianth and short filaments ± 2 mm long, included or exserted up to 1.5 mm from the tube. It is closely allied to, and most easily confused with beige-flowered *I. paucifolia*, a species of shale slopes in the dry interior valleys of the southwestern Cape. That species has flowers with a perianth tube (22–)25–34 mm long, slightly constricted at the apex, spreading tepals 12–15 × 5 mm, filaments ± 3 mm long, exserted 2–3 mm from the perianth tube and anthers ± 4 mm long. Although confined to cooler, south-facing slopes, *I. dolichosiphon* flowers from late August to mid-September, earlier than any population of *I. paucifolia*. It differs from *I. paucifolia* not only in its white or pale lilac-flushed flowers, veined purple on the outside, and shorter perianth tube, but in the tepals, stamens and style. The tepals are 9–13 mm long, the anthers are ± 3 mm long and the style divides opposite the middle of the anthers with the style branches emerging between them in contrast to the longer style of *I. paucifolia* that divides close to the anther tips with the style branches arching above the anthers. As in *I. paucifolia*, the filaments of *I. dolichosiphon* are decurrent almost to the base of the tube, dividing the interior of the tube into three compartments.

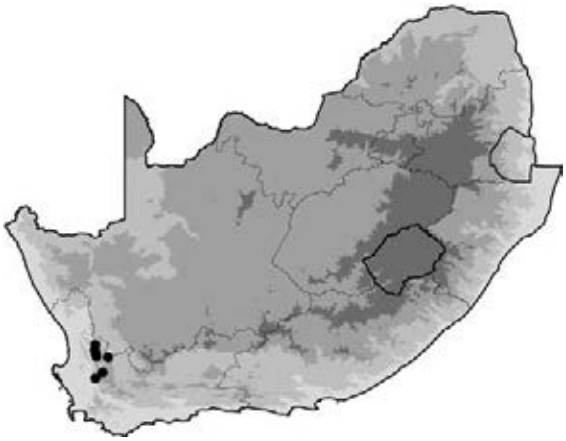
Like *I. paucifolia*, flowers of *I. dolichosiphon* are adapted for pollination by long-proboscid flies.

66. **Ixia cedarmontana** *Goldblatt & J.C.Manning* in Bothalia 41: 126 (2011 incl. *I. seracina*). Type: South Africa, [Western Cape], Wuppertal, Heuningvlei, Groot Koupoort, 3 200 ft [975 m], seasonally moist, 11 Oct. 1975, *Kruger 1668* (PRE, holo.; NBG, iso.).

Plants 150–300(–500) mm high. *Corm* globose, 7–12 mm diam., bearing cormlets at base; tunics of fine netted fibres. *Stem* slender, rarely with 1 or 2 straight branches diverging at 40–80° from axis, subtended by obscure, membranous acute bracts and prophylls 1–2 mm long. *Leaves* 2 or 3(4), lower 1 or 2 (rarely 3) with expanded blades, ± basal, narrowly sword-shaped to ± linear, mostly 2–4(–5) mm wide, with moderately thickened main vein and margins, uppermost leaf sheathing lower part of stem. *Main spike* (1–)3- to 5(–7)-flowered, lateral spikes 1- to 5-flowered; bracts translucent, often flushed pink or purple distally, 6–9 mm long, outer 3-veined and 3-toothed to 3-lobed, inner ± as long or 1 mm longer than outer, 2-veined and 2-toothed. *Flowers* usually half to fully nodding, white to pale pink, sometimes flushed light purple to pink outside, yellow in throat, tube finely lined with purple, not closing at night, usually sweetly scented, especially evenings; perianth tube ± cylindric, 20–24 mm long; tepals subequal, ovate, 10–16 × 5–8 mm, outer slightly wider than inner. *Filaments* 6–10 mm long, reaching mouth of tube or exserted up to 4 mm; anthers ± 4(–5) mm long, pale yellow. *Style* dividing opposite middle to apex of anthers, branches 1–2 mm long. *Flowering time*: October, rarely in late September.

Distribution and ecology: a fairly rare species of Western Cape, South Africa, restricted to the northern and central Cederberg; in peaty sandstone-derived soils, usually in moist habitats such as wet, poorly drained flats, seeps and seasonal marshes.

Diagnosis: *Ixia cedarmontana* is recognised by a combination of a relatively long perianth tube, 20–25 mm long, and small to moderate-sized corms with finely fibrous corm tunics. Most populations have white flowers, pale yellow in the throat, but those with pale pink tepals have been recorded. Flowers are sweetly scented and remain open at night. Some white-flowered plants were included by Lewis (1962) in *I. paucifolia* but that species is distinguished by falcate leaves, coarsely fibrous corm tunics and typically beige flowers with a perianth tube mostly 25–35 mm long. Flowers of *I. cedarmontana* have ovate tepals 10–16 × 5–8 mm, thus about twice as long as wide, and filaments reaching the apex or exserted up to 4 mm from the perianth tube. The flowers of *I. paucifolia* are always unscented, have narrower tepals, 12–15 × 3.0–4.5 mm, thus about three to four times as long as wide, and the filaments are consistently exserted 2–3 mm. Because the flowers are scented and remain open at night, moth pollination is inferred for *I. cedarmontana.* In contrast, flowers of *I. paucifolia,* a plant of relatively dry, well-drained open clay and shale slopes, are unscented, close at night and are pollinated by long-proboscid flies.



Distribution of ***Ixia cedarmontana***.

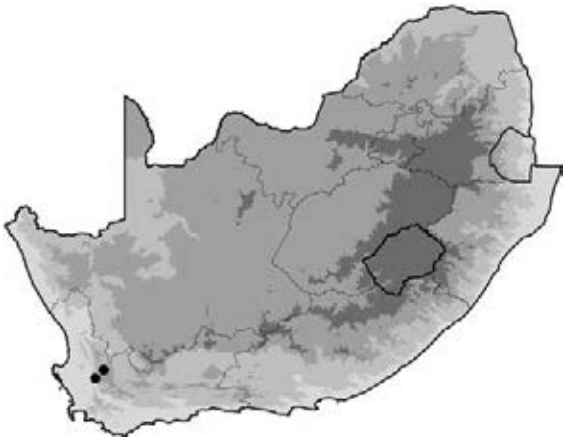
Relatively tall plants from the Great Winterhoek Mtns and Bokkeveld Tafelberg, up to 500 mm high, and with deep pink to pale cherry-red flowers and leaves 4–8 mm wide included in the past in *Ixia cedarmontana* are now regarded as a separate species, *I. seracina.*

67. **Ixia seracina** *Goldblatt & J.C.Manning* in South African Journal of Botany 98: 110 (2015). Type: South Africa, Western Cape, slopes of Bokkeveld Tafelberg, 1550 m, 26 Nov. 2010, *Helme 6635* (NBG, holo.).

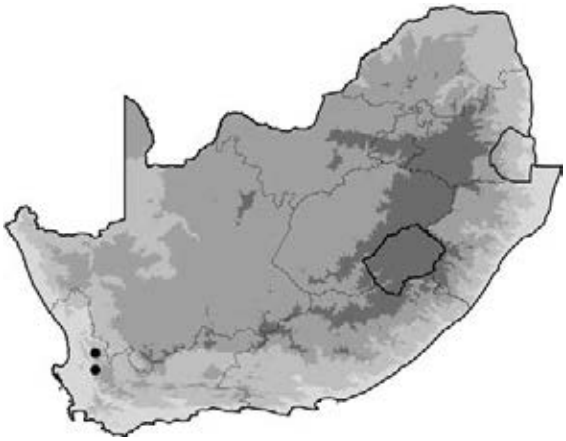
Plants 250–320 mm high. *Corm* globose, 12–15 mm diam.; tunics of fine pale fibres. *Stem* simple or with 1 short branch subtended by obscure, membranous acute bracts and prophylls 1–2 mm long. *Leaves* (2)3, lower 2 basal, upper entirely sheathing, lowermost longest, half to as long as stem, mostly 6–8 mm wide, margins and main vein slightly thickened and hyaline when dry, second leaf smaller, 3–4 mm wide. *Spike* 4- to 8-flowered; bracts mostly 6–8 mm long, reaching to or slightly beyond node above, outer prominently 3-veined and 3-toothed, inner 2-veined and 2-toothed. *Flowers* salver-shaped, deep pink to pale cherry-red with exserted yellow-orange anthers; perianth tube cylindric, 23–25 mm long; tepals spreading, ovoid-obovate, ± 10 × 5 mm. *Filaments* ± 5 mm long, reaching mouth of tube; anthers ± 4 mm long, bright yellow; pollen yellow. *Style* dividing opposite upper ⅓ of anthers, branches ± 1 mm long. *Flowering time*: mid-November to mid-December.

Distribution and ecology: a rare Western Cape endemic, restricted to high elevations in the Cold Bokkeveld and Groot Winterhoek Mtns, South Africa; evidently favouring the shale band of the Cape Sandstone System, flowering well after fire.

Diagnosis: *Ixia seracina* is distinguished by the deep pink to cherry-red, odourless flowers with a perianth tube 23–25 mm long, relatively short tepals ± 10 mm long,



Distribution of ***Ixia seracina***.



Distribution of ***Ixia arenosa***.

and bright yellow anthers borne on short filaments that reach only to the mouth of the perianth tube. Another distinctive feature is the relatively broad, lowermost foliage leaf, 6–8 mm wide, and much narrower second basal leaf. *Ixia cedarmontana* is broadly similar in habit but has either uniformly white or sometimes pale pink flowers that, as far as is known, remain open at night and are sweetly scented. The two foliage leaves of *I. cedarmontana* are more-or-less equal in length and linear, mostly 2–4 mm wide (exceptionally to 5 mm) and its flowers have a perianth tube 20–24 mm long and tepals 12–16 mm long. *Ixia seracina* has been collected on shale bands in bloom from mid-November to mid-December, whereas *I. cedarmontana* occurs on peaty sand in somewhat marshy sites and blooms mainly in October and early November.

68. **Ixia arenosa** *Goldblatt & J.C.Manning* in South African Journal of Botany 98: 111 (2015). Type: South Africa, Western Cape, Cederberg, sandy flats near Sneeuberg Hut, in grassland with Restionaceae, 1 300 m, 25 Oct. 1989, *Le Maitre 620* (NBG, holo.; PRE, iso.).

Plants 150–250 mm high, slender. *Corm* ovoid, 7–12 mm diam., sometimes with small cormlets at base; tunics of fine, netted fibres. *Stem* simple or with 1, rarely 2 short, straight branches diverging from axis, subtended by obscure, membranous, acute bracts and prophylls ± 1 mm long. *Leaves* (2)3(4), lower 1 to 3 ± basal, linear, 1.5–2.0 mm wide, with moderately thickened main vein and margins, uppermost leaf sheathing lower part of stem. *Main spike* 2- to 4-flowered, lateral spikes 1- or 2-flowered; bracts translucent, often flushed pink or purple distally, 7–9 mm long, outer 3-veined and 3-toothed or 3-lobed, inner ± as long or 1 mm longer than outer, 2-veined and 2-toothed. *Flowers* upright, bright pink to rose or white, yellow in throat, flushed light purple to pink outside, closing at night, scented; perianth tube funnel-shaped, 12–18 mm long; tepals subequal, ovate-elliptic, outer slightly wider than inner, 12–15 × 5–8 mm. *Filaments* ± 6 mm long, exserted 1.5–3.5 mm; anthers 4–5 mm long, often with wide abaxial connective. *Style* dividing opposite middle to apex of anthers, branches 1–2 mm long. *Flowering time*: October, possibly in early November.

Distribution and ecology: at middle to upper elevations in the Cederberg and Cold Bokkeveld Mtns of Western Cape, South Africa; on stony sandstone ground.

Diagnosis: *Ixia arenosa* is recognised by the pink to rose-coloured (rarely white) flowers with a funnel-shaped perianth tube 12–18 mm long and linear foliage leaves, the blades 1.5–2.0 mm wide, with moderately thickened main vein and margins. Plants typically have three leaves, the uppermost entirely sheathing, but plants with only two or even four leaves are known. Early collections of the species were included in *I. cedarmontana*, but that species is now restricted to plants of moist habitats with usually white, occasionally pale pink, scented flowers with a cylindric perianth tube 20–24 mm long. The affinities of *I. arenosa* remain uncertain but it is provisionally included in the *Paucifolieae* group, in which the presence of four leaves in some specimens is exceptional.

69. **Ixia stenophylla** *Goldblatt & J.C.Manning* in Bothalia 41: 129 (2011) as new name and rank for *I. fucata* var. *filifolia* G.J.Lewis: 99 (1962) [not *I. filifolia* Redouté (1809)]. Type: South Africa, [Western Cape], Riviersonderend Mtns, northern slopes (as Boschjesveld Mtns, Worcester side), 1 Oct. 1955, *Stokoe s.n.* (SAM 68608 & 68609 (2 sheets), syn. [SAM 69608 was said by De Vos (1999) to be the holotype in error]).

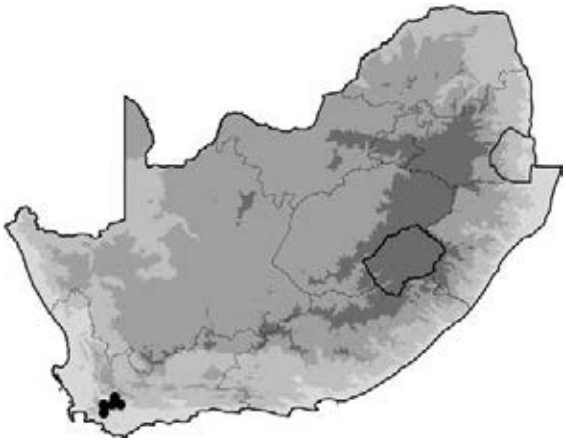
Plants 200–400 mm high. *Corm* globose, 7–15 mm diam.; tunics of fine to medium-textured netted fibres, sometimes thickened and claw-like below. *Stem* flexed at base of spike, simple or rarely with a single branch subtended by silvery, attenuate bracts and prophylls up to 4 mm long. *Leaves* 3, lower 2 linear-filiform, 0.8–1.2 mm wide, main vein heavily thickened and raised, thickened secondary veins sometimes present, margins not thickened, uppermost leaf usually entirely sheathing. *Spike* slightly flexuose, 1- or 2(3)-flowered; bracts

6–8 mm long, outer 3-veined and 3-toothed, inner ± as long as outer, 2-veined, forked apically. *Flowers* nodding, salver-shaped, with unilateral stamens, white or flushed pale mauve, with a ring of dark streaks at tube mouth, pale mauve outside, with dark lines on tube; perianth tube cylindric, (12–)15–20 mm long, ± 2 mm diam., straight; tepals ± elliptic, subequal, 12–15 × 6–8 mm, spreading at right angles to tube. *Filaments* unilateral, horizontal, 5–6 mm long, exserted ± 3 mm; anthers 3–4 mm long, facing lower tepals. *Style* dividing opposite middle to upper ⅓ of anthers, branches ± 1.5 mm long, weakly recurved. *Flowering time*: late September and October, rarely in late August.

Distribution and ecology: a narrow Western Cape endemic, restricted to Brandwag Peak in the Hex River Mtns and the western end of the Riviersonderend Mtns extending from Boesmanskloof Pass above Greyton to near Villiersdorp, South Africa; in rocky sites, usually in low vegetation of upper northern slopes on sandy ground, sandstone outcrops or on shale slopes.

Diagnosis: *Ixia stenophylla* somewhat resembles *I. fucata* but is distinguished by its three leaves, the basal two with filiform blades up to 1.2 mm wide, and the absence of a collar of fibres around the stem base. It also differs in having a spike with only 1 or 2, rarely 3 flowers, and the stem is almost invariably unbranched. The white flowers are flushed mauve outside and have dark veining on the relatively wide perianth tube (12–)15–20 mm long. The stamens are also unilateral (properly visible only in living plants) and extended horizontally with the parallel anthers facing the lower tepals, an orientation unique in *Ixia*.

The immediate relationships of *Ixia stenophylla* are uncertain. The two linear and very narrow foliage leaves suggest it belongs to the *I. capillaris* complex, all species of which also have narrow leaves. The leaf blades, however, differ significantly in having a strongly thickened and raised central vein and a thickened secondary vein, whereas the leaves of all species of the *I. capillaris* complex lack thickened veins.



Distribution of ***Ixia stenophylla***.

Ser. **Rapunculoides** *Goldblatt & J.C.Manning*, new series. Type: *Ixia rapunculoides* Delile

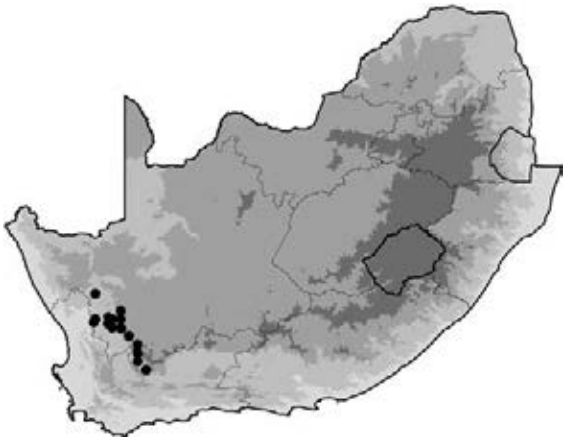
Plants with leaves plane, mostly lanceolate, sometimes broadly so, or falcate. *Flowers* mostly blue-mauve, or pink or creamy white; perianth tube relatively short, funnel-shaped. *Filaments* included and anthers partly to fully included.

70. **Ixia rapunculoides** *Delile* in Redouté, Les Liliacées 8: t. 431 (1814); Goldblatt & Manning: 7 (2008a). Type: South Africa, without precise locality, collector unknown, illustration in Redouté: t. 431 (1814). Epitype: South Africa, [Northern Cape], Nieuwoudtville, Klipkoppies, red clay, 9 Aug. 1961, *Lewis 5853* (NBG, epi., designated by Goldblatt & Manning: 7 (2008a); K, PRE, iso.).

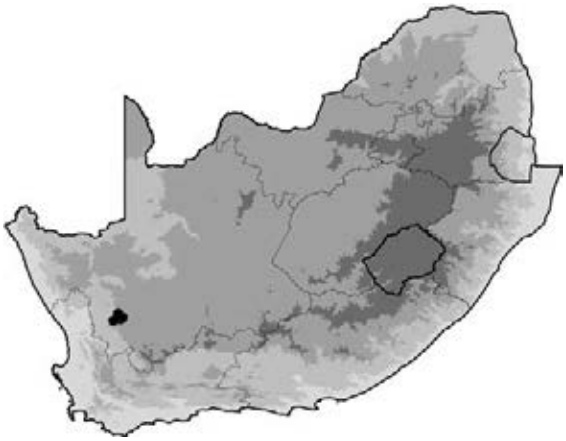
Plants mostly 150–400 mm high. *Corm* subglobose, mostly 14–18 mm diam.; tunics of firm, wiry fibres accumulating in dense mass, with small cormlets at base. *Stem* erect, nodding above, with several to many (up to 10) short, thread-like, ascending to horizontal branchlets subtended by obtuse bracts and prophylls ± 1(–2) mm long. *Leaves* (2)3(4), lower 2 lanceolate to falcate, mostly (3–)7–12 mm wide, ± ¼–½ as long as stem, margins thickened, sometimes lightly crisped, uppermost leaf sheathing stem, rarely unifacial in upper 10–30 mm. *Main spike* mostly 3- to 5-flowered, lateral spikes (1)2- to 5 flowered; bracts translucent sometimes tinged brown especially in fruit, outer with 3 dark veins, mostly 5–6 mm long, 3-toothed or bluntly 3-lobed, inner ± as long, with 2 dark veins, forked apically. *Flowers* ± half to fully nodding, pale blue (mauve or blue-grey) with pale yellow cup, or pink with white cup, faintly rose-scented or evidently unscented; perianth tube 5.5–8.0(–10.0) mm long, widely funnel-shaped, flaring in upper 3–5 mm; tepals subequal, ovate, 11–16 × 4.5–6.0 mm, proximal ± 3 mm forming part of floral cup, spreading distally. *Filaments* 2–3 mm long, inserted 2–4 mm above base of tube; anthers 2.3–3.5 mm long, half exserted from tube but included in floral cup, pale yellow. *Style* dividing shortly below anther tips, branches 0.7–1.2 mm long, not reaching anther tips. *Flowering time*: August to mid-September, sometimes July.

Distribution and ecology: widespread across the Western Karoo, South Africa, from the Langberg west of Loeriesfontein and the Hantamsberg in the north across the Bokkeveld Plateau and Roggeveld Escarpment as far south as Sutherland; mostly on stony clay soils.

Diagnosis: *Ixia rapunculoides* is recognised by the half to fully nodding, mostly blue flowers with a yellow cup (locally pale pink with a white cup), short perianth tube mostly 5.5–8.0 mm long, short filaments 2–3 mm long and anthers 2.3–3.5 mm long and half included in the perianth tube. In the vicinity of the Hantamsberg the species co-occurs with *I. robusta*, which was distinguished at the varietal level by Lewis (1962) by the



Distribution of ***Ixia rapunculoides***.



Distribution of ***Ixia robusta***.

presence of a short collar of fibres sheathing the base of the stem, and three or sometimes four, rather than the usual two leaves with expanded blades. A significant variant of *I. rapunculoides* from the Keiskie Mtns south of Calvinia has long narrow tepals ± 18 × 4 mm, a perianth tube 8.5 mm long and filaments inserted ± 4 mm above the tube base and ± 4 mm long. Elsewhere flowers of *I. rapunculoides* have broader tepals 11–15 × 4.5–6.0 mm, a perianth tube rarely more than 8 mm long, filaments inserted 2–4 mm above the tube base and 2–3 mm long. The anthers of the Keiskie population are also longer, ± 4 mm, compared with 2.3–3.5 mm for *I. rapunculoides*. These plants merit further investigation.

Ixia rapunculoides have been shown to be pollinated by large-bodied anthophorine bees but small empidid flies (Empididae) are frequently found visiting the flowers and likely play a role in pollination. The reward for visiting insects is nectar, small amounts of which are present in the base of the perianth tube.

71. **Ixia robusta** *(G.J.Lewis) Goldblatt & J.C.Manning* in Bothalia 38: 9 (2008a). *I. rapunculoides* var. *robusta* G.J.Lewis: 74 (1962). Type: South Africa. [Northern Cape], Moordenaarspoort, 26 miles [± 40 km] NE of Calvinia, 26 September 1952, *Lewis 2503* (SAM, holo.; BOL, PRE, iso.).

Plants mostly 0.5–1.0 mm high. *Corm* subglobose, mostly 14–18 mm diam., tunics of firm, wiry fibres accumulating in dense mass, with small cormlets at base. *Leaves* usually 4 (5 or 6), lower 3 or 4 lanceolate to subfalcate, mostly 8–14 mm wide, ± ¼–⅓ as long as stem, margins thickened, usually plane, uppermost 1 or 2 leaves sheathing stem below spike. *Stem* erect, sheathed below ground by collar of fibres, with up to 10 short, slender, ascending branchlets subtended by truncate-apiculate bracts and prophylls 0.5–1.0(–2.0) mm long. *Main spike* suberect, mostly 4- to 6-flowered, lateral spikes ascending, mostly 2- to 6-flowered; bracts translucent becoming tinged brown at tips, outer with 3 dark veins, (6–)8–10 mm long, 3-toothed or bluntly 3-lobed, subequal or inner slightly longer, with 2 dark veins and forked apically. *Flowers* ± nodding, pale pink with white cup, faintly acrid-metallic-scented or apparently unscented; perianth tube 7.5–10.2 mm long, widely funnel-shaped, flaring in upper 4–5 mm; tepals subequal, narrowly ovate to subspathulate, (15–)17–20 × 7–9 mm, proximal ± 3 mm forming part of floral cup, spreading distally. *Filaments* ± 4 mm long, inserted ± 3.5 mm above base of tube; anthers 3.5–4.0 mm long, half exserted from tube but included in floral cup, yellow. *Style* dividing opposite middle ⅓ of anthers, branches 1.5–2.0 mm long, extending between anthers. *Flowering time*: late August to late September.

Distribution and ecology: local in Northern Cape in the western Karoo on the plateau and eastern and northern slopes of the Hantamsberg, South Africa; in heavy dolerite-derived clay among dolerite boulders.

Diagnosis: *Ixia robusta* is recognised by its tall stature, up to 1 m high, pink flowers with a white cup, and at least three (and often four) lanceolate basal leaves, the blades thick and leathery to almost succulent. The corms, which are difficult to remove from the rocky ground, are large, and covered with wiry tunics, and the underground part of the stem is enclosed by a collar of coarse fibres, a feature often not preserved in herbarium collections. Closely related *I. rapunculoides* often grows parapatrically with *I. robusta*, sometimes even together, never with any sign of intergradation. Associated with its larger flower, *I. robusta* has anthers ± 4 mm long, the perianth tube is 7.5–10.2 mm long and the style branches are 1.5–2.0 mm long, contrasting with anthers mostly 2.3–3.5 mm long and style branches 0.7–1.0 mm long in *I. rapunculoides*.

72. **Ixia rivulicola** *Goldblatt & J.C.Manning* in Bothalia 38: 9 (2008a). Type: South Africa, Northern Cape, Roggeveld Escarpment, drift across Bo-Vis River at Noudrif Farm, in muddy ground, 11 Oct. 2004, *Goldblatt & Porter 12666* (NBG, holo.; K, MO, PRE, iso.).

Plants 450–800 mm high. *Corm* subglobose, with 1–few cormlets at base; tunics of submembranous fibres soon disintegrating. *Leaves* 3(4 or 5), lower 2 to 4 narrowly sword-shaped to linear, 3–7 mm wide, margins moderately thickened, straight, usually ± ⅓–½ as long as stem, uppermost leaf sheathing stem, penultimate leaf often sheathing in lower half. *Stem* with 3 to 5 straight, filiform lateral branchlets mostly held at ± 30° to main axis. *Main spike* mostly 2- or 3-flowered; lateral spikes 1- or 2-flowered; bracts translucent, mostly ± 8 mm long, outer with 2 dark veins, inner with 2 dark veins, forked apically. *Flowers* ascending to nearly horizontal, white with pale yellow cup, with strong fruity scent; perianth tube funnel-shaped, 8–9 mm long; tepals subequal, 17–18 × 5.0–7.5 mm, proximal 3–4 mm forming part of floral cup, spreading at right angles to tube distally. *Filaments* 3–4 mm long, included; anthers 4.5–5.5 mm long, lower ½ included in tube. *Style* dividing opposite upper ⅓ of anthers, branches ± 0.8 mm long, extending between anthers. *Flowering time*: mainly October.

Distribution and ecology: restricted to the upper reaches of the Bo-Vis River and its tributaries on the Roggeveld Escarpment in Northern Cape, South Africa; around ponds and in shallow water, a habitat unique in *Ixia*.

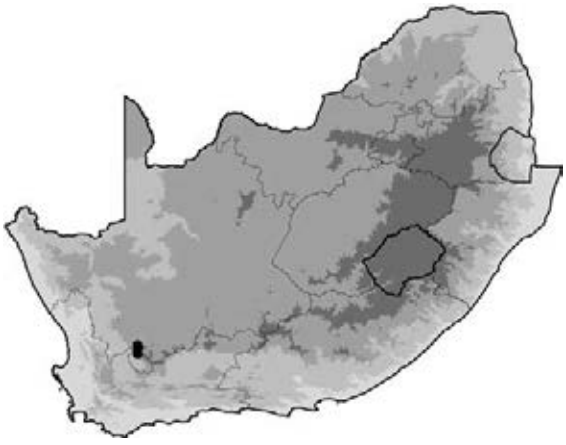
Diagnosis: *Ixia rivulicola* is recognised first by the habitat, in streams, pools and marshy ground, but also by the consistently white tepals 17–18 mm long, a tube 8–9 mm long and anthers 4.5–5.5 mm long. The long, narrow leaves are fairly soft-textured and up to half as long as the stem. It is closely related to *I. rapunculoides* which usually has a shorter tube, 5.5–8.0(–10.0) mm long, tepals 11–16 mm long, and anthers 2.3–3.5 mm long. The ascending to horizontally oriented flowers have a pale yellow cup and are particularly sweetly scented. Typical blue-flowered *I. rapunculoides* grows on the slopes above the Bo-Vis River and blooms in August and early September, and is in fruit by the time *I. rivulicola* comes into flower at the end of September or in October. Like other members of the *I. rapunculoides* complex, the flowers are pollinated by a range of large bees.

73. **Ixia lacerata** *Goldblatt & J.C.Manning* in Bothalia 38: 10 (2008a). Type: South Africa, Western Cape, Klein Roggeveld, ±24 km north of N1 on road to Sutherland, dolerite slope, 26 Aug. 2006, *Goldblatt & Porter 12702* (NBG, holo.; K, MO, PRE, iso.).

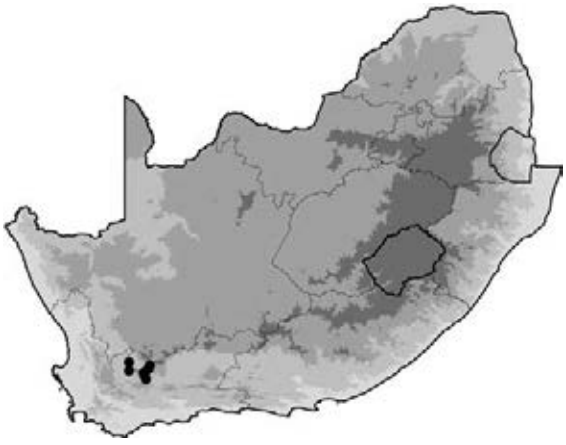
Plants 150–350 mm high. *Corm* subglobose, 14–20 mm diam.; tunics of firm, coarse fibres, with small cormlets at base. *Stem* wiry, sometimes somewhat twisted below spike, simple or with 1 to 3 short, thread-like, twisted branchlets subtended by filiform, forked or lacerate, silvery bracts and prophylls up to 5 mm long, distally spreading to reflexed. *Leaves* 3, lower 2 lanceolate to falcate, 5–10 mm wide, plane, sometimes slightly twisted distally, ± ¼–⅓ as long as stem, margins slightly to moderately thickened, uppermost leaf sheathing stem in lower ½–⅔. *Main spike* (2)3- to 6-flowered, suberect, lateral spikes (1–)3- or 4-flowered; bracts translucent below, becoming rust-coloured in upper ⅓, 6–7 mm long, outer mostly with 5 main veins and 5 attenuate teeth, sometimes slightly lacerate, inner with 2 main and 2 smaller veins, with 2 to 4 attenuate teeth. *Flowers* ± nodding, pale blue-mauve, tepals often whitish at base, with pale yellow cup, weakly rose-scented; perianth tube 10–12(–14) mm long; tepals subequal, (10–)12–14 × 5–6 mm. *Filaments* ± 3 mm long, included; anthers ± 3 mm long, yellow. *Style* dividing opposite middle of anthers, branches ± 1 mm long. *Flowering time*: mainly August to early September.

Distribution and ecology: restricted to the Klein Roggeveld and the Koedoes Mtns in Northern Cape, South Africa; on slopes and flats on shales or mudstones of the Ecca System, or occasionally on rocky, dolerite slopes, remarkably common in years of ample rainfall.

Diagnosis: *Ixia lacerata* is recognised by the nodding pale blue-mauve flowers with a pale yellow cup, a perianth tube 10–14 mm long and unusual outer bracts usually with five major veins and often two smaller veins, terminating in attenuate teeth. The bracts are diagnostic,



Distribution of ***Ixia rivulicola***.



Distribution of ***Ixia lacerata***.

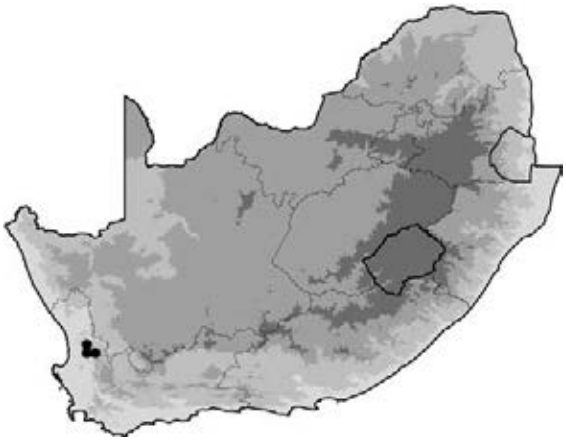
contrasting with related *I. rapunculoides* and most other species of sect. *Morphixia*, which have 1- or 3-veined outer bracts and 2-veined inner bracts, the veins terminating in short, acute or blunt teeth. In addition to the floral differences, the flowering stem has only 1 to 3 branchlets, each bearing 1 to 3(4) flowers, and the branchlets are subtended by forked, thread-like bracts and prophylls that are spreading or directed downward distally, unlike the short, truncate and inconspicuous bracts in most other members of the *I. rapunculoides* complex. Pollination studies have shown that the most common insect visitor is an unnamed long-proboscid fly, *Prosoeca* sp. (Nemestrinidae), also the main pollinator of other moderately long-tubed Iridaceae in the Roggeveld and Klein Roggeveld.

74. **Ixia mollis** *Goldblatt & J.C.Manning* in Bothalia 41: 130 (2011), as new name for *I. flaccida* (G.J.Lewis) Goldblatt & J.C.Manning: 17 (2008a), illegitimate homonym, not *I. flaccida* Salisb. (1796). *I. rapunculoides* var. *flaccida* G.J.Lewis: 74 (1962). Type: South Africa, [Western Cape], Boschkloof, 7 Aug. 1896, *Schlechter 8432* (BOL, holo.; BM, G, K, L, MO, PRE [2 sheets], S, Z, iso.).

Plants 200–350 mm high. *Corm* subglobose, bearing 1–few sessile basal cormlets and rarely a short, filiform stolon; tunics of medium-textured, netted fibres. *Stem* slender-filiform, with 4 to 6 loosely twisted, filiform branchlets up to 35 mm long, spreading at right angles to main axis, subtended by minute, acute bracts and prophylls ± 1 mm long. *Leaves* 3(4), lower 2(3) sword-shaped to linear, 4–9 mm wide, margins hardly thickened, usually ± ½ as long as stem, uppermost leaf sheathing stem. *Main spike* 2- to 4-flowered, lateral spikes 1- to 3-flowered; bracts translucent light brown, outer with 3 dark veins, mostly 5–6 mm long, inner as long or slightly longer than outer, with 2 dark veins, forked at apex. *Flowers* nodding, white or pale blue with white to greenish cup, evidently unscented; perianth tube funnel-shaped or with upper part somewhat urn-shaped, 7–9 mm long; tepals subequal, ± 14 × 3.5–4.5 mm, proximal 3–4 mm forming part of floral cup, spreading distally. *Filaments* 2.5–3.0 mm long, included, inserted 3–4 mm above base of tube; anthers ± 2.5 mm long, half included in tube. *Style* dividing opposite middle of anthers, branches ± 1 mm long, extending between anthers. *Flowering time*: late July to early September.

Distribution and ecology: restricted to the Olifants River Valley and nearby in Western Cape, South Africa; on seasonally moist, south-facing sandy, or sometimes light, loamy clay slopes, among rocks usually in the shade of shrubs and small trees.

Diagnosis: distinguished by the nodding, relatively small, white or pale blue flowers, *Ixia mollis* has tepals ± 14 × 3.4–4.5 mm, a perianth tube 7–9 mm long and anthers ± 2.5 mm long, half included in the tube. The corms bear small cormlets at the base and occasionally a slender stolon and the tunics consist of medium-textured to fine fibres. The nearly linear to narrowly sword-shaped leaves are soft-textured and these, as well as the white or pale blue flowers readily distinguish the species from the closely allied *I. rapunculoides*, which has blue to blue-mauve or sometimes pink flowers with a yellow cup. *Ixia mollis* was confused in the past with what is now *I. sobolifera,* which included pink-flowered plants from the Bokkeveld Plateau and white-flowered plants from the Little Karoo. These plants have soft-textured, short-lived tunics and produce long, ribbon-like stolons and also differ in the longer bracts, 6–10 mm long (vs. 5–6 mm long in *I. mollis*) and, in *I. sobolifera* subsp. *carnea*, a longer perianth tube 9–10 mm long and longer anthers 3–4 mm long.



Distribution of ***Ixia mollis***.

75. **Ixia namaquana** *L.Bolus* in South African Gardening and Country Life 21: 368 (1931b); Goldblatt & Manning: 14 (2008a). *I. rapunculoides* var. *namaquana* (L.Bolus) G.J.Lewis: 76 (1962). Type: South Africa, [Northern Cape], Klipfontein, Sept. 1883, *H. Bolus* as *Herbario Normale Austro-Africana 698* (BOL, lecto., designated by De Vos: 15 (1999); B, G, K, PRE, SAM, Z, iso.).

Plants mostly 300–500 mm high. *Corm* 12–15 mm diam.; tunics of medium-textured to coarse fibres. *Stem* with several short, filiform, twisted lateral branchlets subtended by short bracts and prophylls ± 2 mm long. *Leaves* 3, lower 2 sword-shaped to falcate, mostly 8–18 mm wide, margins thickened and hyaline, sometimes minutely crisped, usually ± ⅓ as long as stem but sometimes shorter, uppermost leaf sheathing stem. *Main spike* 2- or 3-flowered, lateral spikes 1- or 2-flowered; bracts translucent, outer with 3 dark veins, ± 10 mm long, with 3 short, subequal teeth, inner with 2 dark veins, forked at apex. *Flowers* ± nodding, whitish to light mauve, lilac, pale blue or pink with yellow cup edged with a band of short vertical lines, often flushed lilac to mauve outside, violet-scented or unscented; perianth tube 12–16(–18) mm long, narrowly funnel-shaped; tepals subequal, ovate, inner (12–)14–17

× 5–7 mm, outer 6–8 mm, proximal 4–6 mm forming part of floral cup, spreading at right angles to tube in distal 10–12 mm. *Filaments* 4–5 mm long, included; anthers 3.5–4.5 mm long, half exserted from tube but included in floral cup. *Style* mostly dividing opposite upper ⅓ of anthers, branches ± 1 mm long, extending between anthers (in type, dividing at anther tips with branches arching above anthers and 1.5 mm long). *Flowering time*: mainly August to mid-September, rarely October.

Distribution and ecology: scattered across western Northern and Western Cape, South Africa, occurring in the Richtersveld and northern Namaqualand, the southern Kamiesberg in central Namaqualand, and the Bokkeveld Mtns and northern Cederberg to the south; in sands and gravels derived from granite or sandstone.

Diagnosis: *Ixia namaquana* is readily distinguished in the *I. rapunculoides* complex by the longer perianth tube, mostly 13–16 mm long, short branchlets bearing 1 or 2 flowers each, and corm with tunics of coarse, netted fibres. The flowers are relatively large with tepals mostly 14–16 mm long and anthers 3.5–4.5 mm long. The proximal halves of the tepals form a floral cup that fully encloses the stamens. The flowers are usually sweetly scented but are appear unscented in the Bokkeveld Mtns. Pink-flowered plants with a perianth tube 16–20 mm long from Hex River Pass and nearby identified in the past as *I. namaquana* are a different species, *I. oxalidiflora*, distinguished by the longer perianth tube, suberect rather than horizontally oriented flowers, fully included anthers, and most significantly by the corms with papery to finely fibrous tunics and bearing ribbon-like stolons.

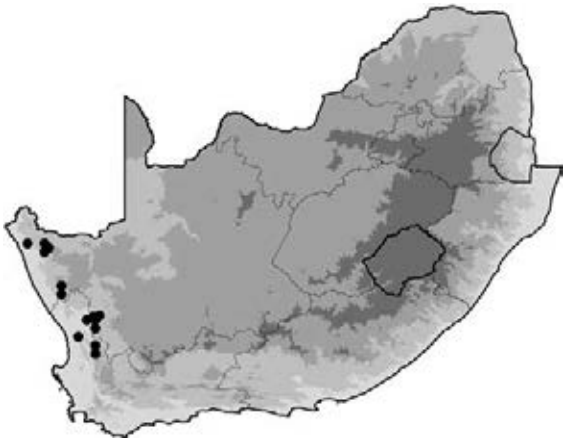
The type of *Ixia namaquana* from Klipfontein near Steinkopf in northern Namaqualand has particularly large flowers, with the tube up to 18 mm long, and the style divides opposite the anther tips with the branches extending above them. The northern populations need additional study.

76. **Ixia oxalidiflora** *Goldblatt & J.C.Manning* in Bothalia 38: 17 (2008a). Type: South Africa, [Western Cape], Hex River Pass, south-facing clay slopes, 2 Sept. 1992, *Goldblatt & Manning 9397* (NBG, holo.; MO, iso.).

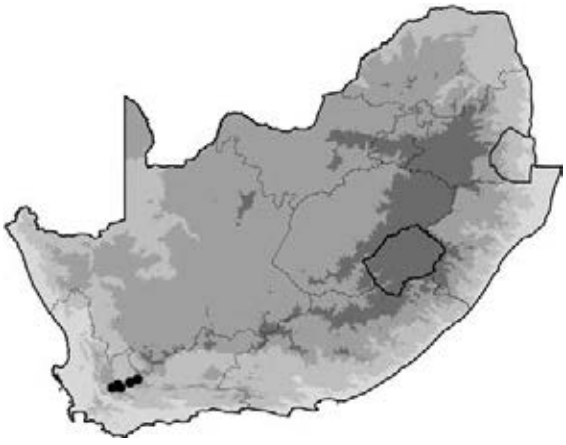
Plants 200–450 mm high. *Corm* 6–8(–10) mm diam., bearing broad, flattened stolons; tunics of fine netted fibres, soon decaying. *Leaves* 3, lower 2 narrowly sword-shaped to linear, fairly soft-textured, 6–12(–15) mm wide, margins straight and not thickened, uppermost leaf sheathing stem. *Stem* usually with 1 or 2 filiform, twisted lateral branches up to 12 mm long. *Main spike* 2- to 4-flowered, lateral spikes 1- or 2-flowered; bracts translucent, outer with 3 dark veins, 10–12 mm long, with 3 subequal acuminate tips, inner 2-veined, forked at apex. *Flowers* ascending to ± upright, purple-pink with white cup, unscented; perianth tube 16–22 mm long, funnel-shaped; tepals subequal, ovate, 14–18 × 6–7 mm, spreading in distal 10–12 mm. *Filaments* ± 4 mm long, included; anthers ± 3.5 mm long, reaching up to 0.5–2.0 mm below mouth of tube. *Style* dividing opposite middle of anthers, branches ± 1 mm long, extending between anthers. *Flowering time*: mid-August to mid-September.

Distribution and ecology: a fairly rare species of interior Western Cape, South Africa, known from the top of Hex River Pass, near Tweedside Station, and at Memorial Hill near Matjiesfontein; mainly on south-trending slopes in clay or loamy soils, the corms typically wedged in crevices of shale rock.

Diagnosis: *Ixia oxalidiflora* stands out in having the stamens fully included in the perianth tube, with the anther tips reaching 0.2–0.5 mm below the tube apex, and the perianth tube itself 16–22 mm long. In related *I. namaquana* only the bases of the anthers are included in the shorter tube, mostly 13–16 mm long. The corms, which have soft-textured tunics bear long stolons, likewise differ from those of *I. namaquana*, which have coarsely fibrous tunics and lack stolons. The



Distribution of ***Ixia namaquana***.



Distribution of ***Ixia oxalidiflora***.

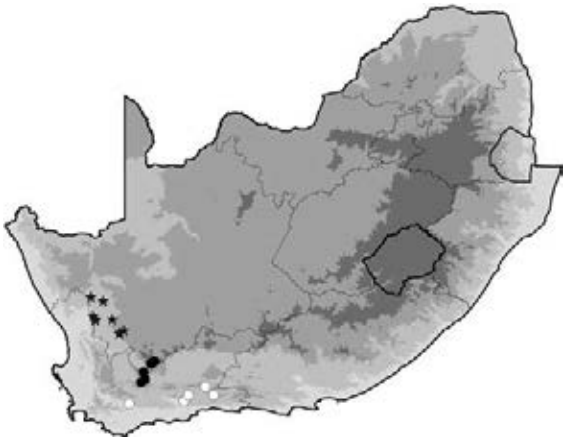
flowers are held upright, a feature only apparent when plants are seen alive, thus unlike the nodding flowers of *I. namaquana*. The purple-pink flowers with a white cup (also described as pale yellow) closely resemble in shape and colouring those of co-occurring *Oxalis heterophylla* DC. (Oxalidaceae) which blooms at the same time.

77. **Ixia sobolifera** *Goldblatt & J.C.Manning* in Bothalia 38: 11 (2008a). Type: South Africa, Northern Cape, north of Matjiesfontein on road to Sutherland, 9 Sept. 2006, *Goldblatt & Porter 12809* (NBG, holo.; MO, PRE, iso.).

Plants (150–)250–750 mm high. *Corm* subglobose, 8–12 mm diam., producing flattened stolons from base; tunics soft, ± papery. *Stem* with 1 to 5 twisted, filiform branchlets subtended by forked, attenuate bracts and prophylls 2–5 mm long. *Leaves* 3, lower 2 linear, often trailing above, (1.5–)2.0–5.0(–8.0) mm wide, ± ½ as long as stem, margins plane, barely thickened, edges flat or concave, uppermost leaf sheathing stem below spike. *Main spike* nodding, 2- to 5(–7)-flowered, lateral spikes nodding, (1)2- to 4(5)-flowered; bracts translucent, or dry and brown distally with age, 6–10 mm long, outer 3-veined, inner 2-veined, forked apically. *Flowers* half to fully nodding, pink or slate-blue with white cup, or white with pale yellow cup, faintly rose- to strongly carnation-scented; perianth tube 5–10 mm long, funnel-shaped, flaring in upper ± 5 mm; tepals subequal, ovate or narrowly ovate, 10–17 × 4.5–7.0 mm, proximal ± 3 mm forming part of floral cup, spreading distally. *Filaments* 2–3 mm long, included; anthers 3.0–4.5 mm long, included or half exserted from tube but included in floral cup, uniformly pale yellow or marked with dark, longitudinal streaks. *Style* dividing opposite or slightly beyond anther tips, branches 1.0–1.5 mm long, usually exceeding anthers when mature. *Flowering time*: August to mid-September.

Distribution and ecology: relatively widespread, extending from the Langberg and Kubiskou ranges northwest of Loeriesfontein in Northern Cape through the Western Karoo and interior Western Cape to the Little Karoo, South Africa (detailed distribution and habitat information is provided under the subspecies).

Diagnosis: recognised by the combination of corms with soft papery (rather than fibrous) tunics and producing prominent, ribbon-like stolons, *Ixia sobolifera* has a main spike bearing 2 to 5(–7), half nodding to half pendent flowers. The tepals are either pink, slate-blue or white and the floral cup white or yellow and the perianth tube is 6–10 mm long. Stems are usually several-branched and the branches are subtended by filiform bracts and prophylls. Three geographic subspecies are recognised, distinguished by relatively small morphological differences. Subsp. *carnea* from the Bokkeveld Plateau and its extensions, the Kubiskou and Langberg, has a pink perianth with white cup, bracts somewhat dry and dark brown at the tips with age and anthers marked with dark longitudinal lines. Subsp. *sobolifera*, from the Klein Roggeveld and nearby, has slate-blue



Distribution of ***Ixia sobolifera*** subsp. ***sobolifera***, ●; subsp. ***albiflora***, ○; subsp. ***carnea***, ★.

flowers and particularly slender stems. Lastly subsp. *albiflora* from the Little Karoo has white, intensely fragrant flowers. Closely related *I. mollis* from the Olifants River Valley has horizontally oriented, white or pale blue flowers, a stem with longer branchlets, and short floral bracts 5–7 mm long (vs. 5–10 mm in *I. sobolifera*). The corm bears subsessile cormlets at the base and has tunics of medium-textured, netted fibres rather different from the soft, papery corm tunics of *I. sobolifera* and long, ribbon-like stolons.

Key to subspecies

1a Perianth pink with yellow throat; perianth tube 9–10 mm long; anthers 3–4 mm long, yellow with dark longitudinal lines on anther lobes . . . . . 77b. subsp. *carnea*

1b Perianth white with pale yellow throat or slate-blue with white throat; perianth tube 5–7 mm long; anthers 2–3 mm long, uniformly yellow:

2a Perianth white with yellow throat; perianth tube 6–7 mm long . . . . . 77c. subsp. *albiflora*

2b Perianth slate-blue with white or pale yellow throat; perianth tube 5–6 mm long . . . . . 77a. subsp. *sobolifera*

77a. subsp. **sobolifera**

Plants with stems slender and drooping above, branchlets mostly 1- or 2-flowered. *Spike* with bracts 7–9 mm long, translucent with dark veins, not turning rust-coloured above with age. *Flowers* slate- or grey-blue with white cup, faintly scented; perianth tube 5–6 mm long, tepals 10–12 × 4.5–5.5 mm. *Filaments* 2–3 mm long; anthers 4.0–4.5 mm long, uniformly yellow; style reaching or exceeding anther tips, branches 1.0–1.5 mm long.

Distribution and ecology: restricted to the Klein Roggeveld and adjacent hills in Northern Cape and the Witteberg and nearby in Western Cape; on stony slopes in sparse vegetation.

Diagnosis: subsp. *sobolifera* is distinguished by its nodding to nearly pendent, slate-blue flowers borne on very slender, arching stems. Unlike pink-flowered subsp. *carnea*, the bracts do not turn dark brown above with age, and the spike and branchlets have one or two, rarely three flowers, fewer than either subsp. *carnea* or the white-flowered subsp. *albiflora*. A distinctive feature of the southern populations of the subspecies is the longer style, which overtops the anthers, and not known elsewhere in the species.

77b. subsp. **carnea** *Goldblatt & J.C.Manning* in Bothalia 38: 13 (2008a). Type: South Africa, Northern Cape, Nieuwoudtville, Glenlyon Farm, dolerite koppies, in bush, 2 Sept. 2001, *P. Goldblatt & L.J. Porter 11810* (NBG, holo.; MO, PRE, iso.).

Plants (150–)250–750 mm high. *Leaves* 3, blades linear, often trailing above, 1.5–3.5 mm wide. *Stem* with 1 to 3 twisted, filiform branchlets. *Main spike* mostly 2- to 4-flowered, lateral spikes 1- to 3(4)-flowered; bracts translucent, becoming brown with age in upper half, outer 8–10 mm long. *Flowers* pale to deep pink with white cup, faintly rose-scented; perianth tube 9–10 mm long, tepals 12–16 × 4.5–6.0 mm. *Filaments* ± 3 mm long, inserted ± 4 mm above base of tube; anthers 3–4 mm long, pale yellow with dark longitudinal lines on thecae; style reaching anther tips.

Distribution and ecology: restricted to the northern end of the range of the species, extending in the Northern Cape from the Langberg in the west to the Bokkeveld Plateau and the Hantamsberg in the east; most often on dolerite-derived clay or on shale slopes but also on sandy tillite soils among sandstone rocks.

Diagnosis: apart from the pink perianth, for which it is named, anthers of subsp. *carnea* have dark longitudinal lines that contrast with the otherwise yellow colour. Plants are sympatric and bloom at the same time as the longer-tubed *I. namaquana* northwest of Nieuwoudtville and with *I. rapunculoides* in the dolerite hills east of Nieuwoudtville and on the Hantamsberg.

77c. subsp. **albiflora** *Goldblatt & J.C.Manning* in Bothalia 38: 14 (2008a). Type: South Africa, Western Cape, Farm Buffelskloof, 35 km from Dysseldorp on Laudina road, S-facing shale hillside, 12 Sept. 2003, *P. Goldblatt & L.J. Porter 12291* (NBG, holo.; K, MO, PRE, iso.).

Plants 400–650 mm high. *Leaves* linear to narrowly sword-shaped, 4–8 mm wide. *Stem* erect, with 2 or 3(–5) suberect to spreading, filiform branchlets subtended by silvery-translucent bracts mostly 3–4 mm long. *Main spike* 4- or 5(–7)-flowered, lateral spikes (1)2- or 3(–5)-flowered; bracts membranous and translucent, mostly 6–8 mm long. *Flowers* creamy white with pale yellow cup, sometimes flushed grey-mauve outside, nodding, intensely carnation-scented; perianth tube 6–7 mm long, tepals 12–17 × 5.0–7.5 mm. *Filaments* ± 3 mm long; anthers ± 3 mm long, uniformly pale yellow; style reaching anther tips. *Flowering time*: August to mid-September.

Distribution and ecology: restricted to the central Little Karoo in Western Cape, and known from just a handful of sites, mostly south and east of Oudtshoorn, with one record from the northern foothills of the Swartberg, east of Prince Albert; on stony, clay loam slopes.

Diagnosis: subsp. *albiflora* is distinguished from its sister subspecies mainly by the strongly carnation-scented flowers with white tepals and a yellow cup, and also by the 4- or 5(–7)-flowered main spike, perianth tube 6–7 mm long (perianth tube 9–10 mm long in subsp. *carnea* and 5–6 mm in subsp. *sobolifera*), and often broader leaves, 4–8 mm wide. Early collections of subsp. *albiflora* were included in what is now *I. mollis,* which occurs in the Olifants River Valley, well to the west.

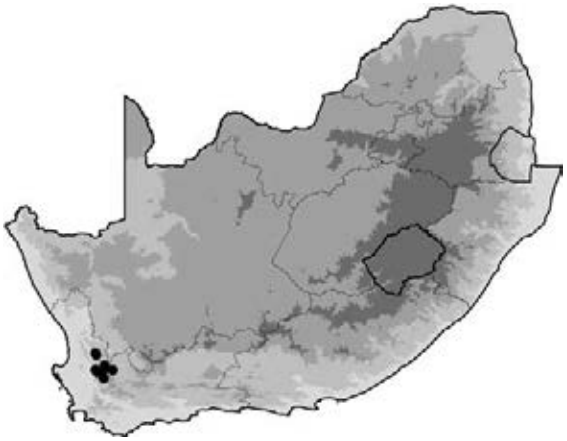
78. **Ixia contorta** *Goldblatt & J.C.Manning* in Bothalia 38: 21 (2008a). Type: South Africa, Western Cape, Cold Bokkeveld, low hill east of Farm Waboomsrivier, well-drained sandy ground, 17 Sept. 2006, *P. Goldblatt & L.J. Porter 12854* (NBG, holo.; MO, PRE, iso.).

[*Ixia rapunculoides* var. *rigida* sensu G.J.Lewis: 77 (1962), but excluding the type.]

Plants (70–)100–300 mm high. *Corm* subglobose, 10–14 mm diam., bearing 1–few sessile cormlets at base; tunics of medium-textured to fine, dark, wiry, netted fibres. *Leaves* 3, lower 2 linear to narrowly sword-shaped or falcate, (2–)3–5 mm wide, ± ⅓ as long as stem, margins and main vein moderately thickened, uppermost leaf sheathing lower ½ of stem. *Stem* suberect, usually with 1 to 3 short, twisted branchlets mostly held at 60–90° to main axis. *Main spike* conspicuously flexuose, bent at base and inclined to ± horizontal, 2- to 6-flowered, lateral spikes 1- to 6-flowered; bracts mostly 7–9 mm long, translucent, often flushed brown or purple, outer 3-veined, bluntly 3-lobed apically, inner 2-veined, forked apically. *Flowers* upright, purple (or said to be blue) with a yellow cup sometimes edged with a band of dark purple, unscented; perianth tube funnel-shaped, 9–13(–14) mm long; tepals subequal, 9–12 × (4.5–)6.0–8.0 mm. *Filaments* ± 3 mm long, included; anthers 3–4 mm long, lower ⅓–½ included in tube. *Style* dividing opposite middle of anthers, branches ± 1 mm long, extending between anthers. *Flowering time*: mid-September to October.

Distribution and ecology: centred in the Cold Bokkeveld, extending north to the Cederberg and east to Touws River in Western Cape, South Africa; in well-drained, sandy ground.

Diagnosis: *Ixia contorta* is distinguished among species of sect. *Morphixia* with included filaments by the markedly flexuose spikes and by the main axis strongly flexed below the first flower, thus inclined to nearly horizontal. The purple flowers (also sometimes described as blue or



Distribution of ***Ixia contorta***.

lilac) have a yellow cup sometimes edged in dark purple, and are held upright on the spikes. The perianth tube is 9–13(–14) mm long and the tepals are 9–12 mm long. The very different appearance of the flowers suggests that these plants are not immediately allied to *I. rapunculoides* with which they were first associated and its relationship to the *I. rapunculoides* complex seems questionable. Plants from the north of the range near Alberta Farm, and in the Cederberg stand out in having a longer and sometimes wider perianth tube, 12–14 mm long.

Plants are usually fairly short, seldom exceeding 150 mm, but collections from Gydo Pass (e.g. *Leipoldt 3023*) are taller, some reaching 300 mm. Typical *Ixia contorta* has also been collected on Gydo Pass and it seems likely that the taller plants with narrow leaves are not simply a local variant of the species but hybrids, the result of crossing with *I. divaricata*, which also grows there. The longer, narrower leaves, paler flower colour and slightly larger perianth in these plants may also reflect the influence of genes of *I. divaricata*.

Ser. **Capillares** *Goldblatt & J.C.Manning*, new series. Type: *Ixia capillaris* L.f.

Plants with leaves plane, linear, with main vein not raised when fresh. *Flowers* blue-mauve, pink or white; perianth tube short and funnel-shaped or elongate and cylindric. *Filaments* sometimes unilateral, shortly exserted or included.

79. **Ixia capillaris** *L.f.*, Supplementum plantarum: 92 (1782); Goldblatt & Manning: 117 (2008b). *Morphixia capillaris* (L.f.) Ker Gawl.: 106 (1827). *I. gracilis* Salisb.: 37 (1796), illegitimate superfluous name for *I. capillaris* L.f. *Hyalis gracilis* Salisb.: 317 (1812) illegitimate name. Type: South Africa, [Western Cape], without precise locality, collected c. 1773, *Thunberg s.n.* (UPS-THUNB 935 & 936, syn.).

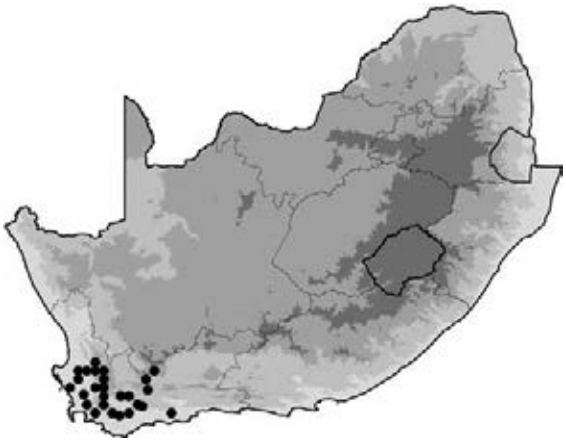
Ixia capillaris var. *gracillima* Ker Gawl.: t. 570 (1802b). Type: South Africa, without precise locality, illustration in Ker Gawl.: t. 570 (1802b).

Ixia tenella Klatt: 396 (1882). Type: South Africa, without precise locality or date, *Zeyher 557* (B: Herb. Lubeck, believed destroyed, drawing at S, not seen).

Plants 200–350(–500) mm high, sheathed at base by chestnut-brown (green) cataphylls. *Corm* globose, 8–12(–15) mm diam.; tunics of fine to medium-textured, netted fibres. *Stem* slender, usually with thin collar of fibres around base; usually with 1 to 3 lateral branches, rarely unbranched, then with 1 or more scale-like bracts on stem; branchlets mostly 8–15 mm long, filiform, curving outward, subtended by translucent, irregularly lobed, attenuate bracts and prophylls 2–3 mm long. *Leaves* 3, lower 2 linear, 1.2–2.0 mm wide, ⅓–⅔ as long as stem, main vein not raised when fresh, margins occasionally slightly raised, uppermost leaf sheathing stem, sometimes to base of spike. *Spike* drooping above, (1)2- or 3-flowered, lateral branchlets 1- or 2(3)-flowered; bracts translucent with dark veins, 7–10 mm long, outer 3-toothed, inner notched apically. *Flowers* ± nodding, pale blue to pale mauve, white or creamy yellow, evidently unscented; perianth tube funnel-shaped, (4–)5–7(–8) mm long; tepals subequal, 11–15 × 4–7 mm, spreading. *Filaments* ± 5 mm long, usually exserted 1–2 mm from tube, rarely reaching only to mouth of tube; anthers (3–)4–5 mm long. *Style* usually dividing between middle and upper third of anthers, branches 1–2 mm long. *Flowering time*: mainly late July to late September.

Distribution and ecology: extending in Western Cape, South Africa, from the Piketberg and Cold Bokkeveld in the north to Bot River in the south and through the southern Cape to Riversdale; on clay slopes, usually in wetter sites, thus often on south-facing slopes.

Diagnosis: *Ixia capillaris* is distinguished by the narrow, linear leaves up to 2 mm wide, corm tunics of fine, netted fibres and a main spike with 1 to 3 flowers. Branchlets when present are very short and 1- or 2-flowered. The pale blue or occasionally creamy yellow flowers have a perianth tube ± 5 mm long, enclosed by



Distribution of ***Ixia capillaris***.

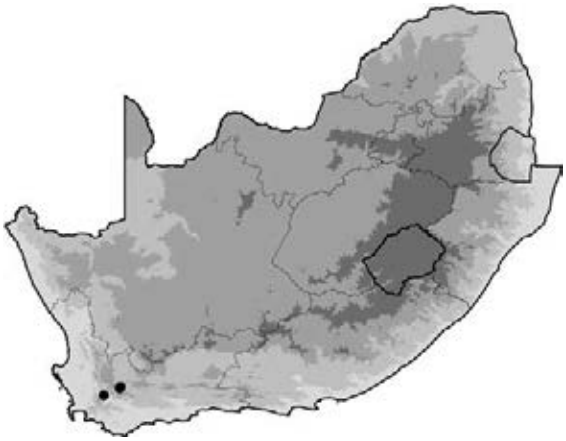
the translucent floral bracts, 6–8 mm long, the flowers, excluding the ovary, are ± 20 mm long. The plants typically have a prominent dark brown cataphyll, a feature more prominent in the northern populations of the species and the upper leaf sheathes the stem for ± half its length. The type material is readily matched by plants from the Western Cape mountains, long known by the name, that have filaments exserted 1–2 mm and anthers held in a column 4.0–4.5 mm long and a style dividing opposite the upper third of the anthers into short branches 1–2 mm long. *Ixia capillaris* is most likely to be confused with *I. exiliflora*, specimens of which were often included in the past as that species. Whereas *I. capillaris* has flowers with a perianth tube 4–7, rarely 8 mm long, and tepals about twice as long as the tube, *I. exiliflora* has a perianth tube 8–10 mm long, and tepals about as long as the tube. The bases of the anthers of *I. exiliflora* are included in the tube but those of *I. capillaris* have anthers that are normally exserted 1–2 mm, or rarely barely exserted on included filaments.

80. **Ixia exiliflora** *Goldblatt & J.C.Manning* in Bothalia 38: 119 (2008b). Type: South Africa, Western Cape, ± 0.8 km S of turnoff to Montagu from N1, flat plateau, 3 200 ft [± 1 050 m], 25 Aug. 2006, *Goldblatt & Porter 12688* (NBG, holo.; K, MO, PRE, iso.).

Plants 250–700 mm high, with green cataphylls becoming dry distally. *Corm* subglobose, 8–12 mm diam., with small cormlets at base; tunics of fine fibres. *Stem* usually with 2 or 3 branchlets subtended by bracts and prophylls 3–4 mm long, acute to attenuate, translucent white. *Leaves* 3, lower 2 linear, reaching lower ⅓ to middle of stem, 1.0–1.7 mm wide, loosely twisted in upper ½, main vein not evident when alive, slightly raised when dry. *Spike* with main axis (2)3- or 4-flowered, lateral spikes (1)2- or 3-flowered; bracts 6–8 mm long, translucent, outer 3-veined and 3-toothed, inner 2-veined, 2-toothed. *Flowers* nodding, grey-blue to dingy white with creamy yellow cup, with faint rose scent; perianth tube narrowly funnel-shaped, 8–10 mm long; tepals ovate, 8–10 × 4–5 mm. *Filaments* 3–4 mm long, included; anthers 3.5–4.0 mm long, half included in tube and entirely within floral cup, yellow. *Style* dividing close to anther tips, branches ± 1.3 mm long, when fully expanded often shortly exceeding anthers. *Flowering time*: July to mid-September.

Distribution and ecology: restricted to the Laingsburg, Montagu and Worcester Districts of Western Cape, South Africa, extending from the hills north of Worcester and the heights east of Hex River Pass to near Matjiesfontein; on loamy clay soils in stony ground, sometimes with sandstone bedrock.

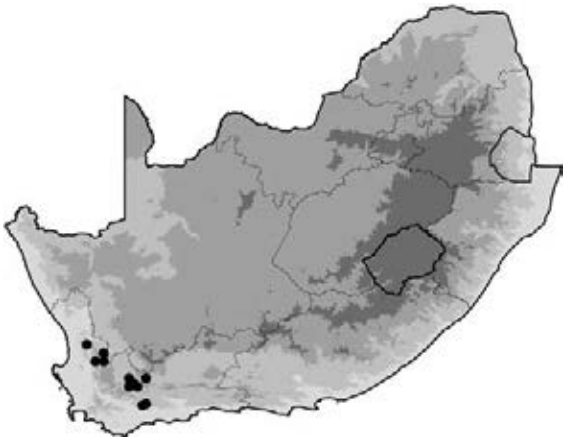
Diagnosis: at first appearing to be a slightly smaller-flowered variant of the widespread, short-tubed *Ixia capillaris*, *I. exiliflora* is distinguished by the longer perianth tube 8–10 mm [vs. (4–)5–7(–8) mm in *I. capillaris*] and anthers partly included in the tube, whereas the filaments are usually exserted ± 2 mm in *I. capillaris*. The partly included anthers recall the *I. rapunculoides* complex of species but the very different, narrow leaves and small corms with finely fibrous tunics, as well as the smaller flowers, make it clear that the included filaments are convergent. Plants from near Simonskloof, west of Koo, stand out in having white flowers with a yellow cup, but otherwise closely resemble blue-flowered *I. exiliflora* and have the characteristic short stamens and partly included anthers of the species.



Distribution of ***Ixia exiliflora***.

81. **Ixia dieramoides** *Goldblatt & J.C.Manning* in Bothalia 38: 120 (2008b). Type: South Africa, Western Cape, north of N1 between Matjiesfontein and Touws River, sandstone outcrop, 27 Aug. 2006, *Goldblatt & Porter 12713* (NBG, holo.; K, MO, PRE, BOL, iso.).

Plants 350–700 mm high, with a sparse collar of fibres around stem base and green or brown cataphylls often dry distally. *Corm* subglobose, 9–14 mm diam., bearing small cormlets at base; tunics of fine fibres. *Stem* sometimes inclined, often nodding above, with 1 to 3 short lateral branchlets up to 10 mm long, occasionally unbranched, bracts and prophylls subtending branchlets lanceolate to attenuate 3–8 mm long, silvery-translucent. *Leaves* 3, lower 2 linear, leathery, reaching between middle and upper ⅓ of stem, ± 1.2–2.0 mm wide, loosely twisted in upper ½, main vein not evident when alive, slightly raised when dry and lying closer to abaxial margin. *Spike* with main axis (1)2- or 3(4)-flowered, lateral branchlets 1- or 2-flowered; bracts translucent, (8–)9–11 mm long, outer 3-veined and 3-toothed, inner sometimes slightly longer than outer, 2-veined and 2-toothed. *Flowers* half nodding, pale mauve-blue to watery lilac or ± violet with pale yellow cup, often sweetly scented; perianth tube 13–18(–22) mm long, widening ± uniformly from base, 5–6 mm diam. at mouth; tepals ovate, outer 13–18 × 7–9 mm, inner 11–14 × 5–8 mm, ascending below. *Filaments* 3–6 mm long, included or rarely barely exserted ± 1 mm from tube, included in floral cup; anthers 2.5–3.5 mm long, yellow, exserted or bases included. *Style* dividing opposite lower to middle ⅓ of anthers, branches 1–2 mm long, when fully extended not reaching anther tips. *Flowering time*: early August to early October.



Distribution of ***Ixia dieramoides***.

Distribution and ecology: fairly common on south-facing slopes of the Bonteberg and Voetpadsberg north and west of Touws River in Western Cape, South Africa, also recorded locally in the southern Cederberg and Little Karoo; on stony sandstone slopes.

Diagnosis: with corms with fine, netted tunics and narrow, leathery leaves of the *Ixia capillaris* type, *I. dieramoides* is recognised mainly by the larger flowers with a tube 13–18(–22) mm long and with filaments and often the bases of the anthers included in the tube. The smaller flowers of *I. capillaris* have a tube (4–)5–7(–8) mm long, tepals spreading from the base and filaments typically exserted 1–2 mm. Unlike *I. capillaris*, the flowers are often faintly scented. Well-grown plants usually reach 600 mm high, thus extending substantially above the surrounding vegetation, which may be only 350 mm high. In dry, stony ground in poor soils, plants may be just 250 mm high, have one or two flowers and may be unbranched. Seen from a distance, the flowering spikes nodding in the breeze resemble species of *Dierama*.

Ixia dieramoides from the Cederberg has short, included filaments 2.5–5.0 mm long, as well as shorter anthers and style branches.

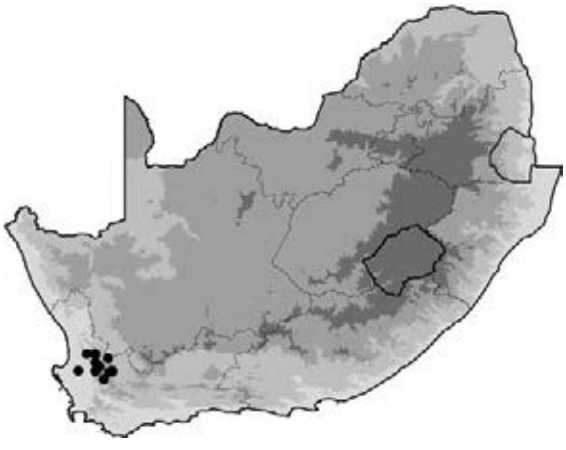
82. **Ixia pauciflora** *G.J.Lewis* in Journal of South African Botany 28: 88 (1962); Goldblatt & Manning: 121 (2008b). Type: South Africa, [Western Cape], Cold Bokkeveld, north of Waboomsrivier, 2 Sept. 1956, *Barker 8635* (NBG, holo.).

Plants 150–300(–400) mm high, with chestnut-brown cataphylls and collar of fibres around base. *Corm* 9–14 mm diam.; tunics of fine, dark fibres. *Stem* usually unbranched, then often with a node bearing a short membranous scale, or with 1 or 2(–4) short branchlets up to 10 mm long, subtended by thread-like, attenuate bracts and prophylls 4–8 mm long. *Leaves* 3, lower 2 linear, leathery, ± 1.8 mm wide; uppermost leaf sheathing stem often to base of spike. *Main spike* 1- or 2(3)-flowered, branchlets 1(2)-flowered; bracts 9–14 mm long, outer 3-veined and 3-toothed, inner 2-veined and 2-toothed. *Flowers* nodding, zygomorphic (?or sometimes radially symmetric) with unilateral stamens, pale blue to blue-mauve, whitish or palest yellow, pale yellow in throat, tepals spreading distally, proximal 3 mm directed forward and forming part of floral cup, odourless or faintly scented; perianth tube expanding uniformly from base to apex, 15–18 mm long; tepals subequal, 16–18 × 8–10 mm, ascending in lower ⅓, spreading above. *Filaments* unilateral, 12–13 mm long, exserted 2–6 mm; anthers (4–)5–6 mm long, horizontal, facing dorsal tepal. *Style* dividing opposite lower ⅓ of anthers, branches 3.0–4.5 mm long, extending between anthers. *Flowering time*: mid-August to mid-September.

Distribution and ecology: restricted to the interior mountains of Western Cape, South Africa, extending from the Cederberg near Algeria south through the Cold Bokkeveld to Gydo Pass; in seasonally moist sites on rocky sandstone slopes or sometimes on loamy clay.

Diagnosis: *Ixia pauciflora* typically has just one or two flowers on slender, often unbranched stems, or with one or two (rarely to four) short branchlets. The flowers are relatively large, having tepals 16–18 mm long, ± as long as the flared perianth tube, long filaments exserted 2–6 mm from the tube, and anthers 4–6 mm long. The stamens on fully open flowers are unilateral and are held horizontally with the anthers facing the dorsal tepal, a feature impossible to determine from pressed specimens. Vegetatively, the species is virtually identical to the more common *I. capillaris* in its two linear leaves, small corms with finely fibrous tunics, a collar of fine fibres around the underground part of the stem, and dry, chestnut-brown cataphylls. Blooms of *I. capillaris* are radially symmetric and have a perianth tube 4–8 mm long, ± half as long as the tepals, and filaments ± 5 mm long, usually exserted 1–2 mm from the tube.

Ixia pauciflora also closely resembles the local Villiersdorp endemic, *I. reclinata*, in its flower, including the unilateral stamens, extended horizontally with declinate anthers, but the latter has longer filaments, exserted 8–10 mm (vs. 2–6 mm in *I. pauciflora*). *Ixia reclinata*



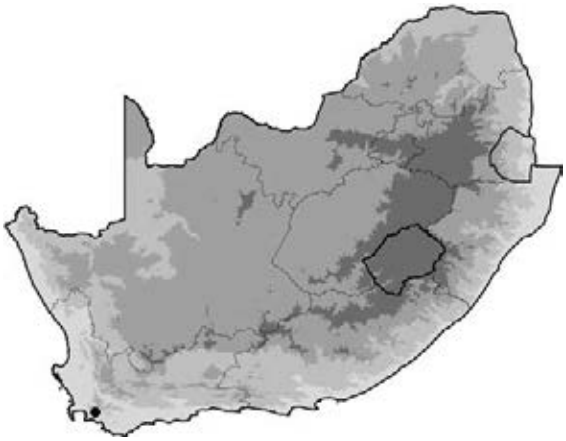
Distribution of ***Ixia pauciflora***.

also lacks the collar fibres around the stem base present in *I. pauciflora*, the stems typically have one or two branchlets, and the cataphylls are green or partly membranous when alive and not dry and brown. *Ixia reclinata* also differs in having the bracts and prophylls subtending the branchlets short and obtuse to subacute, quite different to the fine, thread-like bracts and prophylls of the remaining species of the *I. capillaris* group.

83. **Ixia reclinata** *Goldblatt & J.C.Manning* in Bothalia 38: 123 (2008b). Type: South Africa, Western Cape, Caledon, hills south of Theewaterskloof Dam, Farm Cranesfield, north of Draaiberg road, stony shale outcrops, 24 Aug. 2006, *Goldblatt, Manning & Porter 12686* (NBG, holo.; K, MO, PRE, S, iso.).

Plants 300–450 mm high. *Corm* 10–12 mm diam.; tunics of fine to medium-textured fibres. *Stem* with 1 or 2(3) short branchlets subtended by broad, obtuse to subacute bracts often with dark central vein, 2–3 mm long, exceeding prophylls. *Leaves* 3, lower 2 linear, leathery, ± 1.5 mm wide, main vein not evident when alive, when dry visible and close to abaxial margin, margins hyaline when dry; uppermost leaf entirely sheathing, reaching to shortly below first branch or with a free tip reaching middle of spike. *Spike* (1)2- or 3-flowered; branchlets 1- to 3-flowered; bracts translucent brown, 8–13 mm long, outer shortly 3-toothed, inner forked at apex. *Flowers* nodding, zygomorphic with declinate stamens, white suffused with blue-mauve, pale yellow in throat, with age veins becoming dark, faintly sweet-scented; perianth tube funnel-shaped, 13–15 mm long; tepals 16–21 × 8.5–11.0 mm, spreading, inner slightly wider than outer. *Filaments* 11–12 mm long, unilateral, exserted 8–10 mm from tube; anthers 4–5 mm long, horizontal, facing dorsal tepal. *Style* dividing just below to opposite lower ⅓ of anthers, branches 4.5–5.0 mm long. *Flowering time*: mid-August to early September.

Distribution and ecology: restricted to the low hills south of Theewaterskloof Dam near Villiersdorp in Western Cape, South Africa; one of the most threatened species in the genus with populations reduced to narrow strips of native renosterveld in rough and rocky clay ground among ploughed land and pasture.



Distribution of ***Ixia reclinata***.

Diagnosis: *Ixia reclinata* has linear leaves typical of the *I. capillaris* group but considerably larger flowers with a perianth tube up to 15 mm long and spreading tepals forming a flower ± 40 mm in diameter. The style divides just below to opposite the bases of the anthers and has branches ± 5 mm long, unusual for the complex. This contrasts with blue-mauve (or pale yellow) flowers with a tube up to 8 mm long, flower diameter of ± 20 mm, style dividing opposite the upper third of the anthers and with branches < 1.5 mm long in *I. capillaris*. The flowers of *I. reclinata* are white, suffused with blue-mauve and zygomorphic, having unilateral stamens with parallel filaments extended horizontally with the anthers held closely together and facing upward. Unilateral stamens are rare in *Ixia* but are known in *I. pauciflora* of the *I. capillaris* group, to which *I. reclinata* appears to be most closely related. In *I. pauciflora* the stems are usually unbranched, the pink flowers have filaments exserted only 2–5 mm and the style usually divides opposite the lower third of the anthers. Stems of *I. pauciflora* are typically sheathed below by a collar of fibres, a feature uncommon in *Ixia*, but also present in the *I. capillaris* group in *I. dieramoides*.

Sect. 4. **Dichone** *(Salisb. ex Baker) Goldblatt & J.C.Manning* in Bothalia 29: 63 (1999). *Tritonia* sect. *Dichone* Salisb. ex Baker: 163 (1877). *Tritonia* subg. *Dichone* (Salisb. ex Baker) Baker: 190 (1892). *Tritonixia* sect. *Dichone* (Salisb. ex Baker) Klatt: 357 (1882). *Ixia* subg. *Dichone* (Salisb. ex Baker) G.J.Lewis: 150 (1962). Type: *Ixia scillaris* L., lectotype designated by Goldblatt & Manning: 89 (2012a) [Lewis: 159 (1962) and Goldblatt & Manning: 63 (1999) listed *I. crispa* L. (or its synonym *I. erubescens* Goldblatt) as the type but only *Tritonia undulata* (with its presumed synonym *I. crispa*) and *I. scillaris* were included by Baker in the section when it was first validly described].

[*Dichone* Lawson ex Salisb.: 320 (1812), invalid name without description.]

[*Agretta* Eckl.: 23 (1827), invalid name without description.]

Corm as in *Ixia*; stolons with a terminal cormlet produced in *I. flagellaris*. *Leaves* as in *Ixia* but sometimes only two and then lower with expanded blade and upper largely to entirely sheathing. *Spike*: outer bracts with (1)3 main veins, acutely 3-toothed, 3-lobed, or

1-toothed. *Flowers* pink to magenta or mauve (rarely white), tepal bases white or yellow edged darker pink (with dark centre in *I. brevituba*); perianth tube usually relatively short, filiform below and clasping style, sometimes funnel-shaped with upper part flared. *Stamens* symmetrically disposed or unilateral and reclinate, filaments inserted at apex of narrow part of tube, filiform or flattened; anthers straight and linear to oblong or short and suborbicular with vestigial connective, thecae fully or incompletely dehiscent, then splitting from base. *Style* dividing at mouth of tube opposite or just above base of filaments, branches filiform-tubular and involute, stigmatic only at tips, straight or falcate-recurved.

Species 17: southwestern South Africa.

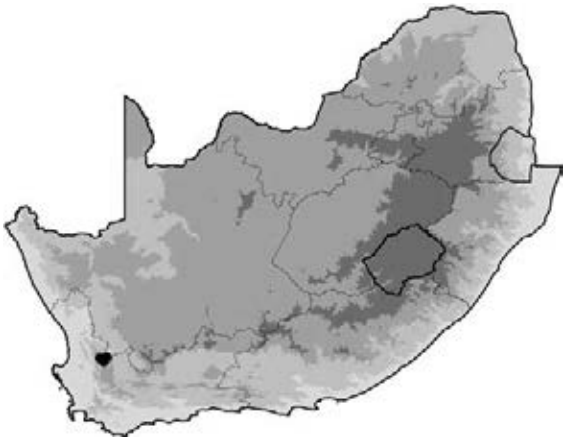
Ser. **Euanthera** *Goldblatt & J.C.Manning* in Bothalia 42: 90 (2012a). Type: *Ixia micrandra* Baker.

Plants with leaves plane, lanceolate to linear. *Flowers* sometimes nodding, blue-mauve, pink or white; perianth tube short and funnel-shaped or elongate and cylindric. *Filaments* symmetrically arranged, partly exserted; anthers longitudinally dehiscent. *Style* with branches straight or falcate.

84. **Ixia altissima** *Goldblatt & J.C.Manning* in Bothalia 42: 90 (2012a). Type: South Africa, Western Cape, Wuppertal, Gonnafontein, seep in sandstone ground among *Kniphofia*, 900 m, 5 Dec. 2005, *Pond 303* (NBG, holo.).

Plants 0.9–1.2 m high. *Corm* 15–18 mm diam.; mature tunics not known. *Stem* simple or with 1 or 2 branches subtended by translucent, attenuate bracts and prophylls up to 8 mm long. *Leaves* 4, lower 3 ± basal, reaching to ± middle of stem, blades linear to linear-sword-shaped, (3–)4–10 mm wide, firm-textured, margins and main vein and often a pair of secondary veins thickened and hyaline (at least when dry), uppermost leaf largely sheathing. *Main spike* slender, weakly flexuose, 14- to 20-flowered, lateral spikes 6- to 14-flowered; bracts dry, membranous, translucent, flecked with brown in upper half, ± 7 mm long, outer usually with 3 prominent veins and 3-toothed, inner bracts sometimes slightly shorter than outer, 2-veined and 2-toothed. *Flowers* rotate, mauve-pink; perianth tube narrowly funnel-shaped, ± 4 mm long, filiform and clasping style below, flared in distal ± 2 mm; tepals spreading, oblong-ovate, 12–13 × ± 4 mm. *Filaments* inserted at base of wide part of tube, ± 4 mm long, ± white; anthers oblong, ± 3 mm long, dehiscing fully, yellow. *Style* dividing opposite middle ⅓ of anthers, branches ± 2 mm long, falcate, tubular, arching outward between or shortly overtopping anthers. *Flowering time*: November to mid-December.

Distribution and ecology: known from two sites in the central and southern Cederberg in Western Cape, South Africa, the Matjies River Nature Reserve and Gonnafontein to the south; along streambanks or in marshy seeps on sandstone derived soil.



Distribution of ***Ixia altissima***.

Diagnosis: a tall plant, sometimes standing over 1 metre high and flowering late in the season, well into December, *Ixia altissima* has anthers with the vestigial connective and involute style branches, stigmatic only at the tips, characteristic of sect. *Dichone* but the funnel-shaped perianth tube with the filaments inserted in the middle of the upper part of the tube are unusual for the section, in which other species have the tube virtually filiform throughout. The perianth tube, only ± 4 mm long, and the pale floral bracts are reminiscent of two Roggeveld species of the section, *I. rigida* and *I. trifolia*, the former also flowering relatively late in the season, often in November. Both share with *I. altissima* relatively unspecialised, longitudinally dehiscent anthers. *Ixia altissima* seems most like *I. rigida*, also a tall plant, up to 600 mm high, which has flowers with a similarly funnel-shaped perianth tube 2–3 mm long and silvery-translucent floral bracts. This contrasts with the slightly longer perianth tube, ± 4 mm long, and shorter anthers just 3 mm long in *I. altissima*, which is also unusual in the section in having the style dividing opposite the middle of the anthers.

85. **Ixia rigida** *Goldblatt & J.C.Manning* in Bothalia 42: 91 (2012a). Type: South Africa, Northern Cape, ± 38 km north of Sutherland to Middelpos, Farm Geelhoek, rocky dolerite slope with red clay soil, 3 108 ft [950 m], 7 Sept. 2006, *Goldblatt & Porter 12796* (MO, holo.; NBG, iso.).

Plants (150–)300–600 mm high. *Corm* 12–18 mm diam.; tunics of firm, relatively hard fibres. *Stem* usually with 2 or 3 ± erect branches held close to axis, sheathed at base by firm, chestnut-brown cataphylls, combining with old corm tunics and leaf bases to form collar around base. *Leaves* (3–)5 to 7, lower (2)3 to 6 with expanded blades, sword-shaped to ± linear, (3–)5–8 mm wide, main vein, margins, and often secondary vein pairs moderately thickened, hyaline when dry, upper 1 or 2 leaves sheathing lower ⅓ to middle of stem. *Main spike* weakly flexuose, nodding in bud, mostly 8- to 15-flowered, lateral spikes with fewer flowers; bracts

membranous, silver-translucent, ± 5.5–7.0 mm long, outer with prominent brown or purple central vein and few secondary veins not reaching upper margin, acute or with 2 obscure lateral lobes, inner 2-veined and acutely 2-toothed. *Flowers* rotate, pale pink, darker at tepal bases and ± white in throat, sweetly rose-scented; perianth tube funnel-shaped, ± 2.5–3.0 mm long, filiform and clasping style in basal 1.5 mm or less, widely flared distally for up to 1 mm; tepals spreading, ovate-oblong, ± 12(–15) × 5(–7) mm, obtuse. *Filaments* ± 1.5(2.5) mm long, ± white; anthers oblong to linear, 3–4(5) mm long, slightly recurved basally, thecae subacute at base, dehiscing fully, yellow. *Style* dividing at base of filaments, branches ± straight, 2.0–3.0(3.5) mm long, ± filiform-tubular. *Flowering time*: September to mid-November.

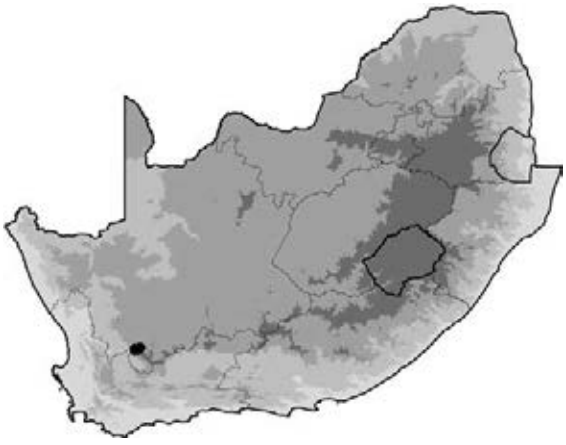
Distribution and ecology: restricted to the Roggeveld Escarpment in Northern Cape, South Africa, the Farms Fransplaas, Quaggasfontein, Uitkyk, Houdenbek and a short distance inland northwest of Sutherland on the Farm Geelhoek; on dolerite outcrops in rocky ground in the heavy red clay.

Diagnosis: *Ixia rigida* is easily recognised by the moderately tall stem up to 600 mm high with 2 or 3 upright branches held close to the axis and the silvery-translucent floral bracts subtending very short-tubed flowers, the tube up to 2.5 mm long with the narrow portion up to ± 1.5 mm long. Plants have up to seven leathery leaves with prominently thickened margins, main and secondary veins. *Ixia rigida* was until 2012 associated with *I. brevifolia*, but this is now understood to be a separate species. Although fairly uniform across its range populations inland and flowering three to four weeks earlier than those along the edge of the escarpment, thus in September, have slightly larger flowers and less fibrous leaves. The escarpment populations mostly have 6 or 7 leaves, typically 5–7 mm wide, tepals ± 12 × 5 mm, anthers ± 3 mm long, and style branches ± 2 mm long. The inland populations have 4 or 5 leaves, mostly 7–8 mm wide, tepals ± 14–16 × 6–8 mm, slightly longer filaments, anthers 4(5) mm long, and style branches ± 3.5 mm long. The bracts of the inland plants also stand out in their darker purple veins. Too little is known about *I. rigida* to assess the significance of this variation.

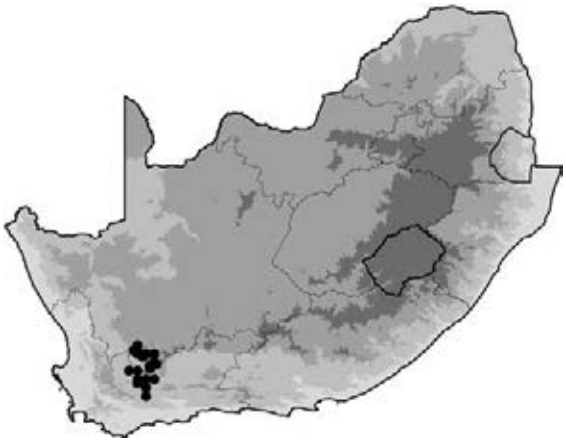
86. **Ixia trifolia** *G.J.Lewis* in Flowering Plants of South Africa 14: t. 543 (1934); Lewis: 171 (1962); Goldblatt & Manning: 92 (2012a). Type: South Africa, [Western Cape], Tweedside, cultivated in Cape Town, Sept. 1932, *Lewis s.n.* (Nat. Bot. Gard. 2706/32 in BOL, lecto., designated by Goldblatt & Manning: 91 (2012a); BOL, K, PRE, SAM, isolecto.).

Plants mostly 150–300 mm high. *Corm* mostly 10–18 mm diam.; tunics of coarse fibres, vertical members often forming claw-like ridges. *Stem* usually with 1 or 2(3) short branches, or simple. *Leaves* 3 or 4(5), lower 2 or 3 with expanded blades, lanceolate to falcate, ½–⅔ as long as stem, (2.5–)5.0–8.0(–12.0) mm wide, main vein and margins moderately thickened, upper 1(2) leaves sheathing lower ⅓–⅔ of stem, without expanded blade. *Spike* drooping in bud, weakly flexuose, mostly 3- to 7-flowered; bracts membranous, translucent, outer 5–6 mm long, with prominent central vein, sometimes with 2 prominent secondary veins, acute or trilobed, inner slightly shorter than outer, 2-veined and 2-toothed. *Flowers* rotate, pale to deep pink (rarely mauve), yellow or white edged with darker pink at base of tepals, unscented; perianth tube funnel-shaped, 3.5–4.0 mm long, filiform in basal 2.5–3.0 mm and clasping style, flared in distal 1 mm, tepals spreading, ovate-elliptic, obtuse to retuse, 12–15 × 5.0–6.5 mm. *Filaments* erect, inserted at base of wide part of tube, 3–4 mm long, free or united basally for up to 0.7 mm, filiform, ± white; anthers oblong-linear, 3–4 mm long, yellow, thecae obtuse at base, dehiscing fully. *Style* dividing between base and lower ⅓ of filaments, branches 4–5 mm long, weakly arched outward, filiform-involute, pale pink. *Flowering time*: mid-August to late September.

Distribution and ecology: extending along the Roggeveld Escarpment from the Farm Uitkyk southward through the Klein Roggeveld to the Laingsburg Karoo as far west as Tweedside, thus in southwestern Northern Cape



Distribution of ***Ixia rigida***.



Distribution of ***Ixia trifolia***.

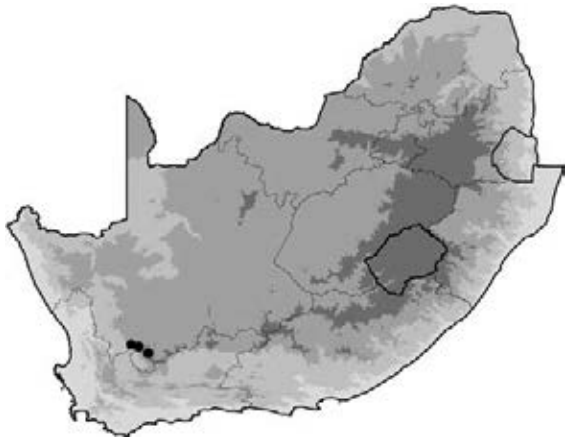
and interior Western Cape, South Africa; on stony clay ground in low, karroid scrub or mountain renosterveld.

Diagnosis: *Ixia trifolia* is recognised by the combination of two or three, relatively broad foliage leaves plus one (or two) more sheathing the stem and bright pink, rarely mauve flowers, white to yellow in the throat edged with a narrow dark pink line, always held upright on inclined spikes. Like other western Karoo species of sect. *Dichone* the style branches are slender and nearly straight and the anthers dehisce completely. A unique feature for the section, the filaments may be united basally for up to one quarter of their length and the style is exserted up to 1.5 mm from the filiform part of the perianth tube. *Ixia trifolia* is perhaps most closely allied to *I. brevituba*, which has similarly oriented, upright flowers on an inclined spike but with narrower leaves, up to 1.5 mm wide, and mauve flowers darker in the centre. Both species stand out in the section in having the spikes drooping in bud.

87. **Ixia brevituba** *G.J.Lewis* in Journal of South African Botany 28: 170 (1962, including *I. rigida*); Goldblatt & Manning: 93 (2012a). Type: South Africa, [Northern Cape], 'Quagas [sic] Pass [probably Ganagga Pass], road between Middelpos and Ceres', Sept. 1929, *Grant & Theiler 4931* (BOL, holo.).

Ixia amethystina J.C.Manning & Goldblatt: 139 (2006). Type: South Africa, Northern Cape, west of Farm Agterkop, near top of Gannaga Pass, 16 Sept. 1997, *Goldblatt & Manning 10745A* (NBG, holo.; MO, iso.).

Plants 150–300 mm high. *Corm* 12–20 mm diam., tunics of medium-textured, wiry, reticulate fibres, extending up in papery collar 30–70 mm long. *Stem* either unbranched and then with scale-like leaves at aerial nodes, or with up to 2 short branches, erect below, inclined above, sheathed at base by ± membranous, red-brown cataphylls. *Leaves* 3 or 4, basal, uppermost completely sheathing lower ⅔ of stem, blades suberect or lowermost slightly falcate, 1.5–2.0 mm wide, reaching to near top of stem, firm-textured, margins and main vein hyaline, lightly thickened. *Spike* inclined, nodding in bud, crowded, 5- to 7-flowered, branches fewer-flowered; bracts dry-membranous, translucent or flushed purple above, outer 5–7 mm long, acute or obscurely 3-dentate, inner ± as long as outer or slightly shorter, 2-veined and 2-toothed, margins united in lower 1.5 mm. *Flowers* rotate, light purple with small dark purple stain in centre, lightly scented; perianth tube ± funnel-shaped, ± 2.3 mm long, filiform below and clasping style, flaring in distal 1 mm; tepals spreading and lightly spooned distally, obovate, ± narrowed below into a short claw, 12–13 × 7–8 mm. *Filaments* inserted at apex of tube, diverging above, 2.5 mm long, blackish purple; anthers ± oblong, 4.5–5.0 mm long, blackish purple, dehiscing laterally along entire length. *Style* dividing at or slightly above bases of filaments, ± 2 mm long, branches filiform, involute, purple, falcate, 2.0–2.5 mm long. *Flowering time*: late September to early October; opening ± 08:00, even in cool, overcast conditions, closing in late afternoon.



Distribution of ***Ixia brevituba***.

Distribution and ecology: known from a small area on the edge of the Roggeveld Escarpment near Gannagga Pass southwest of Middelpos in Northern Cape, South Africa; in stony, light clay in renosterveld.

Diagnosis: *Ixia brevituba* is distinguished by its pale mauve flowers with small, dark eye, and relatively broad, blackish anthers that dehisce laterally, the light-coloured pollen then contrasting with the dark anther tissue. The style is ± as long as the filaments and the short branches 2.0–2.5 mm long scarcely project between them. The flowers are borne on inclined spikes and they face directly upward. *Ixia brevituba* falls among a small group of species that are endemic or near-endemic to the Roggeveld Escarpment and Klein Roggeveld, including *I. curvata*, *I. rigida* and *I. trifolia*, all of which share conventional longitudinally dehiscent anthers. *Ixia brevituba* appears to be most closely allied to *I. trifolia* on the basis of their distinctive, inclined spikes that are decurved and nodding when young. Other related species have spikes erect from bud to fruit. The two species also share a perianth tube 2–3 mm long but the pink (or mauve) flowers of *I. trifolia* have a pale central eye and yellow anthers. The leaves of *I. trifolia* are broader than in *I. brevituba*, (2.5–)5.0–12.0 mm wide, and the tunics are more coarsely fibrous, with the lower fibres developed into woody claws but not drawn into a collar above. In addition, the style branches of *I. trifolia* are longer than the filaments, 4–5 mm long, and project conspicuously between them.

Ixia brevituba has flowers that conform to the hopliine beetle pollination syndrome and the beetle *Kabousia axillaris* has been captured visiting the flowers.

88. **Ixia curvata** *G.J.Lewis* in Journal of South African Botany 28: 171 (1962); Goldblatt & Manning: 95 (2012a). Type: South Africa, [Northern Cape], Agterhantamsberg, Moordenaarspoort, 26 miles [± 39 km] NE of Calvinia, 25 Sept. 1952, *Lewis 3532* (SAM, holo.; BOL [as SAM 61919], PRE, iso.).

Plants 120–350 mm high, with long, chestnut-brown cataphylls and a collar of fibres at base. *Corm* 12–20 mm diam., tunics of medium-textured fibres. *Stem* simple or with 1 or 2 upright branches. *Leaves* usually 4 or 5, lower 3 or 4 with sword-shaped to falcate blades, ± ½ as long as stem and (2–)3–5 mm wide, uppermost leaf entirely sheathing, main vein and margins slightly to moderately thickened. *Spike* flexuose, 2-ranked, mostly 6- to 12-flowered; bracts membranous, translucent, outer 4–5 mm long, outer with prominent central vein or secondary veins equally prominent, 3-lobed with central lobe largest or ± equally 3-lobed, inner slightly shorter than outer, 2-veined and 2-toothed. *Flowers* nodding with tepals held vertically, deep pink (sometimes called purple), white (sometimes edged with dark pink) at base of tepals, unscented; perianth tube filiform but expanded near mouth, 3–5 mm long; tepals oblong, (8–)10–14 × 4–8 mm. *Filaments* symmetrical in bud, becoming unilateral in open flower, held horizontally at right angles to tepals, inserted at mouth of tube, filiform, 2–3(–4) mm long, white; anthers oblong-linear, 2.5–4.0 mm long, yellow, dehiscing completely. *Style* dividing between base and lower ⅓ of filaments, branches ± 2 mm long, tubular, strongly falcate. *Flowering time*: mid-August to late September.

Distribution and ecology: a fairly narrow endemic of the western Karoo in Northern Cape, South Africa, extending from the eastern end of the Hantamsberg at Moordenaars Poort northeast of Calvinia south to Middelpos on the Roggeveld Plateau; on red clay soils derived from dolerite but also found in pale clay ground.

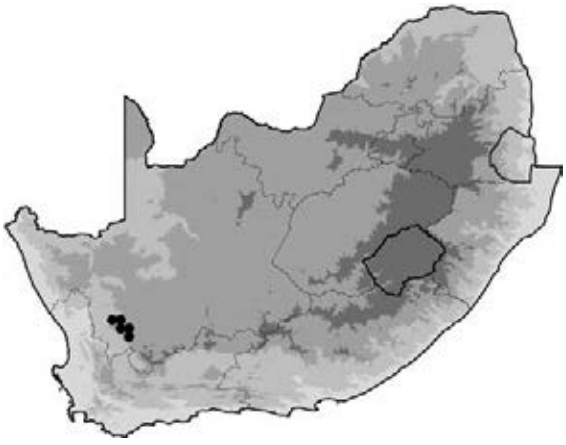
Diagnosis: relatively low growing, *Ixia curvata* is a small plant, seldom exceeding 200 mm (although taller plants are known) and has nodding, pink flowers with vertically oriented tepals with horizontal stamens. Like other members of ser. *Euanthera*, the anthers split completely. The four or five leaves are typically falcate and leathery rather than fibrous. Other species of the series have upright flowers with tepals spreading horizontally. The plants are notable for the thick collar of fibres around the base and chestnut-brown cataphylls.

89. **Ixia trinervata** *(Baker) G.J.Lewis* in Journal of South African Botany 28: 169 (1962); Goldblatt & Manning: 96 (2012a). *Tritonia trinervata* Baker: 191 (1892); Baker: 212 (1896). Type: South Africa, [Western Cape], Appelskraal, Riviersonderend, *Ecklon & Zeyher Irid. 242* (K, holo.; G, Z, iso.).

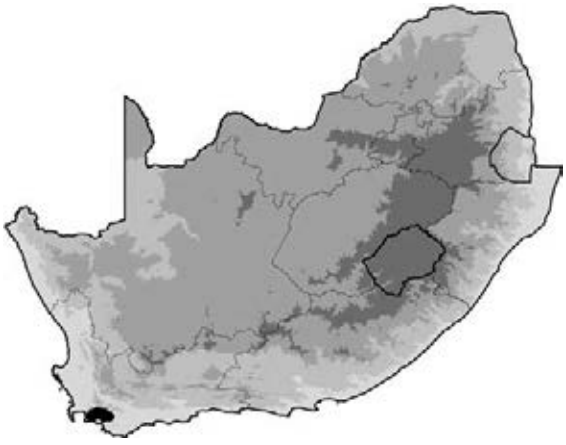
Plants 250–450 mm high. *Corm* 9–18 mm diam., tunics of firm, medium-textured, netted fibres. *Stem* usually unbranched or with a single short branch. *Leaves* 2, lower 1 ± basal, lanceolate, (4–)6–10 mm wide, conspicuously 3-veined, main vein moderately thickened, secondary veins slightly less so, margins not or barely thickened, upper leaf sheathing stem in lower ½. *Spike* flexuose, 5- to 12-flowered; bracts membranous, translucent, sometimes turning rusty brown in upper ⅓, outer 5–6 mm long, with prominent main vein and up to 6 secondary veins, 1-toothed or ± fringed, inner ± as long as outer, 2-veined and 2-toothed. *Flowers* rotate, deep rose-pink, unscented; perianth tube filiform, 4–5 mm long, clasping style; tepals spreading, ovate-elliptic, obtuse to retuse, 12–15 × 6–8 mm. *Filaments* inserted at mouth of tube, filiform, 2–4 mm long, ± white; anthers erect, suborbicular, ± 2 mm long, yellow, thecae acute, recurved at base, dehiscing almost to apex. *Style* dividing at base of filaments, branches falcate, 2.5–3.0 mm long, tubular-filiform, pale pink. *Flowering time*: September.

Distribution and ecology: a narrow endemic of the Caledon District of Western Cape, South Africa, extending from Elgin Station and the Farm Arieskraal in the west to Riviersonderend in the east; on clay soils in renosterveld, often in stony ground, flowering well after fire.

Diagnosis: *Ixia trinervata* is readily recognised by the presence of just one foliage leaf, the blade narrowly sword-shaped, mostly 6–10 mm wide, with three ± equally conspicuous veins and unthickened margins. A second leaf is largely to entirely sheathing, although relatively broad. The flowers are an intense, rose-pink also described as red-magenta. Related *I. bifolia* recalls



Distribution of ***Ixia curvata***.



Distribution of ***Ixia trinervata***.

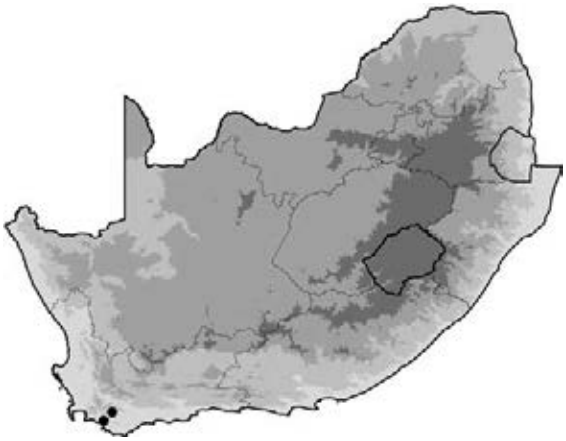
I. trinervata in its single foliage leaf, but the leaf blade is much narrower, usually only 3–5 mm wide, with a single main vein embedded in the leathery, almost succulent leaf tissue. When dry the leaf margins appear moderately thickened, unlike those of *I. trinervata*. The flowers of *I. bifolia* are slightly smaller than those of *I. trinervata* and have unusual, almost straight, deep pink style branches in marked contrast to the pale pink, falcate style branches of *I. trinervata*.

90. **Ixia bifolia** *Goldblatt & J.C.Manning* in Bothalia 42: 97 (2012a). Type: South Africa, Western Cape, Caledon, northern slopes below Shaw's Pass, Farm Treintjiesrivier, 13 Sept. 2009, *Goldblatt & Manning 13444* (NBG, holo.; MO, PRE, iso.).

Plants mostly 160–300 mm high, with dry, brown cataphylls and collar of fibres at base. *Corm* 10–12 mm diam., bearing cormlets at base; tunics of fine, soft to firm fibres. *Stem* unbranched, with short scale ± 1 mm long, inserted 12–30 mm below base of spike. *Leaves* 2, lower 1 with long sheath, blade ± lanceolate, 60–80 × 3–5(–8) mm, reaching middle of stem, leathery-succulent, main vein not raised when alive (visible as a pale line when held against light, slightly raised when dry), margins thickened, hyaline, transparent when alive, when dry appearing raised and hyaline, upper leaf largely sheathing, sometimes with short free blade similar to basal but 2–3 mm wide. *Spike* mostly 4- to 7-flowered, ± straight; bracts translucent pink with purple veins, 5–6 mm long, outer with 3 main veins terminating in acute teeth and 1 or 2 secondary veins along margins, inner 2-veined and acutely 2-toothed. *Flowers* rotate, upright, deep pink, darker toward tepal bases, rose-scented; perianth tube filiform, 5–6 mm long; tepals obovate, 12–14 × 6–7 mm. *Filaments* erect, filiform, inserted at mouth of narrow part of tube, ± 1.5 mm long, deep pink (drying purple); anthers suborbicular, 2.0–2.5 mm long, yellow, thecae obtuse basally, dehiscing completely or almost so. *Style* dividing at base of filaments, branches 3.8–4.0 mm long, deep pink (drying purple), ± straight, extending outward below anthers, bilobed at tips. *Flowering time*: mostly late August to September.

Distribution and ecology: restricted to the Caledon District of Western Cape, South Africa, recorded on the northern slopes of Shaw's Mt south of Caledon and from the lower slopes of the Swartberg east of Caledon; in hard, stony clay.

Diagnosis: *Ixia bifolia* stands out in the very short, leathery-succulent foliage leaf blade, up to 80 mm long and 5–7 mm wide. The leaf has a single vein and moderately thickened margins. The flowers seem most like those of *I. confusa* but the short, deep pink filaments ± 1.5 mm long and deep pink, straight style branches ± 4 mm long (both drying purple) are quite different from those of *I. confusa*, which has white filaments 1.3–2.5 mm long and white, strongly falcate style branches 1–2 mm long. *Ixia bifolia* is evidently closely allied to *I. trinervata*, which has larger flowers on longer spikes but also a single foliage leaf, this relatively broad and always with three prominent veins and unthickened margins. *Ixia bifolia* shares with other members of the *I. micrandra* complex the finely fibrous corm tunics that extend upward around the stem base. Stems are almost always unbranched and have an odd feature, a small, nearly microscopic, translucent scale and prophyll, ± 1 mm long, inserted 12–30 mm below the base of the spike. Stems of *I. confusa* may be branched and are normally taller than in *I. bifolia* but also have a translucent stem scale in populations from the Swartberg and sometimes elsewhere across its range. *Ixia confusa* has 3 or 4 linear leaves, usually ± 2 mm, but occasionally up to 4 mm wide.



Distribution of ***Ixia bifolia***.

91. **Ixia confusa** *(G.J.Lewis) Goldblatt & J.C.Manning* in Bothalia 42: 97 (2012a). *I. micrandra* var. *confusa* G.J.Lewis: 162 (1962). Type: South Africa, [Western Cape], Montagu, Donkerkloof, 26 Sept. 1946, *Compton 18481* (NBG, holo.; BOL, iso.).

Plants (150–)250–500 mm high. *Corm* 8–10 mm diam.; tunics of fine, soft fibres sometimes extending upward in weakly developed collar. *Stem* simple or 1-branched, often with short scale ± 1 mm long, inserted 25–40 mm below base of spike. *Leaves* (2)3(4), lower (1)2 or 3 with linear to narrowly sword-shaped blades, ± ⅓ as long to reaching top of stem, 1.5–4.0 mm wide, upper leaf largely sheathing, with short free blade. *Spike* slightly flexuose, (2–)5- to 9(–12)-flowered; bracts membranous, becoming dry from tips, 4–5 mm long, outer 1- or 3-veined, irregularly 2- or 3(–5)-lobed or shortly toothed, inner often slightly longer than outer, 2-veined and 2-toothed. *Flowers* rotate, upright, pink to light red-purple, rose-scented; perianth tube filiform, 3–4 mm long; tepals spreading, ± ovate, mostly 12–15 × 6–7 mm. *Filaments* inserted at mouth of tube, filiform, 1.0–2.8 mm long; anthers oblong, 2.0–2.3 mm long, yellow, thecae acute, recurved at base, usually dehiscing almost to apex. *Style* dividing opposite base to middle of filaments, branches 1.5–2.0 mm long, falcate, tubular with expanded ciliate,

stigmatic tips, sometimes shortly forked apically. *Flowering time*: mostly July to early December.

Distribution and ecology: widespread in Western Cape, South Africa, extending from near Elim and the Riviersonderend Mtns in the west through the Langeberg to the Outeniqua Mtns and inland in the Great Swartberg from Swartberg Pass east to Blesberg; mostly on moist S-facing slopes in loamy clay or sandy ground in renosterveld–thicket transition vegetation or fynbos, flowering well after fire and also in unburned veld.

Diagnosis: *Ixia confusa* is recognised by the spikes mostly with 5 to 9 small pink flowers with a perianth tube 3–4 mm long and tepals 12–15 mm long and narrow, plane leaves up to 4 mm wide. Both *I. micrandra* and closely related *I. minor* have terete to subterete or linear leaves mostly 1.0–1.5 mm at widest, and spikes of 2 to 4, rarely up to 6 flowers. *Ixia micrandra* has anthers 3–4 mm long, and slender, ± straight, ascending style branches 3–4 mm long, thus quite different from the shorter anthers, ± 1.0–2.5 mm long, and falcate style branches 1.5–2.5 mm long of *I. confusa*. The falcate style branches of *I. confusa* match those of *I. minor* but the terete or subterete leaf blades, flattened filaments and consistently few-flowered spikes of the latter immediately separate them. Leaf number is variable in *I. confusa*, usually three but sometimes two or four, whereas *I. micrandra* and *I. minor* always have two leaves.

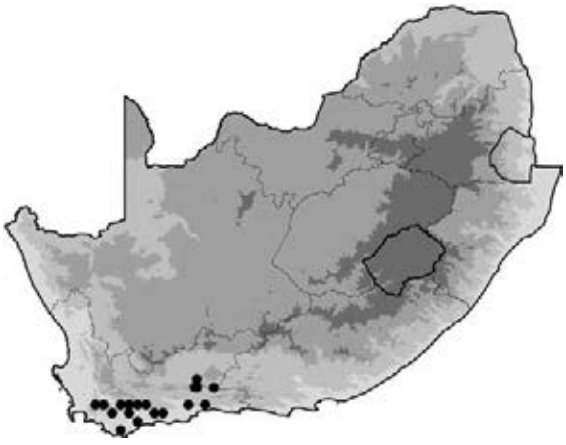
Ixia confusa may also be confused with *I. bifolia* but this species has a single, relatively broad, leathery-succulent foliage leaf and flowers with shorter filaments ± 1 mm long, and longer, straight style branches ± 4 mm long. Both the filaments and style branches of *I. bifolia* are dark pink and dry dark purple, unlike the pale filaments and style branches of *I. confusa*, which dry to a pale, almost colourless state.

Populations of *Ixia confusa* in the Swartberg stand out in having slightly shorter filaments, 1–2 mm long, than typical *I. confusa* (up to 2.8 mm long), the style sometimes dividing above the mouth of the perianth tube, often opposite the middle of the filaments, and anther dehiscence sometimes not reaching the middle of the thecae. The plants have a small, translucent scale and prophyll on the upper part of the stem, a feature occasionally present in southern populations. Additional study may show that the later-flowering Swartberg populations merit separate taxonomic status.

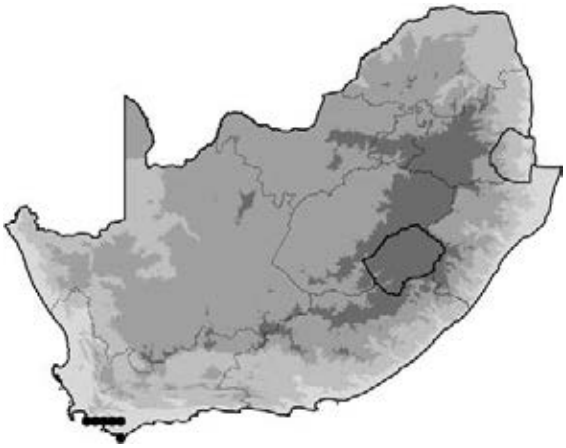
92. **Ixia micrandra** *Baker* in Journal of Botany, British and foreign 5: 237 (1876); Baker: 78 (1896); Lewis: 159 (1962, including *I. confusa* and *I. minor*); Goldblatt & Manning: 99 (2012a). Type: South Africa, [Western Cape], Houw Hoek Mtns, July 1830, *Zeyher 4011* (K, lecto., designated by Lewis: 161 (1962); PRE, SAM, S, Z, isolecto.).

Plants 250–350 mm high. *Corm* 9–18 mm diam., tunics of fine fibres extending upward as a collar. *Stem* slender, unbranched. *Leaves* 2, lower 1 ± basal, linear, (0.5–)1.0–1.5(–2.0) mm wide, margins and main vein slightly thickened, hyaline when dry, upper leaf sheathing stem in lower ½–⅔, apex free for up to 100 mm. *Spike* ± straight, (1)2- to 4(–6)-flowered; bracts membranous, translucent, sometimes suffused with purple distally, outer 5–7 mm long, prominently 3-veined, usually with secondary veins evident, acutely 3-toothed, sometimes central tooth smaller, inner ± as long or slightly longer, 2-veined and 2-toothed. *Flowers* rotate, pale pink to mauve-pink; perianth tube filiform, 3–4 mm long, clasping style; tepals spreading, ovate-elliptic, 12–15 × 4–6 mm. *Filaments* inserted at mouth of tube, linear, straight, 0.6–1.8(–2.5) mm long, ± pale pink; anthers oblong, 2.0–2.6 mm long, erect, yellow, thecae slightly recurved basally, dehiscing completely. *Style* dividing at or shortly above base of filaments, branches ± straight, diverging or slightly arched, 2.0–5.0 mm long, usually longer than stamens, filiform-involute, sometimes forked at apex, pale pink. *Flowering time*: mostly late July to early September, occasionally later.

Distribution and ecology: restricted to southern Western Cape, South Africa, from Houw Hoek to Bredasdorp and



Distribution of ***Ixia confusa***.



Distribution of ***Ixia micrandra***.

De Hoop; mainly montane and typically on sandstone slopes and flowering well only in seasons immediately after veld fires, also in sandy ground over limestone.

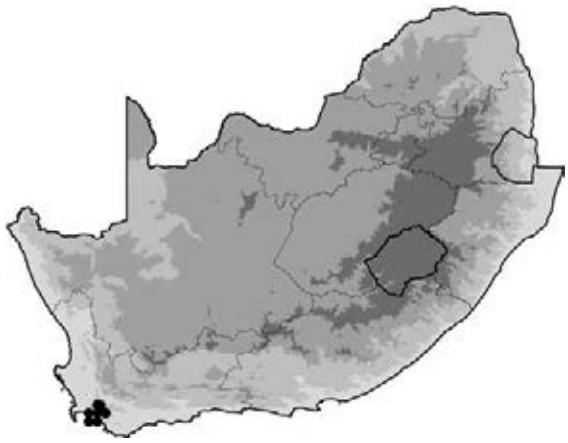
Diagnosis: *Ixia micrandra* is immediately recognised by its solitary long, narrow foliage leaf, mostly 1.0–2.0 mm long, almost linear filaments, and unusually long style branches 2.0–3.5 mm long either straight or slightly arched, extending between the bases of the anthers. *Ixia confusa* has similarly slender but somewhat shorter filaments, slightly shorter anthers, and shorter, strongly arched style branches, 1.5–2.0 mm long. The leaves of *I. confusa* have plane, usually wider blades up to 4 mm wide (vs. 0.5–1.5(–2.0) mm) and without the prominently thickened main vein of *I. micrandra*. The style branches are similarly strongly arched in *I. minor* but that species has unusual flattened, lanceolate filaments, narrowed and kinked at the tips. The ranges of *I. micrandra* and *I. minor* are almost complementary, that of *I. micrandra* extending east of *I. minor*, but the two have been collected in flower on the same day in the Houw Hoek Mtns, where their distributions overlap.

93. **Ixia minor** *(G.J.Lewis) Goldblatt & J.C.Manning* in Bothalia 42: 100 (2012a). *I. micrandra* var. *minor* G.J.Lewis: 162 (1962). Type: South Africa, [Western Cape], Hottentots Holland Mtns, 10 Sept. 1928, *J. Hutchinson 481* (BOL, holo.; K, PRE, iso.).

Plants 200–300 mm high, with membranous to dry, brown cataphylls at base. *Corm* 8–10 mm diam., tunics of fine fibres extending upward as a collar, often in a thick mass. *Stem* unbranched. *Leaves* 2, lower 1 ± basal, largest, terete or oval in section, up to 1 mm diam., main vein evident only when dry, upper leaf sheathing stem in lower ½–⅔, with short free blade. *Spike* straight, mostly 2- to 4-flowered, bracts membranous, translucent, usually flushed purple, outer 5–7 mm long, usually prominently 3-veined, shallowly 3-lobed to acutely 3-toothed, inner ± as long as or slightly longer than outer, 2-veined and 2-lobed or 2-toothed. *Flowers* rotate, bright pink to mauve-pink; perianth tube filiform, 3–5 mm long, clasping style; tepals spreading, ovate-elliptic, 12–14 × 5–6 mm. *Filaments* inserted at mouth of tube, flattened, ± oblanceolate but narrowed and kinked at tips, ± white, 1.0(–1.5) mm long; anthers ovoid, ± 1.0 mm long, yellow, abruptly incurved near base, dehiscing fully, often more widely at base, yellow. *Style* dividing opposite base to middle of filaments, branches 2–3 mm long, involute, tubular-falcate, ± compressed, narrowed at tips. *Flowering time*: late July to mid-September, rarely later.

Distribution and ecology: a narrow endemic of the southwestern corner of Western Cape, South Africa, extending from Franschhoek Pass and the Wemmershoek Mtns south through the Hottentots Holland to Houw Hoek and Kogelberg; on stony sandstone slopes.

Diagnosis: like *Ixia micrandra, I. minor* has a slender, usually unbranched stem, small corms with fine, netted tunics that extend upward in a collar around the base, and a dry, often brown, upper cataphyll. The critical



Distribution of ***Ixia minor***.

differences between the two species lie in their flowers. *Ixia minor* has flattened, ± wedge-shaped to oblanceolate filaments abruptly narrowed and kinked at the tips, and shorter and broader anthers, often not dehiscing to the apex. The style branches are also shorter, 2–3 mm long, wider, and strongly arched whereas those of *I. micrandra* are more-or-less straight and (2)3–5 mm long. To these microscopic details can be added a brighter pink perianth. Flowers of *I. micrandra* have pale pink to purple-pink tepals, straight, filiform filaments and longer, oblong anthers dehiscing to the apex. The leaves of the two species also differ somewhat: those of *I. minor* are subterete to oval in section, thus when alive without margins or evident central vein, whereas *I. micrandra* has plane, linear leaf blades with slightly thickened margins and, when dry, a visibly raised main vein. Evidence for their separation is provided by collections of both species made in the Houw Hoek Mtns flowering on the same date and visibly different in appearance.

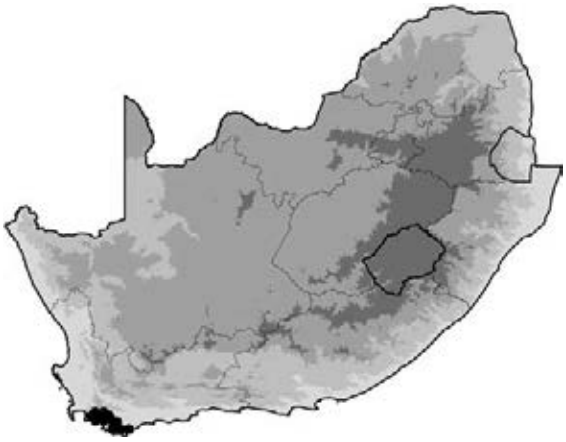
Ser. **Dichone** *Goldblatt & J.C.Manning*, new series. Type: *Ixia scillaris*.

Flowers upright or nodding, radially symmetric (*I. stricta*) or zygomorphic. *Filaments* symmetrically arranged (*I. stricta*) or unilateral and horizontal to pendent; anthers oblong, recurved and acute at base, dehiscing incompletely from base. *Style* with branches always falcate.

94. **Ixia stricta** *(Eckl. ex Klatt) G.J.Lewis* in Journal of South African Botany 28: 167 (1962); Goldblatt & Manning: 101 (2012a). *Tritonixia stricta* Eckl. ex Klatt: 357 (1882). *Tritonia scillaris* var. *stricta* (Eckl. ex Klatt) Baker: 191 (1892). Type: Western Cape, Caledon, Swartberg and vicinity of the Baths, December 1830, *Zeyher 4008* (SAM, lecto., designated by Lewis: 162 (1962); K, PRE, isolecto.).

[*Agretta stricta* Eckl.: 23 (1827), invalid name without description.]

Plants to 200–450 mm high. *Corm* mostly ± 10–15 mm diam.; tunics of medium-textured, shaggy fibres. *Stem*



Distribution of ***Ixia stricta***.

simple or with 1 or 2 ± erect branches subtended by acute, translucent bracts and prophylls. *Leaves* (3)4 or 5, often ± dry at flowering, all basal, lower 2 or 3 ± sword-shaped, plane, 2–5 mm wide, upper 1 or 2 sheathing stem in lower ½–⅔, free distally for short distance, margins and main vein thickened (hyaline when dry). *Spike* flexuose, 6- to 12(–18)-flowered, bracts membranous, translucent, outer 5–6 mm long, usually with 1 prominent vein, and 1-toothed, inner ± as long or slightly shorter or longer, 2-veined and 2-toothed. *Flowers* rotate, pink to purple, pale yellow edged with darker pink at tepal bases, sweetly scented; perianth tube filiform, 4–5 mm long, clasping style; tepals spreading, obovate, ± obtuse, ± 10 × 4–5 mm. *Filaments* 1.0–1.5 mm long, white; anthers oblong, ± 2 mm long, erect, yellow, thecae acute and slightly recurved at base, dehiscing near base. *Style* dividing opposite base of filaments, branches arching outward, ± 1.5 mm long, falcate, tubular, pale pink. *Flowering time*: November to mid-December.

Distribution and ecology: restricted to the Caledon–Bredasdorp area of Western Cape, South Africa, extending from the Houw Hoek Mtns east to Bredasdorp; mostly in montane habitats, usually at fairly low elevations, in sandstone and loamy clay soils.

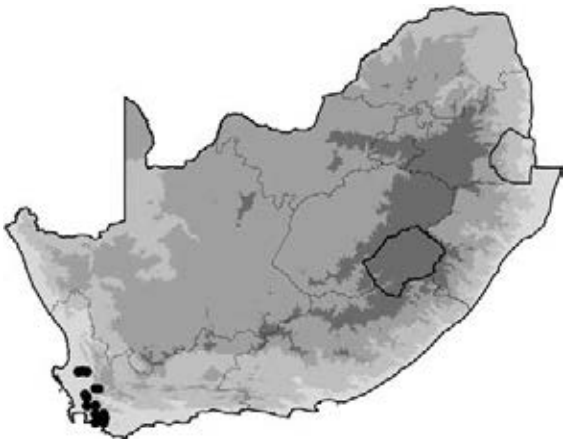
Diagnosis: typically flowering late in the year, in November and December, the foliage of *Ixia stricta* is often more-or-less dry at flowering. Not particularly distinctive, the pink flowers are radially symmetric and have short, erect stamens. It is identified in ser. *Dichone* by a combination of the rotate flowers and a basal fan of (3)4 or 5 sword-shaped leaves with a prominent main vein and thickened margins. The sweetly scented flowers have a filiform tube about half as long as the tepals and particularly short style branches ± 1.5 mm long.

95. **Ixia erubescens** *Goldblatt* in Journal of South African Botany 37: 233 (1971), as a new name for *I. crispa* L.f.: 91 (1782), illegitimate superfluous name for *I. undulata* Burm.f. (1768). *Agretta crispa* Eckl.: 24 (1827), illegitimate name. *Tritonia thunbergii* N.E.Br.: 137 (1929), new name for *I. crispa* in *Tritonia* [not *T. crispa* (L.f.) Ker Gawl.; not *I. thunbergii* Roem. & Schult.]. Type: South Africa without precise locality, *Thunberg s.n.* [LINN 58.25, lecto., designated by Lewis: 173 (1962)].

Plants 120–300 mm high, usually forming clumps. *Corm* mostly 5–8 mm diam.; tunics of fine fibres, usually with large cormlets at base. *Stem* simple, rarely 1-branched. *Leaves* 4 to 6, ± lanceolate, all basal, ± ¼–⅓ as long as stem, 2–4(–6) mm wide, main vein well developed, margins or half blades crisped and deeply undulate. *Spike* lax, secund, weakly flexuose, mostly 6- to 10-flowered; bracts mostly green, ± translucent at tips, turning purple along distal margins, 3–4 mm long, outer with 3 acute-attenuate cusps, obscurely 3-veined, inner 2-veined and acutely 2-toothed. *Flowers* zygomorphic with stamens unilateral, nodding with tepals held ± vertically, pink, yellow-green in throat edged with dark purple at tepal bases, unscented; perianth tube filiform, 2–3 mm long, tightly clasping style; tepals ovate, spreading ± at right angles to tube, 8–11 × 4–6 mm, outer tepals slightly narrower than inner. *Filaments* unilateral, ± 2 mm long, greenish white (drying yellow); anthers oblong, 2.0–2.5 mm long, yellow, parallel and horizontal, becoming slightly pendent, thecae acute, recurved at base, dehiscing incompletely by a narrow slit at base, yellow. *Style* dividing at base of filaments, branches 1.5–2.0 mm long, greenish white, falcate, recurved in distal third, tubular. *Flowering time*: mainly mid-August to mid-September.

Distribution and ecology: restricted to southwestern Western Cape, South Africa, extending from Piketberg and Tulbagh south to Stellenbosch and the Caledon District as far east as Franskraal but absent from the Cape Peninsula; mostly on heavy clay or granitic alluvium in seasonally damp places, flowering especially well after fire.

Diagnosis: a relatively small plant, *Ixia erubescens* is immediately recognised by the fine corm tunic fibres,



Distribution of ***Ixia erubescens***.

4 to 6 narrow leaves with deeply undulate and crisped margins, usually unbranched stem, nodding, pink flowers with vertically oriented tepals and the stamens unilateral and slightly pendent when fully open. *Ixia erubescens* is evidently closely allied to *I. scillaris*, which typically has medium to coarse corm tunic fibres, broader leaves, usually with plane margins, and somewhat to substantially larger flowers, also with unilateral stamens, but with a perianth tube up to 4.5 mm long and tepals up to 14 mm long (vs. tube 2–3 mm long and tepals 11–12 mm long). Occasional populations of *I. scillaris* with undulate or crisped leaves are readily distinguished from *I. erubescens* by their broader leaves, larger flowers, and coarser corm tunic fibres.

96. **Ixia scillaris** *L.*, Species plantarum, edn. 2, 1: 52 (1762); Lewis: 173 (1962); Goldblatt & Manning: 102 (2012a). *Tritonia scillaris* (L.) Baker: 163 (1877). *Tritonixia scillaris* (L.) Klatt: 357 (1882). Type: South Africa, without precise locality of collector [LINN 58.25, lecto., designated by Lewis: 174 (1962)].

Plants mostly 250–500 mm high. *Corm* 10–15 mm diam., with cormlets at base, especially numerous in subsp. *toximontana*; tunics of medium-textured to coarse fibres. *Stem* often with 1 or 2, rarely up to 6, branches, occasionally simple. *Leaves* 3 to 7, mostly in basal fan, ⅓–½ as long as stem, lanceolate or falcate, (3–)6–20 mm wide, main and sometimes additional veins raised but not thickened, margins markedly thickened in subsp. *toximontana*, occasionally undulate(–crisped) in subsp. *scillaris*. *Spike* erect, fairly lax, flexuose to ± straight, secund in 2 ranks, mostly 10- to 20-flowered; bracts membranous, translucent, sometimes turning purple distally, 3–5 mm long, outer prominently 3-veined and 3-toothed, inner 2-veined and 2-toothed. *Flowers* ± nodding with tepals held vertically with lowermost slightly reflexed, zygomorphic with stamens unilateral, bright to pale pink, occasionally white, tepal bases yellow or white edged in darker pink, lightly rose-scented or unscented; perianth tube filiform, 2.5–4.0 mm long, tightly clasping style; tepals ovate-elliptic, (8–)10–15 × 5–9 mm, inner 3 slightly larger than outer, lowermost tepal held apart. *Filaments* unilateral, inserted at mouth of tube, 1.6–3.5 mm long, arching upward near tips, white to pale yellow; anthers oblong-linear, 2.3–4.0 mm long, parallel, horizontal or slightly pendent, thecae recurved, acute at base, dehiscing incompletely from base, yellow. *Style* dividing ± opposite base of filaments, branches ± 1.5 mm long, pale yellow, falcate, tubular. *Flowering time*: mainly mid-August to mid-October, occasionally later.

Distribution and ecology: relatively widespread along the Atlantic Coast and near interior of Western Cape, South Africa, extending from the Cape Peninsula north to the Gifberg and Koebee Mtns, along the coastal plain and mountains as far inland as the Cederberg and the Pakhuis–Nardouw Mtns, with isolated populations in the Spektakel Mtns in Northern Cape; on a variety of soils but most commonly on heavier clays derived from shale or granite.

Diagnosis: the most common and widespread species of sect. *Dichone*, *Ixia scillaris* is recognised primarily by the nodding flowers with vertically oriented tepals and unilateral, slightly pendent and often relatively long anthers, combined with a fan of 3 to 7 basal leaves, (3–)6–20 mm wide. Related *I. erubescens* has narrow, ± falcate leaves, 2–4(–6) mm wide, with closely crisped margins, and is a smaller plant with smaller flowers, the tepals 8–11 × 4–6 mm and anthers 2.0–2.5 mm long vs. tepals mostly 10–15 × 5–9 mm and anthers 3–4 mm long in *I. scillaris*. Apparently closely allied *I. simulans*, with half to fully nodding flowers and unilateral stamens with pendent anthers, has a single basal, ± linear foliage leaf and a second leaf sheathing the stem for most of its length.

Three subspecies are recognised: subsp. *scillaris* from Darling and Tulbagh to the Cape Peninsula has (4)5 to 7 relatively narrow leaves, mostly 5–8 mm wide, with 3 to 5 secondary veins conspicuous only when dry, mostly branched stems (rarely with up to 7 branches), and moderately dense spikes with flowers spaced 8–12 mm apart. The flowers are relatively small, with tepals 8–10 × 4–5 mm and ± symmetrically arranged, although the lowermost tepal is held slightly apart and recurved, and anthers 2.0–2.8 mm long. In contrast, subsp. *lata* (a new name for the homonym subsp. *latifolia*) from the Olifants River Valley and low elevations in the Cederberg, Bokkeveld and Spektakel Mtns are always taller, with 2 to 4, broader leaves mostly 15–20 mm wide, usually with at least two conspicuous secondary veins in addition to the main vein, stems simple or with 1(2) branches, and lax spikes with flowers distantly spaced, 15–25 mm apart. The flowers are larger, with tepals 14–16 × 5–9 mm, the upper tepals overlapping and separated from the three lower tepals, and anthers 3.2–4.0 mm long. A third subspecies, subsp. *toximontana* occurs on the Gifberg–Matsikamma Mt complex and comprises small plants, seldom exceeding 20 mm in height, with small flowers (tepals ± 8 × ± 4 mm, anthers ± 2 mm long), thus like subsp. *scillaris* but with just three leaves (rarely two in depauperate individuals).

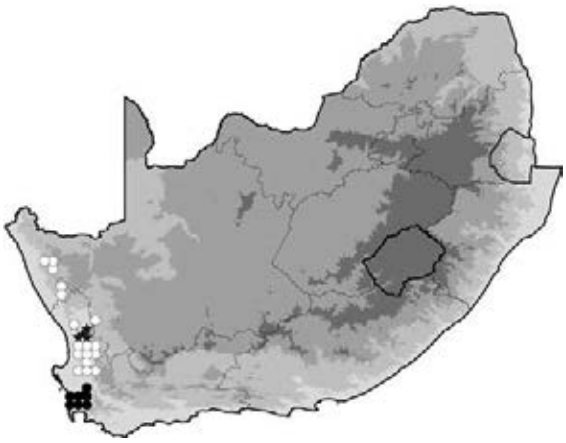
Key to subspecies

1a Leaves (4)5 to 7, lower two up to 10 mm wide, usually lanceolate and lacking submarginal veins (margins rarely undulate); tepals 8–10 × 4–5 mm; anthers 2.0–3.5 mm long . . . . . 96a. subsp. *scillaris*

1b Leaves 2 to 4, lower two 3–25 mm wide, usually ± falcate, sometimes with pair of prominent secondary veins, these often submarginal (margins sometimes undulate to crisped, then without prominent secondary veins); tepals 8–15 × 4–9 mm; anthers 2–4 mm long:

2a Leaves (9–)12–25 mm wide; tepals 10–15 × 5–9 mm; anthers mostly 3–4 mm long . . . . . 96b. subsp. *lata*

2b Leaves 3–8 mm wide; tepals ± 8 × 4 mm; anthers 1.6–2.5 mm long. . . . . 96c. subsp. *toximontana*



Distribution of ***Ixia scillaris*** subsp. ***scillaris***, ●; subsp. ***lata***, ○; subsp. ***toximontana***, ★.

96a. subsp. **scillaris**

Gladiolus ramosus L.: 37 (1753) [not *Ixia ramosa* Ker Gawl. (1802) = *Geissorhiza scillaris* A. Dietr.]. *Melasphaerula ramosa* (L.) Klatt: 203 (1894). Type: South Africa, without precise locality or collector, ex hort. Leiden, *A. van Royen s.n.* (L: Herb. Royen, holo. – digital image).

Ixia pentandra L.f.: 92 (1782). *Agretta pentandra* (L.f.) Eckl.: 23 (1827). Type: South Africa, [Western Cape], near Groene Kloof, without date, *Thunberg s.n.* (UPS-THUNB, holo.).

Plants mostly 15–35 mm high, stem usually branched, sometimes with up to 6 branches. *Corm* mostly 12–14 mm diam. *Leaves* 5 to 7, lanceolate to sword-shaped or subfalcate, margins sometimes undulate, 5–8 mm wide, upper leaves progressively smaller than lower. *Spike* mostly 10- to 15-flowered, flowers mostly 6–12 mm apart; bracts 3.5–4.8 mm long. *Flowers* pale to deep pink, darker at base of tepals, not pale in throat; perianth tube 2.5–4.0 mm long; tepals subequal, upper 5 tepals overlapping and evenly disposed with lower laterals extended horizontally, lowermost held apart, directed forward above base and then downward, 8–10 × 4–5 mm, inner narrower than outer. *Filaments* 1.5–2.0 mm long; anthers mostly 2–3 mm long. *Flowering time*: mainly mid-September to late October (rarely in late August).

Distribution and ecology: restricted to the southwestern corner of Western Cape, recorded from Tulbagh and Darling to the Cape Peninsula and Somerset West; mainly on granite-derived sandy gravels.

Diagnosis: subsp. *scillaris* can be distinguished by the several, (4)5 to 7, leaves mostly 5–8 mm wide, in which only the main vein is prominent when fresh. The flowers are slightly smaller than in subsp. *lata*, with tepals 8–10 × 4–5 mm, the lowermost slightly recurved and held separate from the upper five. The anthers are also slightly smaller than in subsp. *lata*, 2–3 mm vs. mostly 3–4 mm long.

96b. subsp. **lata** *Goldblatt & J.C.Manning*, new name for subsp. *latifolia* Goldblatt & J.C.Manning in Bothalia 42: 105 (2012a), illegitimate homonym, not *I. scillaris* var. *latifolia* Ker Gawl. (1801). Type: South Africa, Western Cape, Cederberg, Nieuwoudt Pass, burned slopes, *Goldblatt & Porter 13475* (NBG, holo.; K, MO, PRE, iso.).

Ixia reflexa Andrews: t. 14 (1797). *I. rotata* [Ker Gawl.] in Andrews: 3 (1801c), illegitimate superfluous name for *I. reflexa* Andrews. Type: South Africa, without precise locality, cultivated in Great Britain by Messrs. Lee & Kennedy and sent to them by J. Pringle but possibly collected by F. Masson or W. Paterson, illustration in Andrews: t. 14 (1797).

Ixia polystachya var. *incarnata* Andrews: t. 128 (1800). Type: South Africa, without precise locality, cultivated in Great Britain by Messrs. Lee & Kennedy and sent to them by J. Pringle but possibly collected by Francis Masson or William Paterson, illustration in Andrews: t. 128 (1800).

Ixia scillaris var. *angustifolia* Ker Gawl. in Sims: sub t. 542 (1801), illegitimate superfluous name including type of *I. polystachya* var. *incarnata* Andrews. Type: not designated, two illustrations cited.

Ixia scillaris var. *latifolia* Ker Gawl. in Sims: t. 542 (1801). Type: South Africa, without precise locality, cultivated in Great Britain, *Masson s.n.*, illustration in Sims: t. 542 (1801).

Ixia scillaris var. *subundulata* G.J.Lewis: 177 (1962). Type: South Africa, Western Cape, Klipfonteinrand, 13 Sept. 1947, *Barker 4727* (NBG, holo.; BOL, iso.).

Plants mostly 300–500 mm high, stem simple or with 1 or 2(3) branches. *Corm* mostly 14–20 mm diam. *Leaves* 3 or 4, sometimes an additional leaf present at base of a branch, lower 2 or 3 broadly falcate, (9–)12–25 mm wide, usually with pair of conspicuous secondary veins and often well-developed submarginal vein, upper leaf/leaves smaller, margins plane or undulate, then without well-developed secondary veins. *Spike* mostly 15- to 20-flowered, flowers mostly 14–20 mm apart; bracts 4–5 mm long. *Flowers* pale to deep pink or white, then flushed pale pink near tepal bases; perianth tube 3.5–4.0 mm long; tepals subequal, upper 3 held close together, lowermost held slightly apart arched backward, 10–15 × 5–9 mm. *Filaments* 2.0–3.5 mm long, broader at base; anthers 3–4 mm long. *Style branches* ± 2.5 mm long, almost reaching anther bases. *Flowering time*: mainly mid-August to mid-September, rarely to early October at higher elevations).

Distribution and ecology: centred in the Olifants River Valley in Western Cape extending to lower elevations on the surrounding Cederberg, Pakhuis–Biedouw Mtns,

also local in the Bokkeveld Mtns and with isolated populations on the Spektakel Mtns of Northern Cape; mainly in rocky habitats in sandy ground, flowering well after fire or clearing of vegetation.

Diagnosis: subsp. *lata* is distinguished by the presence of three or four leaves and by the relatively larger flowers, the tepals 10–15 × 5–9 mm and anthers 3–4 mm long (vs. tepals 8–10 × 4–5 mm and anthers 2–3 m long in other subspecies). The upper three tepals are held more closely together than the lower three and the lowermost is conspicuously recurved. Variation in leaf morphology in subsp. *lata* is notable. Plants from Clanwilliam and nearby have a conspicuous submarginal vein, but those from elsewhere have a prominent secondary vein pair distant from the margins, and plants from the Spektakel Mtns of Namaqualand show no prominent secondary veins and appear thinner in texture. No other feature seems to set the Spektakel population apart. Populations east of the Pakhuis–Nardouw Mtns have leaf margins slightly to markedly undulate and without conspicuous veins apart from the main vein.

96c. subsp. **toximontana** *Goldblatt & J.C.Manning* in Bothalia 42: 106 (2012a). Type: South Africa, Western Cape, Gifberg, summit plateau in sandy ground over rocky pavement, common after fire, 1 Nov. 2011, *Goldblatt & Porter 13703* (NBG, holo.; K, MO, PRE, iso.).

Plants 120–250 mm high. *Corms* globose-conic, mostly 15–18 mm at widest diam., bearing conspicuous cormlets at base; tunics of hard, coarse fibres. *Stem* simple or with 1 or 2, rarely 3 branches. *Leaves* (2)3(4), all ± basal, mostly 3–8 mm wide, with main vein and secondary pair of veins hyaline when alive, raised when dry, margins appearing thickened when dry. *Spike* mostly 10- to 15-flowered, flowers mostly 8–12 mm apart; bracts 3–4 mm long. *Flowers* opening pale pink turning deep pink next day, tepal bases yellow edged dark pink, throat pale yellow; perianth tube ± 3 mm long; tepals subequal, ± 8 × 4 mm lowermost held slightly apart and arched backward. *Filaments* 1.0–1.6 mm long; anthers 1.6–2.5 mm long. *Style branches* ± 1.5 mm long, almost reaching anther bases. *Flowering time*: late September to mid-November.

Distribution and ecology: restricted to the Gifberg and Matsikamma Mtn complex of northern Western Cape; in shallow, sandy ground overlying sandstone pavement.

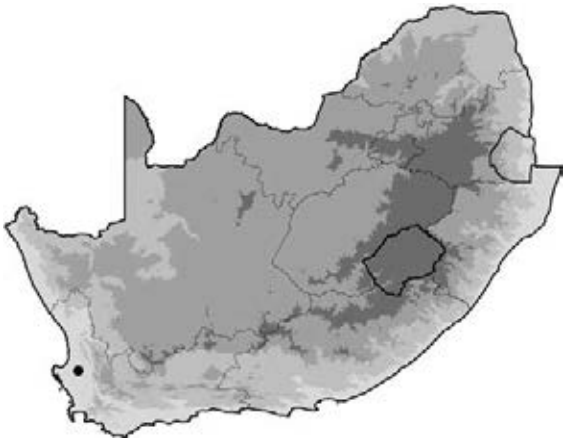
Diagnosis: subsp. *toximontana* is distinguished in *Ixia scillaris* by its low stature, seldom exceeding 150 mm, combined with relatively small flowers and only 2 or 3 leaves, these short and relatively narrow, 3–8 mm wide. The flowers have tepals ± 8 × 4 mm and anthers ± 2.3 mm long, smaller than in subsp. *lata* or subsp. *scillaris*. In their small size they recall subsp. *scillaris* rather than subsp. *lata*, in whose range it is nested.

97. **Ixia tenuis** *Goldblatt & J.C.Manning* in Bothalia 42: 106 (2012a). Type: South Africa, Western Cape, Piketberg, Farm Noupoort, in wet mossy seeps on sandstone rocks, 2 Nov. 2011, *Goldblatt & Porter 13710* (NBG, holo.; K, MO, PRE, iso.).

Plants slender, 180–350 mm high. *Corms* globose, 7–10 mm diam.; tunics of fine fibres. *Stem* simple or rarely 1-branched. *Leaves* mostly (2)3, occasionally 4 but then uppermost very small, ± linear to narrowly sword-shaped, ¼–½ as long as stem, mostly 1.5–3.0 mm wide, relatively soft-textured, pale grey-green, when alive main vein slightly raised (appearing thickened when dry), margins not raised (rarely undulate, then blade up to 5 mm wide). *Spike* mostly 4- to 10-flowered, flowers mostly 10–15 mm apart; bracts 2–3 mm long. *Flowers* nodding, deep magenta with tepal bases yellow edged with darker magenta (or pale pink or white, throat pale yellow); perianth tube 3.0–3.5 mm long, expanded in upper 1 mm; tepals 8–9 × 4–5 mm, oriented vertically with lowermost tepals recurved. *Filaments* unilateral, ± 2 mm long; anthers 2.0–2.5 mm long, parallel. *Style* with branches ± 1 mm long, reaching to ± middle of filaments. *Flowering time*: mid-October to mid-November.

Distribution and ecology: restricted to the Piketberg Mtns in Western Cape, South Africa, mostly at elevations of 650–800 m; on rocky sandstone slopes, often in wet moss pads.

Diagnosis: *Ixia tenuis* is distinguished from the widespread *I. scillaris* by its very slender habit, the stems rarely branched, usually three, narrow leaves, mostly 1.5–3.0 mm wide, and relatively small flowers with tepals 8–9 × 4–5 mm and anthers 2.0–2.5 mm long. The corms are also relatively small, mostly less than 10 mm in diameter and with relatively fine tunic fibres. Corms of *I. scillaris* are larger, typically 12–18 (rarely only 10) mm in diameter, with relatively coarse tunic fibres, and the species has broader leaves, mostly 8–25 mm wide. Provisionally collections from De Hoek



Distribution of ***Ixia tenuis***.

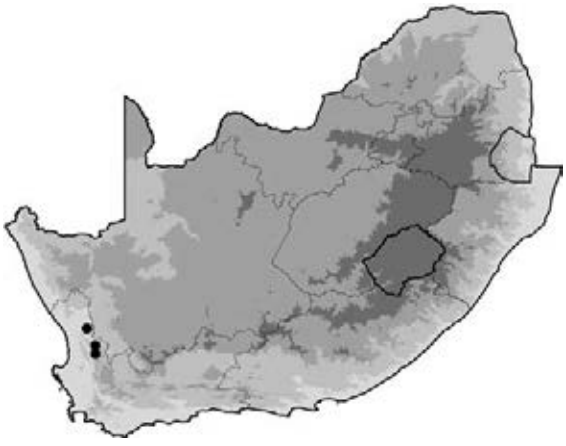
at the southern end of the Piketberg and flowering in September are included here. These plants have slightly broader but shorter leaves than typical *I. tenuis* and have undulate margins.

98. **Ixia flagellaris** *Goldblatt & J.C.Manning* in Bothalia 42: 107 (2012a). Type: South Africa, [Western Cape], Wuppertal, Heuningvlei, Groot Koupoort, common on wet sandy flats burnt last summer, 3 150 ft [± 960 m], 11 Oct. 1975, *Kruger 1687* (NBG, holo.; PRE, iso.).

Plants 150–330 mm high. *Corm* small, up to 10 mm diam., bearing stolons from base up to 50 mm long, with a large terminal cormlet up to 5 mm diam.; tunics finely fibrous to moderately coarse. *Stem* simple, rarely with 1 branch. *Leaves* 4, uppermost sheathing for most of its length, foliage leaves narrowly sword-shaped to falcate, ± ⅓ as long as stem, mostly 2–4 mm wide, main vein prominent, margins slightly thickened. *Spike* mostly 5- to 9-flowered; bracts translucent with purple veins, 3–4 mm long, outer 3-veined, acutely 3-toothed, inner slightly shorter than outer, 2-veined and 2-toothed. *Flowers* evidently zygomorphic, nodding with tepals vertical, pink, throat and tepal bases yellow edged with deep pink; perianth tube filiform, ± 3 mm long; tepals ovate, ± 9 × 4.5 mm. *Filaments* evidently unilateral, slightly flattened, ± 2 mm long; anthers oblong-orbicular, ± 3 mm long, yellow, thecae recurved, acute at base, splitting incompletely from base. *Style* dividing at base of filaments, branches ± 1.8 mm long, falcate, slender. *Flowering time*: October and November.

Distribution and ecology: restricted to middle and upper elevations in the Cederberg in Western Cape, South Africa, known from Heuning Vlei in the north and from Sneeuberg in the south; on damp flats, most likely on peaty sandstone ground, flowering well after fire.

Diagnosis: the outstanding feature of *Ixia flagellaris* is the corm, which is remarkable in the *I. scillaris* complex in the finely fibrous corm tunics and in the production of slender stolons up to 50 mm long each terminating in a relatively large cormlet. No other member of sect. *Dichone* produces stolons although they are known in a few species of other sections. *Ixia flagellaris* otherwise accords closely with *I. scillaris* subsp. *toximontana*, notably in its relatively low stature, 150–330 mm high, and small flowers with tepals ± 9 × 4.5 mm, but differs in lacking prominent, thickened leaf margins. The late flowering and moist habitat, seeps and marshy sites, are unusual for the complex, although known in the Piketberg species, *I. tenuis*. Plants from Koebee Pass may belong here as they have fine corm tunics and unthickened leaf margins but they evidently do not produce stolons. Their exact status remains uncertain.



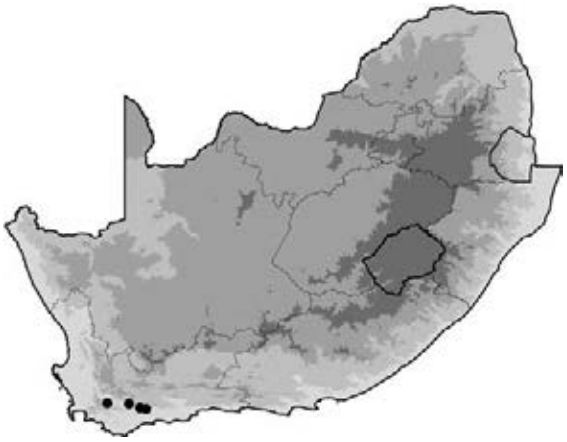
Distribution of ***Ixia flagellaris***.

99. **Ixia simulans** *Goldblatt & J.C.Manning* in Bothalia 42: 107 (2012a). Type: South Africa, Western Cape, Langeberg Mtns, gorge near Montagu hot springs above Keisie River, on steep rocky sandstone slopes, 1 Sept. 2007, *Goldblatt & Porter 12946* (NBG, holo.; K, MO, PRE, iso.).

Plants 400–700 mm high. *Corm* ± 10 mm diam., tunics of fine, netted fibres. *Stem* usually simple, rarely with a single branch. *Leaves* 2(3), lower 1(2) with narrowly sword-shaped to linear blade with single prominent vein, ± ½ as long as stem, 1.5–6.5 mm wide, margins thickened and slightly raised, hyaline when dry; upper leaf sheathing lower ½ of stem, with short, unifacial tip. *Spike* fairly lax, weakly flexuose or straight, 4- to 8-flowered; bracts membranous, translucent, purple at tips, ± 4 mm long, outer usually 3-veined and 3-toothed, inner 2-veined and forked at apex. *Flowers* ± nodding with tepals inclined in nearly vertical plane, zygomorphic with stamens unilateral, bright (rarely pale) pink, tepal bases white, unscented; perianth tube filiform, ± 4.5 mm long, tightly clasping style; tepals spreading, ovate-elliptic, (10–)12–14 × 5–6 mm, inner whorl slightly larger than outer. *Filaments* unilateral, inserted at mouth of tube, ± 2.5 mm long, white; anthers oblong, 2.0–2.5 mm long, yellow, horizontal or slightly pendent, thecae acute and slightly recurved at base, dehiscing incompletely from base. *Style* dividing opposite lower ⅓ of filaments, branches ± 1.3 mm long, white, tubular, falcate. *Flowering time*: mid-August to mid-October.

Distribution and ecology: restricted to the western Langeberg in Western Cape, South Africa, from Dassieshoek near Robertson to Swellendam and Suurbraak, and in Lemoenpoort in the northern foothills of the Riviersonderend Mtns; on rocky sandstone slopes.

Diagnosis: *Ixia simulans* closely resembles *I. scillaris* in general appearance and in the pink flowers, which have unilateral, horizontal to slightly pendent anthers that dehisce incompletely by narrow slits near the base. It differs most conspicuously in its single, or rarely two, long, foliage leaves with ± linear blades 1.0–4.5 mm wide, spikes of only 4 to 8 flowers, relatively short floral bracts ± 4 mm long and the spreading, subequal tepals, those of the inner whorl being slightly shorter than the outer. The tepals are inclined and all held in the same



Distribution of ***Ixia simulans***.

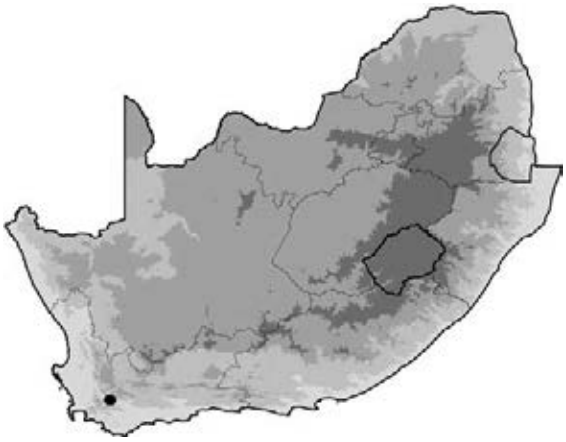
plane whereas those of *I. scillaris* are always held vertically and the lowermost tepal is weakly to strongly recurved and held apart from the other five tepals.

100. **Ixia collina** *Goldblatt & Snijman* in South African Journal of Botany 51: 68 (1985); Manning & Goldblatt: 108 (2012a). Type: South Africa, [Western Cape], Aan de Doorns, SW of Worcester, Farm Alfalfa, 30 Aug. 1983, *Snijman 721* (NBG, holo.; MO, PRE, S, iso.).

Plants 500–900 mm high. *Corm* globose, 7–12 mm diam., often with cormlets at base; tunics of medium-textured fibres. *Stem* usually 2- or 3-branched, branches held at right angles to main axis, distally suberect, subtended by short, acute bracts and prophylls. *Leaves* 3 or 4, lower 2 or 3 ± linear to narrowly sword-shaped, ± ½ as long as stem, 4–8 mm wide, main vein moderately thickened, uppermost leaf sheathing lower ½ of stem. *Main spike* flexuose, 7- to 16-flowered, lateral spikes with fewer flowers; bracts membranous, translucent, 4.5–7.0 mm long, outer with 3 prominent, purple veins, 3- or 5-toothed, inner 2-veined and 2-toothed. *Flowers* zygomorphic, half to fully nodding, pink, tepal bases white to yellow edged deep pink, sweetly scented; perianth tube filiform, ± 5 mm long, expanded in upper 0.5 mm; tepals subequal, ovate, ± obtuse, 9–12 × ± 5 mm. *Filaments* unilateral, ± horizontal, inserted at mouth of filiform part of tube, ± 3 mm long, curved at right angles in upper 1 mm and becoming flattened and as wide as anthers; anthers ± 3 mm long, oblong, yellow, thecae acute and recurved near base, dehiscing incompletely from base. *Style* dividing at base of filaments, branches ± 2.5 mm long, tubular, falcate, apex bifid. *Flowering time*: late August to mid-September.

Distribution and ecology: a narrow endemic of the mid-Breede River Valley in Western Cape, South Africa, near Aan de Doorns south of Worcester and on the Rooiberg south of Robertson; on south-trending slopes of low clay hills above the Breede River flood plain.

Diagnosis: *Ixia collina* is easily distinguished from other members of ser. *Dichone* by the unusual branching pattern: the relatively short branches extend outward horizontally and curve upward distally, as well as by an unusual floral feature. The filaments are unique in the section in being filiform below, curved at right angles in the distal 1 mm and broadened so that they are as wide as the anthers. As in *I. scillaris,* the flowers are zygomorphic and have unilateral stamens.



Distribution of ***Ixia collina***.

UNCERTAIN SPECIES

Ixia aurantiaca Klatt. See synonymy of *I. erecta* var. *lutea* Ker Gawl. below.

Ixia bicolorata Klatt: 396 (1882). *I. polystachya* var. *bicolorata* (Klatt) Baker: 78 (1896). Type: South Africa, [Western Cape], near Cape Town, *Spilhaus s.n.* (B: Herb. Lubeck, holo. not extant). The identity of the type, no longer extant, is uncertain. If correctly from near Cape Town (by inference on the Cape Peninsula) (Klatt 1882) this pale yellow-flowered plant is most likely *I. dubia* but the low stature, 6–12 inches [150–300 mm] high, no mention of the characteristic dark central mark in the flower and bracts violet at the tips argues against this determination. Lewis (1962) suggested the species might equally be *I. polystachya*, but this is also usually taller and likewise has a flower with a darker central mark. De Vos (1999) suggested that *I. bicolorata* might not be an *Ixia.*

Ixia erecta var. *lutea* Ker Gawl. in Curtis's Botanical Magazine 22: t. 846 (1805). *I. aurantiaca* Klatt: 397 (1882), new name for *I. lutea* (Ker Gawl.) Baker: 91 (1877), illegitimate homonym, not *I. lutea* Eckl. (1827). *I. polystachya* var. *lutea* (Ker Gawl.) G.J.Lewis: 107 (1962). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 846 (1805). No plant matching this illustration is known.

Ixia hybrida Ker Gawl.: 227 (1804a). Type: South Africa, without precise locality or collector, illustration in Curtis's Bot. Mag. 7: t. 127 (as 128) '*Ixia flexuosa*' (1790). The illustration shows a plant with flowers white with tepals red at base edged with a broader pink halo, erect, white filaments, diverging anthers and style dividing opposite the base of the anthers and said to be scented. The illustration matches no known member of sect. *Ixia* and may well be an interspecific hybrid.

Ixia retusa Salisb., Prodromus stirpium in horto ad Chapel Allerton vigentium: 35 (1796). *Watsonia retusa* (Salisb.) Klatt: 354 (1882). Type: unknown. The identity of this species has remained a mystery as the description is inadequate to identify the plant and no type is known. Ker Gawler (in Sims 1801) associated the name with what he called *Ixia polystachya* (actually *I. scillaris*, thus not the same as Linnaeus's species), and Lewis (1962) queried whether *I. retusa* might be *I. stricta*. Although *I. retusa* may be a member of sect. *Dichone*, it is impossible to tell which species and the name has been rejected.

EXCLUDED SPECIES

Ixia minuta L.f.: 92 (1782). This is the basionym of *Pauridia minuta* (L.f.) Th.Durand & H.Schinz (Hypoxidaceae).

Ixia nervosa Vent.: t. 10 (1803), invalid name. The name was proposed by Ventenat for *I. dubia* and *I. maculata* should they be considered conspecific.

REFERENCES

AITON, W. 1789. *Hortus Kewensis*, vol. 1. George Nicol, London.

ANDREWS, H. 1797. *Ixia reflexa*. Reflex flowered ixia. *The Botanist's Repository* 1: t. 14.

ANDREWS, H. 1798a. *Ixia capitata* var. *ovata*. Bunch-flowering ixia. var. egg-shaped purple petals. *The Botanist's Repository* 1: t. 23 (1798a).

ANDREWS, H. 1798b. *Ixia spicata* var. *viridi-nigra*. Sea-green spiked ixia. *The Botanist's Repository* 1: t. 29.

ANDREWS, H. 1799. *Ixia capitata* var. *flore aurantio*. Bunch-flowering ixia. var. blossom gold coloured. *The Botanist's Repository* 1: t. 50.

ANDREWS, H. 1800. *Ixia polystachya* var. *incarnata*. *The Botanist's Repository* 2: t. 128.

ANDREWS, H. 1801a. *Ixia speciosa*. Deep crimson ixia. *The Botanist's Repository* 3: t. 186.

ANDREWS, H. 1801b. *Ixia maculata*. Spotted-flowered ixia. *The Botanist's Repository* 3: t. 196.

ANDREWS, H. 1801c. *Recensiae plantarum*. London, J. White.

ANDREWS, H. 1802a. *Ixia columnaris*. Columnar-chived ixia. *The Botanist's Repository* 3: t. 203.

ANDREWS, H. 1802b. *Ixia columnaris* var. *grandiflora*. Columnar-chived ixia. Large-flowered var. *The Botanist's Repository* 4: t. 250.

ANDREWS, H. 1802c. *Ixia columnaris* var. *latifolia*. Columnar-chived ixia. Broad-leaved var. *The botanist's repository* 3: t. 213.

ANDREWS, H. 1802d. *Ixia columnaris* var. *versicolor*. Columnar-leaved ixia. Changeable var. *The Botanist's Repository* 3: t. 211.

ANDREWS, H. 1802e. *Ixia capitata* var. *flore albo fundo nigro*. Bunch-flowering ixia. Var. white flowered, black bottom. *The Botanist's repository* 3: t. 159.

ANDREWS, H. 1802f. *Ixia capitata* var. *stellata*. *The Botanist's Repository* 4: t. 232.

ANDREWS, H. 1804. *Ixia columnaris* var. *angustifolia*. Columnar-chived ixia. Narrow-leaved var. *The Botanist's Repository* 6: t. 392.

ANDREWS, H. 1809. *Ixia curta*. Short ixia. *The Botanist's Repository* 9: t. 564.

BAKER, J.G. 1876. New species of Ixieae. *Journal of Botany, British and foreign* 5: 236–239.

BAKER, J.G. 1877 ['1878']. Systema iridacearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae*. Bell, London.

BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve & Co., Ashford, Kent.

BERGIUS, P.J. 1767. *Descriptiones plantarum capensium*. Salvius, Stockholm.

BOLUS,.L. 1927. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 69–119.

BOLUS, L. 1929a. Novitates africanae. *Journal of Botany, British and foreign* 67: 132–139.

BOLUS, L. 1929b. Plants—new and noteworthy. *South African Gardening and Country Life* 19: 27.

BOLUS, L. 1931a. Plants—new or noteworthy. *South African Gardening and Country Life* 21: 281, 282.

BOLUS, L. 1931b. Plants—new or noteworthy. *South African Gardening and Country Life* 21: 367, 368.

BERGIUS, P.J. 1767. *Descriptiones plantarum capensium*. Salvius, Stockholm.

BROWN, N.E. 1928. The South African Iridaceae of Thunberg's herbarium. *Journal of the Linnean Society, Botany* 48: 15–55.

BROWN, N.E. 1929. The Iridaceae of Burman's *Florae capensis prodromus*. *Bulletin of Miscellaneous Information, Kew* 1929: 129–139.

BURMAN, N.L. 1768. *Prodromus florae capensis*. Cornelius Haek, Amsterdam.

DELAROCHE, D, 1766. *Descriptiones plantarum aliquot novarum*. Verbeek, Leiden.

DELILE, A.R. 1814a. *Ixia phlogiflora*. t. 432. In J.P. Redouté, *Les Liliacées* 8(72). Paris.

DELILE, A.R. 1814b. *Ixia rapunculoides*. t. 431. In J.P. Redouté, *Les Liliacées* 8(72). Paris.

DE VOS, M.P. 1988. Three new species of *Ixia* L. (Iridaceae) from the Cape Province. *South African Journal of Botany* 54: 596–602.

DE VOS, M.P. 1999. *Ixia*. In M.P. de Vos & P. Goldblatt, *Flora of southern Africa* 7(2, 1): 3–87.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.

ENGLER, A. & PRANTL, K. 1930. Die natürlichen Pflanzenfamilien, edn. 2, vol. 15. Leipzig and Berlin.

FOSTER, R.C. 1936. Notes on nomenclature in Iridaceae. *Contributions from the Gray Herbarium of Harvard University* 114: 37–50.
GOLDBLATT, P. 1971. A new species of *Gladiolus* and some nomenclatural changes in the Iridaceae. *Journal of South African Botany* 37: 229–236.
GOLDBLATT, P. 1979. New species of Cape Iridaceae. *Journal of South African Botany* 45: 81–89.
GOLDBLATT, P. & MANNING, J.C. 1993. *Ixia acaulis*, a new acaulescent species of Iridaceae: Ixioideae from the Knersvlakte, Namaqualand, South Africa. *Novon* 3: 148–153.
GOLDBLATT, P. & MANNING, J.C. 1999. New species of *Sparaxis* and *Ixia* (Iridaceae: Ixioideae) from Western Cape, South Africa, and taxonomic notes on *Ixia* and *Gladiolus*. *Bothalia* 29: 59–63.
GOLDBLATT, P. & MANNING, J.C. 2001. Two new renosterveld species of Iridaceae: Crocoideae from South Africa. *Bothalia* 31: 189–192.
GOLDBLATT, P. & MANNING, J.C. 2004. New species of *Ixia* (Crocoideae) and *Moraea* (Iridoideae), and taxonomic notes on some other African Iridaceae. *Novon* 14: 288–298.
GOLDBLATT, P. & MANNING, J.C. 2008a. Systematics of the southern African genus *Ixia* (Iridaceae). 1. The *I. rapunculoides* complex. *Bothalia* 38: 1–23.
GOLDBLATT, P. & MANNING, J.C. 2008b. Systematics of the southern African genus *Ixia* (Iridaceae). 2. The filiform-leaved *I. capillaris* complex. *Bothalia* 38: 115–124.
GOLDBLATT, P. & MANNING, J.C. 2010. Iridaceae. Reappraisal of *Ixia maculata* with *I. calendulacea* sp. nov., and an earlier name for *I. lutea*. *Bothalia* 40: 59–64.
GOLDBLATT, P. & MANNING, J.C. 2011. Systematics of the southern African genus *Ixia* (Iridaceae): 3. Sections *Hyalis* and *Morphixia*. *Bothalia* 41: 83–134.
GOLDBLATT, P. & MANNING, J.C. 2012a. Systematics of the southern African genus *Ixia* (Iridaceae: Crocoideae): 4. Revision of sect. *Dichone*. *Bothalia* 42: 87–110.
GOLDBLATT, P. & MANNING, J.C. 2012b. New species and subspecies of *Babiana*, *Hesperantha* and *Ixia* (Iridaceae: Crocoideae) from southern Africa, range extensions, and morphological and nomenclatural notes in *Babiana* and *Geissorhiza*. *Bothalia* 42: 137–145.
GOLDBLATT, P. & MANNING, J.C. 2016a. Systematics of the southern African genus *Ixia* (Iridaceae). 5. Synopsis of section *Ixia*, including five new species. *South African Journal of Botany* 104: 175–198.
GOLDBLATT, P. & MANNING, J.C. 2016b. *Ixia nutans*, a new species of *Ixia* sect. *Morphixia* (Iridaceae) from the western Little Karoo, Western Cape, South Africa. *South African Journal of Botany* 106: 192–195.
GOLDBLATT, P., MANNING, J.C. & HELME, N.A. 2015. New species of *Ixia* (Iridaceae: Crocoideae) from western South Africa with a revised circumscription of *I. cedarmontana* and two important range extensions. *South African Journal of Botany* 98: 108–113.
GOLDBLATT, P. & SNIJMAN, D. 1985. New species and notes on the southern African genus *Ixia* (Iridaceae). *South African Journal of Botany* 51: 66–70.
HEYNHOLD, G. 1841. *Nomenclator botanicus hortensis* 2. Dresden & Leipzig.
HEYNHOLD, G. 1847 [‘1846’]. *Alphabetische und synonymische Aufzählung der Gewächse*. Dresden & Leipzig.
HORNEMANN, J.W. 1819. *Hortus regius botanicus hafniensis*, *Supplementum*. Copenhagen.
HOUTTUYN, M. 1780. *Natuurlijke historie*, vol. 12. Amsterdam.
JACQUIN, N.J. 1788–1795 [‘1786–1793’]. *Icones plantarum rariorum*, vol. 2. C.F. Wappler, Vienna.
JACQUIN, N.J. 1797. *Plantarum rariorum horti caesarei schoenbrunnensis*, vol. 1. C.F. Wappler, Vienna.
KER GAWLER, J.B. 1802a. *Ixia aristata*. Salver-flowered ixia. *Curtis’s Botanical Magazine* 16: t. 589.
KER GAWLER, J.B. 1802b. *Ixia capillaris* (var. γ) *gracillima*. Slender ixia. *Curtis’s Botanical Magazine* 17: sub t. 570.
KER GAWLER, J.B. 1802c. *Ixia aristata*. Salver-flowered ixia. *Curtis’s Botanical Magazine* 16: t. 589.
KER GAWLER, J.B. 1802d. *Ixia crateroides*. Crimson ixia. *Curtis’s Botanical Magazine* 16: t. 594.
KER GAWLER, J.B. 1802e. *Ixia maculate* (var. γ) *viridis*. Green-stained ixia. *Curtis’s Botanical Magazine* 16: t. 549.
KER GAWLER, J.B. 1803a. *Ixia capillaris* (var. β) *stricta*. Wire-stemmed Ixia. et *Ixia capillaris* var. γ *incarnata*. Flesh ixia. *Curtis’s Botanical Magazine* 17: t. 617.
KER GAWLER, J.B. 1803b. *Tritonia capensis*. Long-Tubed tritonia. *Curtis’s Botanical Magazine* 17: t. 618.
KER GAWLER, J.B. 1803c. *Ixia rochensis*. (α) Plaid ixia. *Curtis’s Botanical Magazine* 17: t. 598.
KER GAWLER, J.B. 1803d. *Ixia columellaris*. Variegated ixia. *Curtis’s Botanical Magazine* 17: t. 630.
KER GAWLER, J.B. 1804a [‘1805’]. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.
KER GAWLER, J.B. 1804b. *Ixia maculata* var. β. *amethystina*. Amethystine ixia. *Curtis’s Botanical Magazine* 18: t. 789.
KER GAWLER, J.B. 1805. *Ixia erecta* var. *lutea*. Yellow upright ixia. *Curtis’s Botanical Magazine* 22: t. 846.
KER GAWLER, J.B. 1807. *Ixia capillaris* (var. γ) *aulica*. Rose ixia. *Curtis’s Botanical Magazine* 25: t. 1013.
KER GAWLER, J.B. 1809. *Ixia erecta*. (var. *lutea; odorata*). Yellow sweet-scented ixia. *Curtis’s Botanical Magazine* 29: t. 1173.
KER GAWLER, J.B. 1810a. *Tritonia viridis*. Greenish-flowered tritonia. *Curtis’s Botanical Magazine* 31: t. 1275.
KER GAWLER, J.B. 1810b. *Ixia maculata* var. *ochroleuca*. Cream spotted ixia. *Curtis’s Botanical Magazine* 32: t. 1285.
KER GAWLER, J.B. 1811a. *Ixia fucata*. Painted-flowered ixia. *Curtis’s Botanical Magazine* 34: t. 1379.
KER GAWLER, J.B. 1811b. *Ixia monadelpha* var. (β). Orange monadelphous ixia. *Curtis’s Botanical Magazine* 34: t. 1378.
KER GAWLER, J.B. 1812a. *Tritonia rochensis* (α.) Bending-flowered ixia. *Curtis’s Botanical Magazine* 37: t. 1503.
KER GAWLER, J.B. 1812b. *Tritonia longiflora* (β, γ). Long-flowered tritonia. *Curtis’s Botanical Magazine* 37: t. 1502.
KER GAWLER, J.B. 1821a. Notes [3]. *The botanical register* 7.
KER GAWLER, J.B. 1821b. *Ixia maculata* var. *caesia*. Green-spotted French-grey ixia. *The botanical register* 7: t. 530.
KER GAWLER, J.B. 1827. *Genera Iridearum*. De Mat, Brussels.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker’s Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
KLATT, F.W. 1894 [‘1895’]. Iridaceae. In Th. Durand & H. Schinz, *Conspectus florae africae*, vol. 5: 143–230. Jardin botanique de l’Etat, Bruxelles etc.
LAMARCK, J.B.A.P. M. de. 1789. *Encyclopédie méthodique. Botanique*, vol. 3. Pancoucke, Paris.
LAMARCK, J.B.A.P. M. de. 1791. *Tableau Encyclopedie et Methodique. Botanique*, vol. 1. Pancoucke Paris.
LEWIS, G.J. 1931. Plants—new or noteworthy. *South African Gardening and Country Life* 21: 367, 368.
LEWIS, G.J. 1933. Plants—new or noteworthy. *South African Gardening and Country Life* 23: 213.
LEWIS, G.J. 1934. *Ixia trifolia*. *Flowering Plants of South Africa* 14: t. 543.
LEWIS, G.J. 1938. Eight new Iridaceae from the Cape Province. *Journal of South African Botany* 4: 1–11.

LEWIS, G.J. 1945. *Ixia cochlearis* G.J.Lewis. *Flowering Plants of Africa* 25: t. 969.
LEWIS, G.J. 1950. Iridaceae. Pp. 217–265. In R.A. Adamson & T.M. Salter, *Flora of the Cape Peninsula*. Juta, Cape Town.
LEWIS, G.J. 1952. Plantae novae Africanae. *Annals of the South African Museum* 40(2): 1–14.
LEWIS, G.J. 1954. Iridaceae – New species and miscellaneous notes. *Annals of the South African Museum* 40: 115–135.
LEWIS, G.J. 1962. South African Iridaceae: The genus *Ixia*. *Journal of South African Botany* 28: 45–195.
LINNAEUS, C. 1753. *Species plantarum*. Salvius, Stockholm.
LINNAEUS, C. 1762. *Species plantarum*, edn. 2, vol. 1. Salvius, Stockholm.
LINNAEUS, C. 1763. *Species plantarum*, edn. 2, vol. 2. Salvius, Stockholm.
LINNAEUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.
MANNING, J.C. & GOLDBLATT, P. 2006. New species of Iridaceae from the Hantam–Roggeveld centre of endemism and the Bokkeveld, Northern Cape, South Africa. *Bothalia* 36: 139–145.
MILLER, P. 1760. *Figures of the most beautiful, useful, and uncommon plants described in the Gardener's dictionary*. P. Miller, London.
MILLER, P. 1768. *The gardener's dictionary*, edn. 8. P. Miller, London.
NORDENSTAM, B. 1972. Types of Ecklon's 'Topographisches Verzeichniss' in the Swedish Museum of Natural History in Stockholm. *Journal of South African Botany* 38: 277–298.
PAX, F. 1888. Iridaceae. In A. Engler & K. Prantl, *Die natürlichen Pflanzenfamilien* 2, 5: 137–157. Engelmann, Leipzig.
PERSOON, H. 1805. *Synopsis plantarum*, vol. 1. C.H. Cramer, Paris.
PETERS, W.C.H. 1864. *Naturwissenschaftliche Reise nach Mossambique*, Band 6, *Botanik*, II Abteilung. Georg Reimer, Berlin.
REDOUTÉ, P.J. 1803. *Les Liliacées*, vol. 1. Pancoucke, Paris.
REDOUTÉ, P.J. 1804. *Les Liliacées*, vol. 2. Pancoucke, Paris.
REDOUTÉ, P.J. 1814. *Les Liliacées*, vol. 8. Pancoucke, Paris.
REGEL, E. 1851. Drei neue Pflanzen. *Botanische Zeitung (Berlin)* 9: 595–597.
REGEL, E. 1853. *Würthia elegans* Rgl. *Gartenflora* [1]: 98, 99 et t. 46.
REGEL, E. 1862. *Ixia patens* Ait. var. *kermesina*. *Gartenflora* 11: 90, 91 et t. 356, f. 1.
SALISBURY, R. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SALISBURY, R. 1812. On the cultivation of rare plants, etc. *Transactions of the Horticultural Society, London* 1: 261–366.
SCHNEEVOOGT, C.V. 1793. *Icones plantarum rariorum*. C. Plaat, Haarlem.
SCHRANK, F. DE P. 1822. Commentarius in Irideas capenses. *Denkschriften Königlich-Baierischen Botanischen Gesellschaft in Regensburg* 2: 165–224.
SIMS, G. 1801. *Ixia scillaris*, var. *latifolia* (a). Squill-flowered ixia. Broad-leaved variety. *Curtis's Botanical Magazine* 15: t. 542.
STEUDEL, E.G. 1821. *Nomenclator botanicus*, vol. 1. J.G. Cotta, Stuttgart.
SWEET, R. 1826. *Hortus britannicus*. Ridgeway, London.
SWEET, R. 1830. *Hortus britannicus*, edn. 2. Ridgeway, London.
THUNBERG, C.P. 1783. *Disertatio de Ixia*. Edman, Uppsala.
THUNBERG, C.P. 1784. *Flora japonica*. Leipzig.
THUNBERG, C.P. 1811. *Flora capensis* [fasc. 2]. Edman, Uppsala.
VAHL, M. 1805. *Enumeratio plantarum*, vol. 2. Copenhagen.
VENTENAT, E.P. 1801. *Descriptions des plantes nouvelles et peu connues*. Crapelat, Paris.
VENTENAT, E.P. 1803. *Choix de plantes dont la plupart sont cultivées dans le jardin de Cels*. Crapelat, Paris.
VOIGT, J.O. 1845. *Hortus suburbanus calcuttensis*. Bishop's College Press, Calcutta.

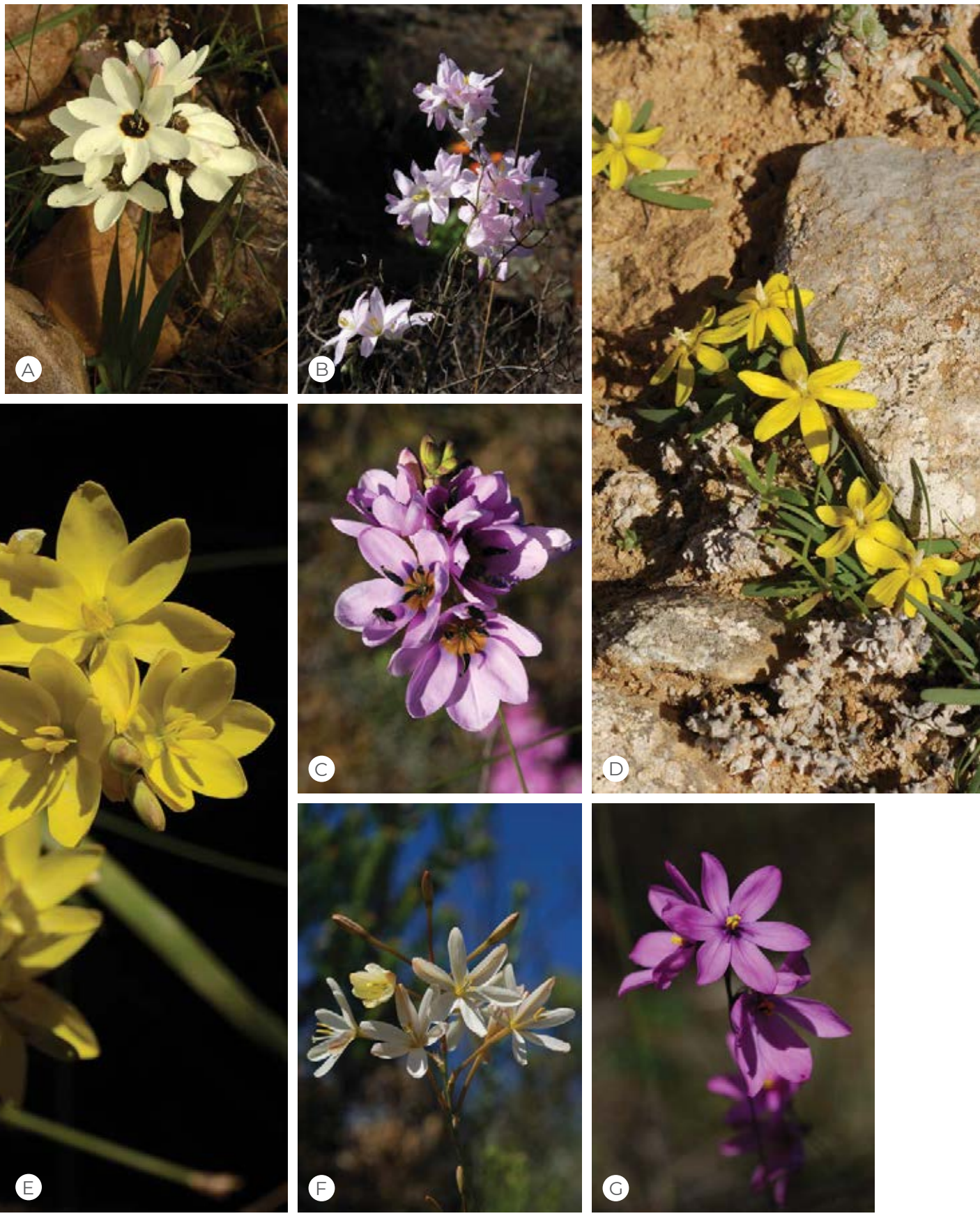


Plate 59. A, ***Ixia abbreviata***, Hermon, WC; B, ***I. alata***, Calvinia, NC; C, ***I. atrandra***, Worcester, WC; D, ***I. acaulis***, Vanrhynsdorp, WC; E, ***I. angelae***, Clanwilliam, WC; F, ***I. bellendenii***, Villiersdorp, WC; G, ***I. bifolia***, Caledon, WC.



Plate 60. A, ***Ixia capillaris***, Worcester, WC; B, ***I. calendulacea***, Clanwilliam, WC; C, ***I. curta***, Darling, WC; D, ***I. curvata***, Middelpos, NC; E, ***I. dubia***, Cape Peninsula, WC; F, ***I. flexuosa***, Bot River, WC; G, ***I. erubescens***, Hermon, WC.



Plate 61. A, ***Ixia fucata***, Ceres, WC; B, ***I. fuscocitrina***, Piketberg, WC; C, ***I. lacerata***, Sutherland, NC; D, ***I. latifolia***, Ceres, WC; E, ***I. latifolia***, Worcester, WC; F, ***I. longistylis***, Botha, WC; G, ***I. maculata***, Darling, WC.

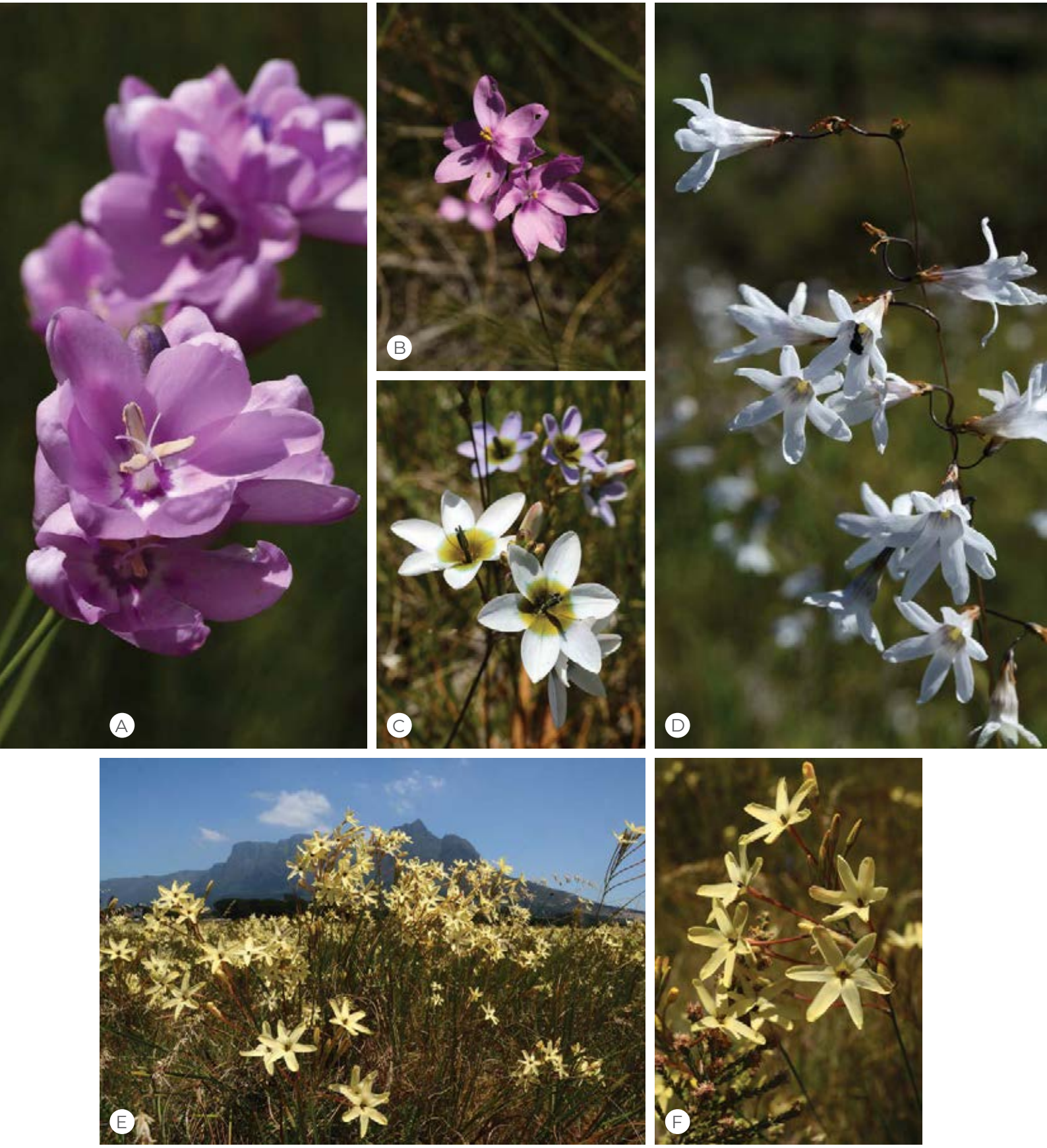


Plate 62. A, ***Ixia metlerkampii***, Du Toit's Kloof, WC; B, ***I. micrandra***, Bot River, WC; C, ***I. monadelpha***, Cape Town, WC; D, ***I. mollis***, Clanwilliam, WC; E & F, ***I. paniculata***, Cape Town, WC.

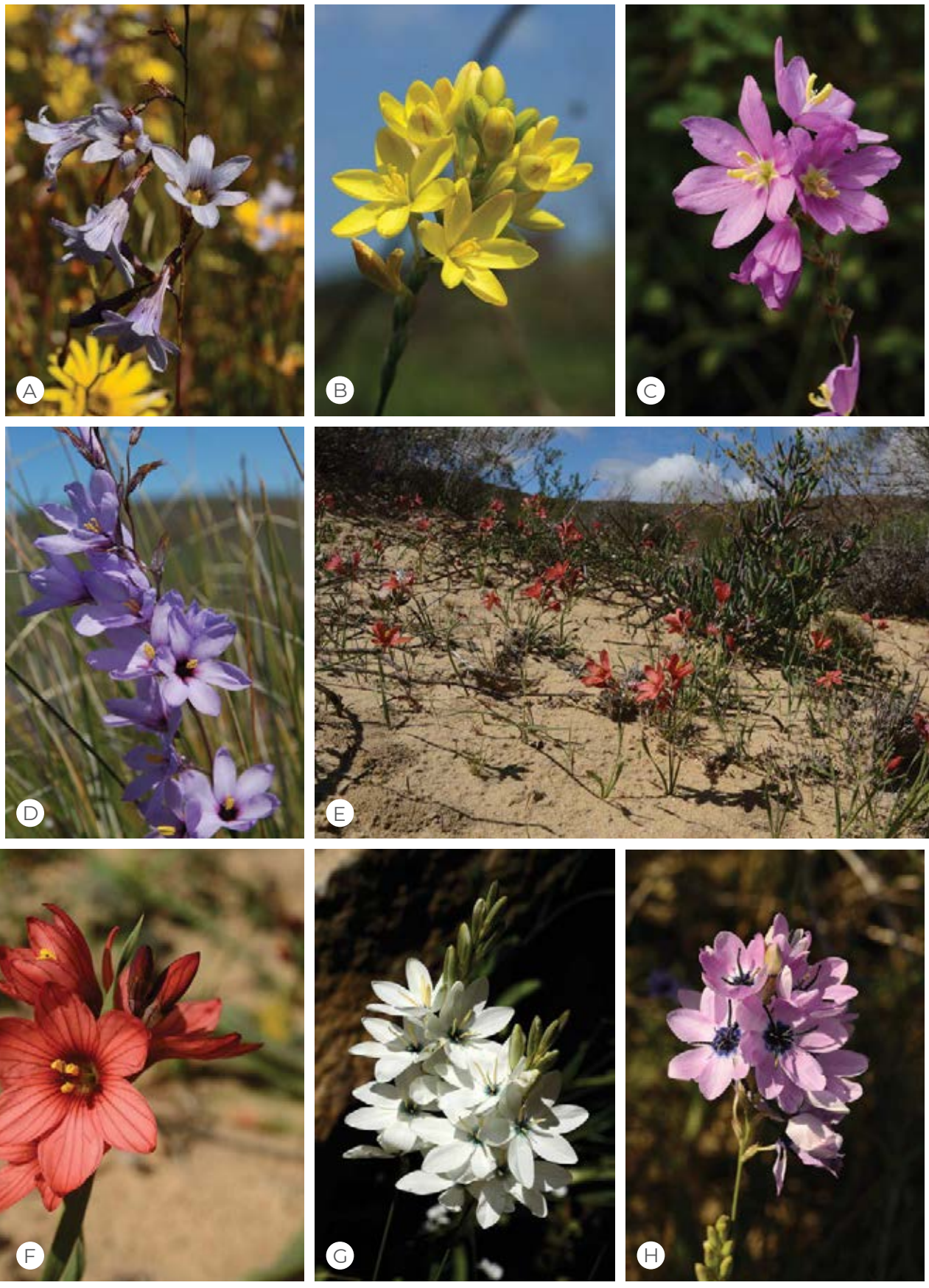


Plate 63. A, ***Ixia namaquana***, Nieuwoudtville, NC; B, ***I. odorata***, Hermon, WC; C, ***I. patens***, Villiersdorp, WC; D, ***I. pavonia***, Calvinia, WC; E & F, ***I. pumilio***, Worcester, WC; G, ***I. polystachya***, Du Toit's Kloof, WC; H, ***I. polystachya***, Malmesbury, WC.

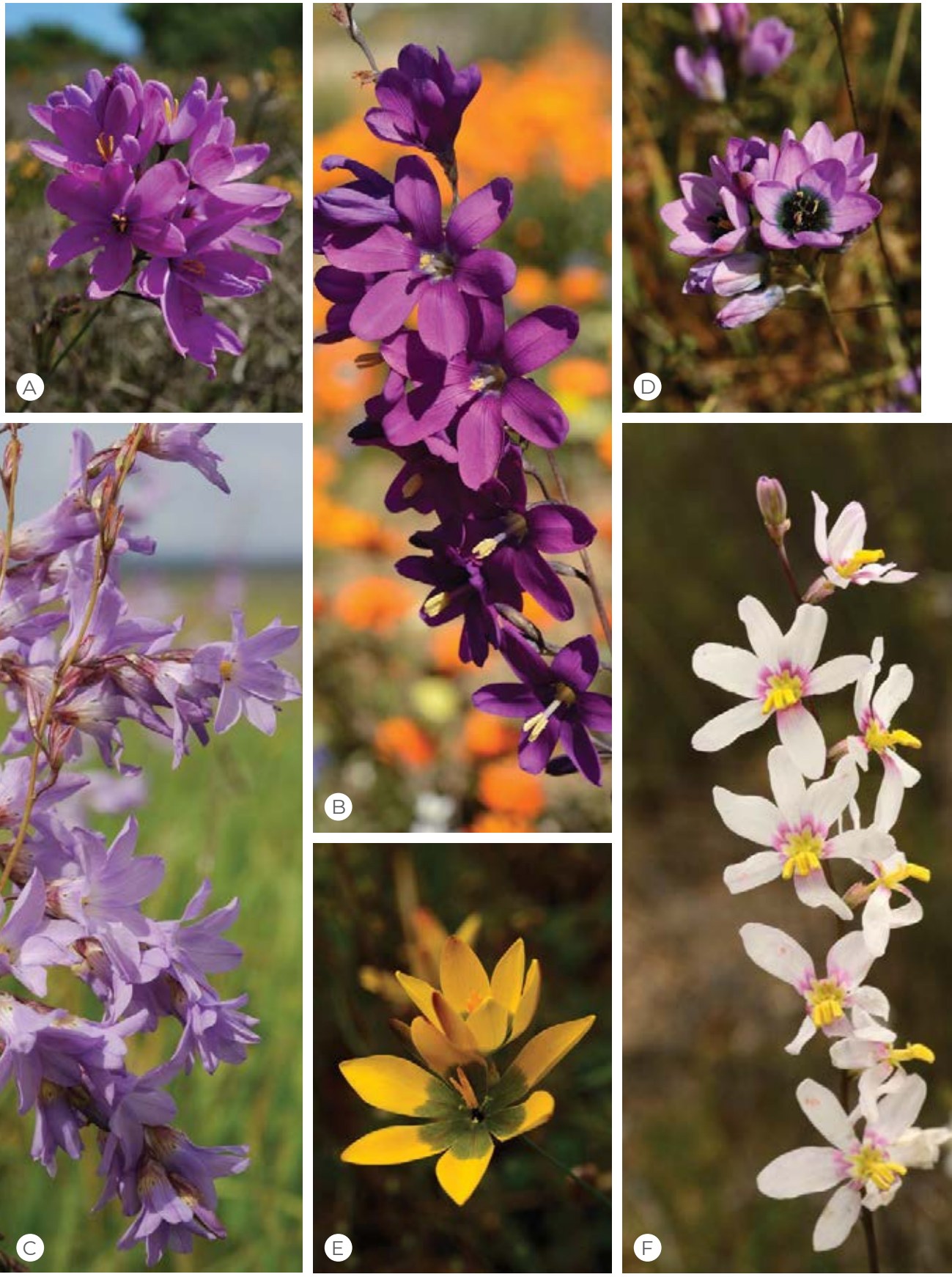


Plate 64. A, ***Ixia purpureorosea***, Saldanha, WC; B, ***I. ramulosa***, Kamieskroon, NC; C, ***I. rapunculoides***, Nieuwoudtville, NC; D, ***I. rouxii***, Wellington, WC; E, ***I. sarmentosa***, Hermon, WC; F, ***I. scillaris*** subsp. ***latifolia***, Clanwilliam, NC.



Plate 65. A, ***Ixia saundersiana***, Hex River Mtns, WC (photograph: N. Helme); B, ***I. sobolifera*** subsp. ***carnea***, Nieuwoudtville, NC; C, ***I. stolonifera***, Koo, WC (photograph: I. Ebrahim); D, ***I. trinervia***, Villiersdorp, WC; E, ***I. vanzyliae***, Worcester, WC; F, ***I. versicolor***, Somerset West, WC; G, ***I. viridiflora***, Hermon, WC.

Subtribe 6. **Radinosiphoninae**

Radinosiphoninae *Goldblatt & J.C.Manning*, new subtribe. Type: *Radinosiphon* N.E.Br.

Corm tunics papery becoming fibrous; stem well developed, angled. *Leaf* margins with subepidermal sclerenchyma strand. *Inflorescence* a spike. *Flowers* zygomorphic with stamens arcuate; style branches simple or notched apically; seed epidermal cell outlines prominent; ovular vasculature intact; $x = 15$.

Genera 1, only *Radinosiphon* (2 spp.): southern Africa to east tropical Africa.

29. **Radinosiphon**

Radinosiphon *N.E.Br.* in Transactions of the Royal Society of South Africa 20: 262 (1932). Lectotype: *R. leptostachya* (Baker) N.E.Br., designated by Goldblatt & Manning: 155 (2008).

Revisionary accounts: Brown: 261–280 (1932); Carter: t. 1384 (1962).

From the Greek, *radinosus*, slender, *siphon*, tube, for the tubular flowers.

Deciduous geophytes, often stoloniferous or rhizomatous. *Corm* globose, axial in origin, tunics papery, becoming finely fibrous. *Cataphylls* 2 or 3, dry and papery or uppermost green. *Stem* aerial, simple or few-branched, compressed and angled or weakly winged. *Leaves* several, unifacial, sword-shaped, mostly basal and forming a lax 2-ranked fan, blade plane with definite main vein, ± soft textured; marginal bundle with fibre cap, epidermis unspecialised. *Inflorescence* a spike, secund; bracts green or flushed purple and soft-textured or submembranous, becoming dry apically, inner similar to outer thus multi-veined without two main veins but shorter and notched apically. *Flowers* zygomorphic, long-lived, salver-shaped, pink to light purple, lower tepals with darker median streaks, unscented, with nectar from septal nectaries; perianth tube elongate, suberect and curved outward distally, cylindric widening slightly distally; tepals subequal and weakly spreading, narrowly lanceolate, dorsal slightly larger and arching over anthers, weakly hooded, lower 3 forming a lip. *Stamens* unilateral and arcuate; filaments inserted shortly below top of perianth tube; anthers mauve. *Ovary* subglobose; style filiform, 3-branched distally, branches narrowly oblanceolate, longitudinally folded or channelled, diverging. *Capsules* subglobose, cartilaginous. *Seeds* few to several per locule, globose, flattened at chalazal end, lightly wrinkled, matte, testa cells domed. *Pollen grains* monosulcate-operculate, operculum 2-banded, exine perforate-scabrate. *Basic chromosome number* $x = 15$.

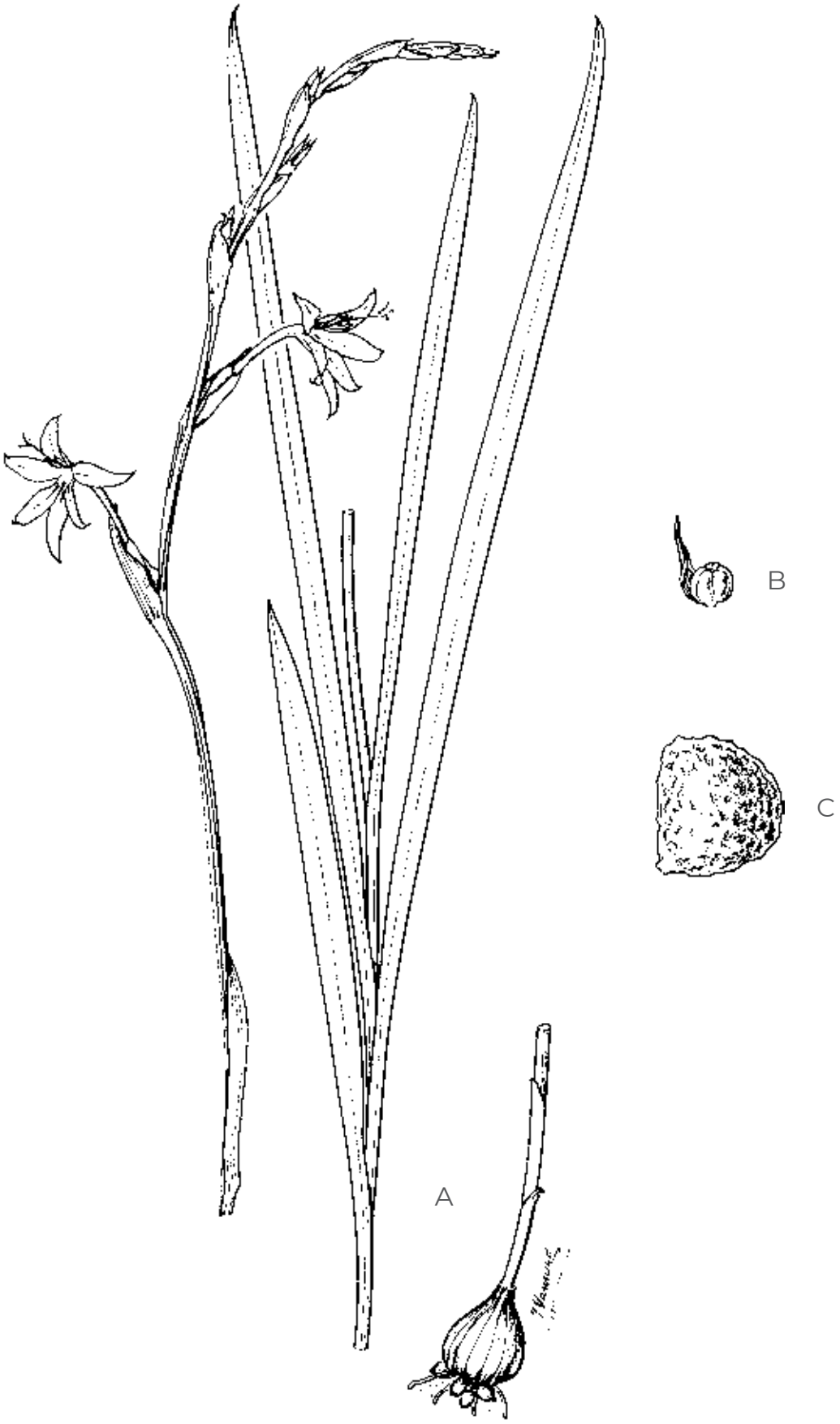
Species 2, northeastern South Africa and Eswatini through eastern Zimbabwe, Zambia and Malawi to southern Tanzania, mainly montane in rocky habitats, or low grassland and light bush.

A taxonomically isolated genus, *Radinosiphon* is unusual in Crocoideae in the angled or lightly winged stems and in having the inner bracts resembling the outer in both texture and venation – in most other Crocoideae the inner bracts are strongly 2-veined and often more completely membranous than the outer. Molecular data place the genus as sister to the clade including *Romulea* and related acaulescent genera, but there is no evident morphological support for this relationship. Although Brown recognised five species when he described the genus, later opinion (Carter 1962) favoured their reduction to a single, variable species *R. leptostachya*. We are able, however, to recognise two species among the southern African material, although the distinction between them is not always clear. Large-flowered plants that we have seen on the Mauchsberg and adjacent peaks east of Lydenburg represent a distinctive race, which we treat under the name *R. lomatensis*. These populations differ from typical *R. leptostachya* not only in their larger flowers but evidently also in their outbreeding system and mode of vegetative reproduction.

Key to species

1a Perianth tube (25–)30–45 mm long; tepals 12–15 mm long, uppermost 3–7 mm wide; seeds up to 8 per locule; plants outbreeding . . . . . 1. *R. lomatensis*

1b Perianth tube 15–30 mm long; tepals 8–12(–15) mm long, uppermost 2–3 mm wide; seeds mostly 1 or 2(–5) per locule; plants autogamous . . . . . 2. *R. leptostachya*



Radinosiphon leptostachya: A, flowering plant; B, capsule; C, seed.

1. **Radinosiphon lomatensis** *(N.E.Br.) N.E.Br.* in Transactions of the Royal Society of South Africa 20: 263 (1932). *Acidanthera lomatensis* N.E.Br.: 298 (1921). Type: South Africa, Transvaal [Mpumalanga], Lomati Valley, near Barberton, among rocks, 1 200 m, *G. Thorncroft 1065* (K, holo.).

Plants 300–750 mm high. *Corm* 8–15 mm diam., producing naked stolons from base; tunics papery, becoming finely fibrous. *Stem* simple or branched. *Leaves* 6 to 9, mostly basal and reaching base of spike, narrowly lanceolate, 150–300 × 4–15 mm, cauline leaves ± 3, progressively smaller and entirely sheathing. *Spike* inclined, 2- to 10-flowered; bracts 10–18 mm long. *Flowers* pale to deep pink, all or only lower 3 tepals with dark pink median streak; tube (25–)30–45 mm long; tepals ± spreading, linear to lanceolate, 12–15 × 2–3, uppermost lanceolate, 3–7 mm wide. *Filaments* 6–7 mm long, exserted ± 4 mm from tube; anthers 5–6 mm long, purple. *Style* dividing opposite or beyond anther tips, branches 2–3 mm long. *Capsules* subglobose, ± 10 mm long. *Seeds* up to 8 per locule, 2–3 mm diam. *Flowering time*: January, February.

Distribution and ecology: a local endemic restricted to the highlands above 2 000 m elevation, between Pigg's Peak in northern Eswatini and the mountains west of Lydenburg, South Africa; in quartzite outcrops in montane grassland. It has been confirmed to be pollinated by long-proboscid nemestrinid flies.

Diagnosis: distinguished from *Radinosiphon leptostachya* by its larger flowers, with longer perianth tube, (25–)30–45 mm long, broader tepals, the uppermost 12–15 × 3–7 mm, slightly longer filaments 6–7 mm long, and anthers 5–6 mm long. Plants of *R. lomatensis* reproduce vegetatively by slender, naked stolons quite different from the thick, scaly rhizomes developed in *R. leptostachya*. The species is evidently outcrossing, producing larger capsules with up to 8 seeds per locule, unlike autogamous *R. leptostachya*, which produces small capsules, 4–6 mm long, containing just 1 or 2 seeds (rarely up to 5 in tropical Africa) per locule.

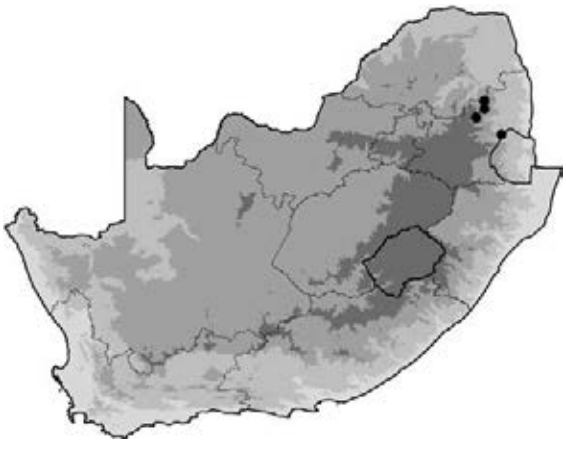
2. **Radinosiphon leptostachya** *(Baker) N.E.Br.* in Transactions of the Royal Society of South Africa 20: 263 (1932). *Lapeirousia leptostachya* Baker: 170 (1892). *Acidanthera leptostachya* (Baker) N.E.Br.: 297 (1921). Type: South Africa, Transvaal [Mpumalanga], Lydenburg District, Macmac [Mac Mac], *Mudd s.n.* (K, holo.).

Lapeirousia holostachya Baker: 391 (1894). *Acidanthera holostachya* (Baker) N.E.Br.: 297 (1921). *Radinosiphon holostachya* (Baker) N.E.Br.: 263 (1932). Type: [Zambia], Fwambo, Lake Tanganyika, Feb. 1893, *A. Carson 14* (K, holo.)

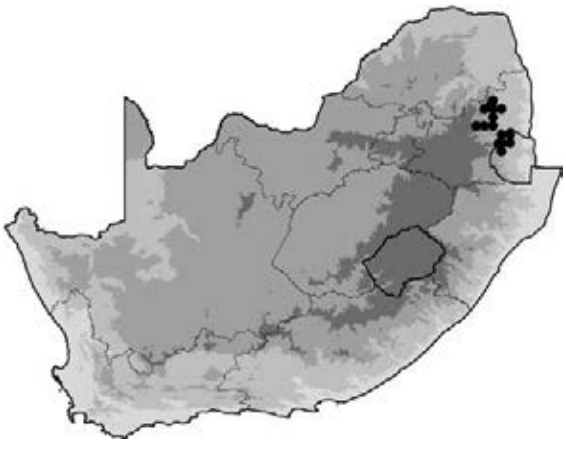
Tritonia acroloba Harms in Engler: 278 (1901). Type: [Tanzania], Ubena, eastern Livingstone Mtns, Mar. 1899, *Goetze 814* (B, holo.).

Radinosiphon cameronii N.E.Br.: 263 (1932). Type: Nyasaland, [Malawi], summit of Chiradzulu, 1905, *Cameron 179* (K, holo.).

Plants (80–)150–500(–750) mm high. *Corm* 8–15 mm diam., developing scaly rhizomes from base, sometimes producing cormlets; tunics papery, becoming finely fibrous. *Stem* usually branched, rarely with small cormlet in axils of upper leaves when unbranched. *Leaves* 6 to 9, mostly basal and reaching base of spike, narrowly lanceolate, 150–300 × 3–10(–15) mm, cauline leaves ± 3, progressively smaller and entirely sheathing. *Spike* inclined, (2–)4- to 12-flowered; bracts 8–18(–25) mm long. *Flowers* pale to deep pink, all or only lower 3 tepals with dark pink median streak; perianth tube 15–30 mm long; tepals ± spreading, linear to lanceolate, 8–12(–15) × 1–2(–3), uppermost lanceolate, 2–3 mm wide. *Filaments* 4–6 mm long, exserted ± 3 mm from tube; anthers 2.5–5.0 mm long, purple. *Style* dividing opposite or beyond anthers tips, branches 1.5–2.0 mm long. *Capsules* globose, 4–6 mm long. *Seeds* 1 or 2 (rarely up to 5 in tropical Africa) per locule, 2–3 mm diam., lightly wrinkled. *Flowering time*: January to March.



Distribution of ***Radinosiphon lomatensis***.



Distribution of ***Radinosiphon leptostachya***.

Distribution and ecology: ranging along the north eastern escarpment, from Eswatini to Pilgrim's Rest in Mpumalanga in southern Africa, and northward though Mozambique and eastern Zimbabwe to Malawi, Tanzania and Zambia; in quartzite outcrops and crevices in montane grassland, 1 000–2 000 m elevation.

Diagnosis: as far as we can determine this is an autogamous species which is prone to the development of local forms varying in flower size, especially perianth tube length and tepal dimensions, several of which were described as distinct species. Among the southern African material we are able distinguish two more-or-less distinct entities, smaller flowered plants corresponding to *Radinosiphon leptostachya* and larger-flowered, outbreeding plants which we treat as *R. lomatensis*. Typically, *R. leptostachya* has flowers with the perianth tube 15–30 mm long, and narrow, almost linear lower tepals 8–12 × 1–2 mm, with the upper tepals at most 3 mm wide. The small capsules, 4–6 mm long, contain just one or two seeds per locule (up to five in tropical African material). The species appears to have a very distinctive means of vegetative reproduction through the development of thick, scaly rhizomes. These do not always elongate, resulting in the formation of clusters of corms that are well illustrated in Carter (1962).

REFERENCES

BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell and Co., London.

BAKER, J.G. 1894. Plantarum novarum in herbario horti regnii conservatorum Decas XI. *Bulletin of Miscellaneous Information, Kew* 1894: 387–391.

BROWN, N.E. 1921. New plants from tropical and South Africa collected by Archdeacon F.A. Rogers. *Bulletin of Miscellaneous Information, Kew* 1921: 287–301.

BROWN, N.E. 1932. Contributions to a knowledge of the Transvaal Iridaceae. Part II. *Transactions of the Royal Society of South Africa* 20: 261–280.

CARTER, S. 1962. *Radinosiphon leptostachya. Flowering Plants of Africa* 35: t. 1384.

GOLDBLATT, P. & MANNING, J.C. 2008. *The Iris Family: natural history and classification*. Timber Press, Portland.

ENGLER, A. 1901. Beiträge zur Flora von Afrika XXII. *Botanische Jahrbücher für Systematik* 30: 239–443.





Plate 66. A & B, ***Radinosiphon lomatensis***, Lydenburg, MP,

Subtribe 7. **Crocinae**

Crocinae [as subtribe Croceae] *Bentham & Hooker*, Genera Plantarum 3: 683 (1883). Type: *Crocus* L.

Corm often asymmetric, tunics woody or fibrous; stem often contracted and subterranean. *Leaves* often filiform or bifacial, margins either with a subepidermal sclerenchyma strand or with columnar epidermis. *Inflorescence* with solitary flowers, sometimes angled. *Flowers* actinomorphic; style branches simple or deeply divided (*Romulea*); seed epidermal cell outlines smooth; ovular vasculature intact; x = ?14 (12, 10, 7, 6, many other numbers in *Crocus*).

Genera 4, 3 in southern Africa; species ± 180, 92 in southern Africa: *Romulea* 84; *Afrocrocus* 1; *Syringodea* 7.

30. **Romulea**

Romulea *Maratti*, Plantarum Romuleae et Saturniae: 13 (1772), name conserved against *Ilmu* Adans. [Vienna Congress 1905]. Type: *Romulea bulbocodium* (L.) Sebast. & Maur. (conserved type).

Bulbocodium Gronov.: 38 (1755), illegitimate homonym, not *Bulbocodium* L. (1737). Type: *B. crocifolium* Gronov. = *Romulea bulbocodium* (L.) Sebast. & Mauri

Ilmu Adans.: 497 (1763). Type: Unknown.

Trichonema Ker Gawl.: t. 575 (1802). *Romulea* subg. *Trichonema* (Ker Gawl.) Klatt: 400 (1882). Type: *T. cruciatum* (Jacq.) Ker Gawl. = *R. cruciata* (Jacq.) Bég.

Spatalanthus Sweet: t. 300 (1829). Type: *S. speciosus* Sweet = *Romulea monadelpha* (Sweet) Baker

Bulbocodium Ludw. ex Kuntze: 700 (1891), illegitimate homonym, not *Bulbocodium* L. (1737). Type: not designated.

Revisionary accounts: De Vos: 1–307 (1972); De Vos: 10–76 (1983); Manning & Goldblatt: 59–108 (2001).

Named for Romulus, one of the legendary founders of Rome, where the type species is native.

Deciduous geophytes. *Corm* asymmetric with a pointed or crescent-shaped basal ridge, or bell-shaped with a circular basal rim, axial in origin, the tunics of hard, woody or rarely fibrous layers. *Cataphylls* 1 to 3, dry and papery or membranous. *Leaves* solitary to several, lower (1)2 or evidently all basal, blade usually bifacial and ± terete, filiform or cylindric, straight or twisted, main vein and margins ± thickened or winged and blade longitudinally 4(8)-grooved or H-shaped, rarely bifacial and channelled, glabrous or ribs ciliate; margin with fibrous vascular bundle and unspecialised epidermis. *Stem* short and subterranean or longer and aerial, angles occasionally pubescent, usually branched, sometimes only below the ground, sometimes coiled in fruit. *Inflorescence* composed of solitary flowers terminal on branches; outer bracts green with narrow or broader, colourless or brown-flecked, membranous margins, usually glabrous, smooth or prominently veined, inner bracts with broad membranous margins or ± entirely membranous, 2-veined and acute or bifid apically. *Flowers* actinomorphic, long-lived, closing tightly at night, mostly cup-shaped with shallow or deep cup, or salver-shaped, variously coloured, often pink or yellow, usually paler in centre, sometimes with darker markings around cup, sometimes with prominently coloured veining on outside, usually unscented, with nectar from septal nectarines (often only traces or lacking); perianth tube usually short and funnel-shaped, sometimes elongate and cylindric; tepals equal or subequal, usually ascending below and spreading above. *Stamens* central and symmetrically arranged; filaments inserted shortly below top of tube, ± contiguous, rarely united (in *R. monadelpha*), often slightly swollen and hairy below; anthers linear, diverging or contiguous, yellow to black. *Ovary* subglobose; style filiform, branching opposite or beyond anthers, 3-branched distally, branches usually divided for half their length or ± multifid. *Capsules* cartilaginous, oblong to subglobose. *Seeds* subglobose or lightly angled, flattened at chalazal end, smooth, matte, surface cells usually colliculate. *Pollen grains* monosulcate-operculate, operculum (1)2-banded, exine perforate-scabrate. *Basic chromosome number* x = 14 or 13, other base numbers 12, 11, 10, 9.

Species ± 94, widespread across Africa, southern Europe and the Middle East, but centred in the winter-rainfall zone of South Africa, with a secondary centre in the western Mediterranean and Canary Islands; 84 spp. in southern Africa, another 2 spp. in tropical Africa, and a further ± 8 spp. in Europe.

Romulea is recognised by the mostly stemless or short-stemmed habit, narrow and needle-like (sometimes winged) leaves with four (rarely three or eight) longitudinal grooves, and radially symmetric, funnel-shaped or more rarely salver-shaped flowers borne singly at the

branch tips. The style branches are deeply divided, even multifid in some species. The corms are usually asymmetric (rarely bell-shaped) with a rounded or pointed base, often with a crescent-shaped basal ridge, and the tunics are ± woody. The shape of the corm and the way in which the tunics fragment are diagnostic for the sections and these features are critical for correct identification of the species. Bell-shaped corms with a circular basal rim have evolved at least twice (in sections *Aggregatae* and *Romulea*). The anatomy of the leaves is taxonomically valuable, notably the degree of development of the bundle caps (touching the epidermis as vascular girders or not), the absence of secondary bundles, and the presence of fibre strands or additional vascular bundles in the rib margins (Table 1).

Molecular data place the genus in a clade with *Crocus, Syringodea* and *Afrocrocus*, all of which are distinguished by their ± bifacial leaves and variously derived pollen. Outgroup comparison suggests that oblique corms with a crescent-shaped basal ridge and woody tunics splitting into fine parallel fibres, as found in sect. *Romulea*, is ancestral for *Romulea*.

The presence or absence of yellow pigmentation in the distal part of the tepals (i.e. not the cup, which is often yellow) is often correlated with characters of the leaf anatomy or chromosome number or both. Tepal colour was therefore considered to be taxonomically critical by De Vos (1972), who treated plants with yellow to orange or salmon-pink flowers as specifically distinct from morphologically similar plants with magenta or lilac flowers. Currently *Romulea dichotoma* is the only species that includes yellow as well as pink-flowered plants. Differentiating between yellow and blue shades of pink can be difficult (and impossible in dried material without adequate colour notes).

Pollination systems in the genus are less diverse than in other large genera of Iridaceae, evidently a consequence of the conservative floral architecture and flowering phenology, and significant diversity is restricted to the winter-rainfall region species. Species with unmarked or weakly marked, cup-shaped flowers, comprising the majority, are pollinated by pollen-collecting bees, sometimes in combination with hopliine beetles (Scarabaeidae: Hopliini); those with larger, red or dark pink flowers conspicuously marked with dark blotches are specialised for pollination by hopliine beetles; and species with long floral tubes are adapted for pollination by long-proboscid flies (Goldblatt et al. 2002).

Key to sections

1a Corms rounded or pointed at base, tunics splitting into coarse, bent or straight teeth without fibrous tips; stem short and subterranean . . . . . sect. 4 *Roseae*
1a Corms either obliquely or vertically flattened toward base with crescent- or fan-shaped basal ridge, or bell-shaped with circular basal ridge, tunics fringed or splitting into fibrils or slender teeth on basal ridge or rim; stems short or well-developed:
2a Basal fibres aggregated into small, rounded clusters, the fibrils in each cluster converging and pointed, a root emerging from each cluster . . . . . sect. 3 *Aggregatae*
2b Basal fibres or teeth not aggregated into clusters of converging fibrils, sometimes the basal ridge more deeply incised between groups of parallel fibres but roots not emerging only from fibril clusters, fibrils ± blunt:
3a Corms with moderate-sized to small oblique basal ridge up to half as wide as corm; tunics splitting into slender, pointed or flexed teeth. . . . . sect. 2 *Autumnales*
3b Corms with prominent basal ridge, more than ½ as wide as corm; tunics splitting into fine, truncated fibrils . . . . . sect. 1 *Romulea*

Key to species

1. Sect. *Romulea*

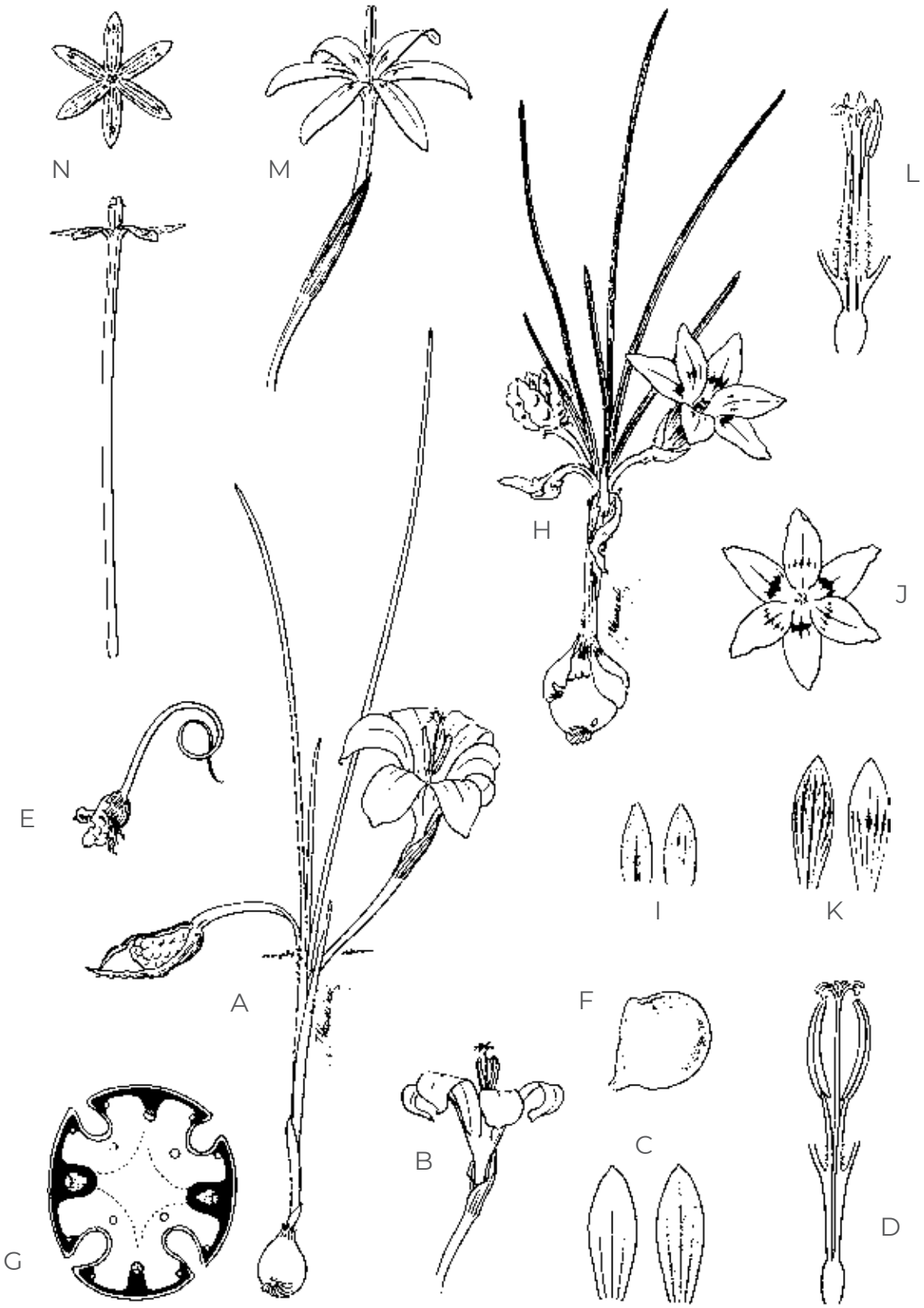
1a Corms symmetrical and bell-shaped with circular basal rim (ser. *Hirsutae*):
2a Flowers apricot-coloured or pink to magenta with yellow cup:
3a Tepals 3–5 mm wide, pale pink without dark blotches in throat . . . . . 22. *R. gracillima*
3b Tepals 6–12 mm wide, pink to apricot-coloured, with or without dark blotches in throat . . . . . 23. *R. hirsuta*
2b Flowers yellow or white with yellow cup:
4a Corm strongly depressed, disc-shaped; flowers yellow with black blotches in throat . . . . . 26. *R. discifera*
4b Corm bell-shaped; flowers white or yellow without dark blotches in throat:
5a Flowers yellow (rarely white), outer tepals greenish or cream-coloured on reverse; basal rim of the corm narrow; fruiting peduncles suberect or slightly spreading . . . . . 24. *R. triflora*
5b Flowers white, outer tepals purplish or green on reverse; basal rim of corm wide and scalloped; fruiting peduncles abruptly spreading . . . . . 25. *R. sladenii*
1b Corms obliquely flattened with crescent-shaped basal ridge or compressed with fan-shaped basal ridge:
6a Flowers salver-shaped with cylindric perianth tube ≥ 10 mm long, white to purple or magenta; filaments usually glabrous:
7a Flowers yellow; outer bracts with broad membranous margins or entirely submembranous . . . . . 33. *R. tubulosa*

TABLE 1. Chromosome number and selected leaf anatomical characters (De Vos 1972 and subsequent protologues) in southern African *Romulea* species (√ present; × absent; ? unknown).

Species	2n	Secondary bundles	Vascular girders	Rib marginal fibre strands	Rib marginal veins
1. *R. schlechteri*	24	√	×	×	×
2. *R. saxatilis*	c. 28	√	×	×	×
3. *R. vinacea*	24	×	√	×	×
4. *R. flexuosa*	c. 24	√	×	×	×
5. *R. tabularis*	24	√	×	×	×
6. *R. leipoldtii*	24	√	×	×	×
7. *R. saldanhensis*	24	√	×	×	×
8. *R. barkerae*	24	√	×	×	×
9. *R. flava*	24, 48	√	×	×	×
10. *R. elliptica*	24	√	×	×	×
11. *R. lutea*	?	√	×	×	×
12. *R. sulphurea*	?	?	?	?	?
13. *R. quartzicola*	?	√	×	×	×
14. *R. citrina*	24	√	×	√	×
15. *R. montana*	24	√	×	×	×
16. *R. toximontana*	c. 28	√	×	×	×
17. *R. singularis*	?	?	?	?	?
18. *R. namaquensis*	26	×	×	×	×
19. *R. kamisensis*	c. 26	×	√	×	×
20. *R. biflora*	24	√/×	×	×	×
21. *R. stellata*	?	×	×	×	×
22. *R. gracillima*	24	×	×	×	×
23. *R. hirsuta*	24	×	×	×	×
24. *R. triflora*	24, ?22	×	×	×	×
25. *R. sladenii*	c. 24	√	×	×	×
26. *R. discifera*	?	√	×	×	×
27. *R. multisulcata*	24	√	×	√	×
28. *R. aquatica*	24	√	√	√	×
29. *R. rupestris*	?	?	?	?	?
30. *R. speciosa*	?	√	√	√	×
31. *R. maculata*	?	?	?	?	?
32. *R. pearsonii*	?	√	√	√	×
33. *R. tubulosa*	?	√	√	√	×
34. *R. minutiflora*	26	√	√	√	×
35. *R. sinispinosensis*	50	√	×	√	×
36. *R. tetragona*	26	√	√	√	×
37. *R. austinii*	30	×	×	×	×
38. *R. tortuosa*	30	×	×	×	×
39. *R. sphaerocarpa*	c. 30, 32	×	×	×	×
40. *R. macowanii*	c. 32	×	×	×	×
41. *R. alticola*	?	√/×	√/×	×	×
42. *R. autumnalis*	22	√	√	√	×

TABLE 1. Chromosome number and selected leaf anatomical characters (De Vos 1972 and subsequent protologues) in southern African *Romulea* species (√ present; × absent; ? unknown) (continued).

Species	2n	Secondary bundles	Vascular girders	Rib marginal fibre strands	Rib marginal veins
43. *R. camerooniana*	22, 26	√	√	√	×
44. *R. gigantea*	c. 42, 44	√	√	√	×
45. *R. pratensis*	44	√	√	√	×
46. *R. pudica*	24	√	×	×	×
47. *R. sanguinalis*	24	√	×	×	×
48. *R. fibrosa*	ca. 30	√	√	×	×
49. *R. longipes*	ca. 30	√	√	×	×
50. *R. jugicola*	c. 30, 32	√	√	×	×
51. *R. dichotoma*	30	√	√	×	×
52. *R. pilosa*	?	√	√	×	×
53. *R. setifolia*	c. 30, 32, c. 54	×	×/√	×	×
54. *R. albomarginata*	30	√	√	×	×
55. *R. cedarbergensis*	?	√	√	√	×
56. *R. lilacina*	?	√/×	√	√	×
57. *R. rosea*	18	√	√	√	×
58. *R. cruciata*	18	√	√	√	×
59. *R. eximia*	18	√	√	√	×
60. *R. obscura*	22	√	√	√	×
61. *R. monticola*	22	√	√	√	×
62. *R. atrandra*	22	√	√	√	√
63. *R. vlokii*	?	√	√	√	√
64. *R. hallii*	22	√	√	√	√
65. *R. komsbergensis*	20	√	√	√	√
66. *R. multifida*	22	√	√	√	√
67. *R. luteoflora*	20	√	√	√	√
68. *R. sanisensis*	?	?	?	?	?
69. *R. diversiformis*	20	√	√	√	×
70. *R. eburnea*	?	×	√	√	√
71. *R. monophylla*	?	?	?	?	?
72. *R. fuscomontana*	?	×	√	√	×
73. *R. malaniae*	24	√	√	√	√
74. *R. collina*	?	√	√	√	√
75. *R. membranacea*	c. 24	√	√	√	×
76. *R. hirta*	26	√	√	?	?
77. *R. subfistulosa*	26	√	√	√	√
78. *R. unifolia*	?	√	√	√	√
79. *R. sabulosa*	26	√	√	√	√
80. *R. monadelpha*	26	√	√	√	√
81. *R. viridibracteata*	26	√	√	√	√
82. *R. syringodeoflora*	20	×	√	√	×
83. *R. albiflora*	?	×	√	√	×
84. *R. hantamensis*	30	√	√	√	×



ROMULEA. R. eburnea: A, flowering plant; B, flower; C, detached inner tepal (left) and outer tepal showing lower surface; D, detail of stamens and style; E, dehisced capsule; F, seed; G, tissue plan of leaf transection. ***R. collina***: H, flowering plant; I, outer bract (left) and inner bract (right); J, flower front view; K, detached outer tepal (left) and inner tepal (right) showing lower surface; L, detail of stamens and style. ***R. albiflora***: M, flower. ***R. hantamensis***: N, flower front view (top) and side view (bottom).

7b Flowers white or blue to purple; outer bracts with narrow membranous margins:
8a Leaf 1(2); filaments inserted near top of tube, thus ± entirely exserted; perianth tube 11–17 mm long (ser. *Stellanthe*) . . . . . 21. *R. stellata*
8b Leaves 3 to 6; filaments inserted near middle of tube, thus mostly or entirely included:
9a Perianth tube 17–25 mm long; filaments inserted in upper half of tube, 4–5 mm long, glabrous 19. *R. kamisensis*
9b Perianth tube 10–13 mm long; filaments inserted in lower half of tube, 8–9 mm long, pilose basally . . . . . 17. *R. singularis*
6b Flowers funnel-shaped with perianth tube < 10 mm long; filaments often hairy:
10a Basal foliage leaves 4-winged, H-shaped in section and usually conspicuously ciliate; peduncles hairy (ser. *Tetragonae*) . . . . . 36. *R. tetragona*
10b Basal foliage leaves ± terete and narrowly grooved, rarely T-shaped in section but never winged and H-shaped in section; peduncles glabrous:
11a Leaf blades 5- to 8-grooved; plants aquatic with corms submerged (ser. *Aquaticae*):
12a Basal foliage leaves 2; style 12–15 mm long, dividing near anther apices; fruiting peduncles widely spreading, 50–90 mm long . . . . . 27. *R. multisulcata*
12b Basal foliage leaf 1; style 4–8 mm long, dividing near anther bases; fruiting peduncles erect, 10–50 mm long . . . . . 28. *R. aquatica*
11b Leaf blades 4-grooved, sometimes channelled above; plants not aquatic but sometimes growing in marshy ground:
13a Outer bracts with conspicuous brown-streaked membranous apices and/or margins (ser. *Namaquana*):
14a Flowers carmine-red. . . . . 30. *R. speciosa*
14b Flowers white to mauve or yellow:
15a Stem well-exserted with long internode above basal leaf . . . . . 29. *R. rupestris*
15b Stem subterranean or shortly exserted:
16a Upper cataphyll pale green; flowers yellow . . . . . 32. *R. pearsonii*
16b Upper cataphyll purple speckled white; flowers white . . . . . 31. *R. maculata*
13b Outer bracts with narrow or scarcely visible membranous apices and margins:
17a Inner bracts wholly scarious or submembranous, differing markedly from outer bracts; basal foliage leaf 1 when stem elongated; outer tepals without dark feathering on reverse:
18a Flowers white with large black blotches bordered with yellow in throat; leaves widely 2-grooved and T-shaped in section . . . . . 8. *R. barkerae*
18b Flowers without dark blotches; leaves 4-grooved:
19a Flowers pale or sulphur-yellow, white or blue; inner bracts usually scarious . . . . . 9. *R. flava*
19b Flowers golden- or orange-yellow (rarely cream-coloured with golden-yellow cup); inner bracts often greenish in upper half, central part sometimes spotted with brown . . . . . 7. *R. saldanhensis*
17b Inner bracts usually with green median zone and wide membranous margins, rarely both outer and inner bracts membranous; basal leaves usually 2 when stem elongated; outer tepals with or without dark feathering on reverse:
20a Flowers uniformly yellow:
21a Outer bracts membranous throughout or in lower half, rarely green; leaves often channelled for most of length (ser. *Tortuosae*):
22a Perianth tube 13–35(–65) mm long, lower part elongate and cylindric, widening distally; bracts 20–60 mm long . . . . . 40. *R. macowanii*
22b Perianth tube 3–10 mm long, cylindric basal part very short; bracts 10–25 mm long:
23a Foliage leaf 1(2), with adhering sand particles . . . . . 39. *R. sphaerocarpa*
23b Foliage leaves 2 to 8, without adhering sand particles:
24a Basal ridge oblique to vertical, sometimes fan-shaped and much wider than corm; leaves 4 to 8, often flexuous or twisted, bifacial almost to tip, sometimes conspicuously ciliate; outer bracts largely membranous or submembranous . . . . . 38. *R. tortuosa*
24b Basal ridge oblique, not or scarcely wider than corm; leaves 2 to 4(6), suberect or spreading, bifacial only in lower half, never ciliate; outer bracts green or submembranous in lower half . . . . . 37. *R. austinii*
21b Outer bracts mostly green with or without narrow membranous margins:
25a Filaments at least twice as long as anthers:
26a Leaves 3 to 5, filiform, acute; bracts ovate-lanceolate, inner with broad membranous margins > 1 mm wide; perianth tube 4–5 mm long; tepals acute, with dark marks at base . . . . . 12. *R. sulphurea*
26b Leaves 2 or 3, terete to subclavate, obtuse; bracts suborbicular, inner with narrow membranous margins < 1 mm wide; perianth tube 7–8 mm long; tepals obtuse, without dark marks at base . . . . . 13. *R. quartzicola*
25b Filaments less than twice as long as anthers, mostly ± as long as anthers:
27a Inner bracts with relatively narrow colourless margins widened only at base; reverse of outer tepals green with brown flecks along margins . . . . . 10. *R. elliptica*
27b Inner bracts with wide, brownish or brown-flecked margins; reverse of outer tepals green or irregularly streaked but without distinct brown flecks along margins:
28a Basal foliage leaf 1; flowers unmarked. . . . . 11. *R. lutea*
28b Basal foliage leaves 2; flowers with or without dark marks in throat:
29a Corm with narrow basal ridge and fibrils uniformly arranged; fruiting peduncles at first curved, later suberect. . . . . 14. *R. citrina*
29b Corm with wide basal ridge, often wider than the corm, fibrils irregularly clustered; fruiting peduncles widely spreading . . . . . 15. *R. montana*

20b Flowers not entirely yellow although usually with a yellow cup:
30a Filaments inserted in middle of tube or above, usually red or reddish black; flowers with little or no yellow in cup. . . . . 18. *R. namaquensis*
30b Filaments inserted in lower half of tube, yellow to orange:
31a Corm higher than wide with high, chisel-shaped basal ridge; stem subterranean; flowers up to 20 mm long; inner bracts usually with conspicuously brown-spotted membranous margins (ser. *Minutiflorae*):
32a Flowers 7–15 mm long, often with mauve throat, tepals 4–9 mm long and < 3 mm wide; inner bract margins conspicuously brown-spotted . . . . . 34. *R. minutiflora*
32b Flowers 15–20 mm long, white, tepals 10–12 × 3–4 mm; inner bract margins inconspicuously spotted . . . . . 35. *R. sinispinosensis*
31b Corm ± as wide as high or wider; stem usually aerial; flowers up to 35 mm long; inner bracts with unspotted or spotted membranous margins:
33a Flowers rose-coloured or pink with large violet or purple blotches in yellow throat . . . . . 20. *R. biflora*
33b Flowers without blotches in throat or rarely pale lilac with small blotches:
34a Anthers sagittate, connectives attenuate and produced 2.5–6.0 mm above thecae . . . . . 4. *R. flexuosa*
34b Anthers oblong, connectives not produced:
35a Corm obliquely flattened with wide, fan-like basal ridge. . . . . 16. *R. toximontana*
35b Corm not flattened, with narrow, crescent-shaped basal ridge:
36a Tepals usually bicoloured above cup, lower third or half yellow and upper part white to blue or lilac; fruiting peduncles at first recurved, later suberect; inner bract margins flecked with brown:
37a Basal leaves 2; bracteole green and leathery with broad membranous margins; upper part of tepals cream-coloured or white, 5–8 mm wide; outer tepals not blotched on reverse . . . . 6. *R. leipoldtii*
37b Basal leaf usually 1; bracteole green or submembranous with central part flushed purplish; upper part of tepals bluish or white, usually up to 5 mm wide; outer tepals often irregularly blotched on reverse . . . . . 5. *R. tabularis*
36b Tepals unicoloured above cup; fruiting peduncles not recurved; inner bract margins translucent or speckled:
38a Outer tepals shiny and wine-red on reverse, inner tepals pale; tepals mostly obtuse. . . . . 3. *R. vinacea*
38b Outer tepals not shiny and wine-red; tepals acute to subobtuse:
39a Stem rigid; flowers pale lilac to mauve, pink or cream-coloured; stamens 8–19 mm long . . . . . 1. *R. schlechteri*
39b Stem slender and wiry; flowers magenta, rarely pale pink; stamens 6–8 mm long . . . . 2. *R. saxatilis*

2. Sect. *Autumnales*

1a Corm with inconspicuous, pointed basal ridge much less than half as wide as corm; flowers often pink or purple with yellow cup:
2a Corm tunics papery, splitting into slender teeth curved over basal ridge, becoming almost fibrous with age; leaves 3 or 4; stem exserted (ser. *Alticolae*). . . . . 41. *R. alticola*
2b Corm tunics woody, splitting into small teeth converging on basal point; leaves up to 6; stem subterranean (ser. *Autumnales*):
3a Stamens and style not reaching halfway up perianth, included in cup; tepals mostly 20–30 mm long; bracts sparsely striate and soft-textured basally . . . . . 42. *R. autumnalis*
3b Stamens and style reaching more than halfway up perianth, exserted from cup; tepals mostly 12–20 mm long; bracts closely ribbed, rarely softer basally . . . . . 43. *R. camerooniana*
1a Corm with prominent basal ridge at least half as wide as corm, tunics splitting into teeth bent over and fragmenting across basal ridge; stem subterranean or aerial; flowers white or pale pink to blue with greenish yellow cup (ser. *Pratenses*):
4a Corm tunics with basal fibrils parallel and not clustered; bract green throughout; flowers usually white . . . . 44. *R. gigantea*
4b Corm tunics with basal fibrils aggregated into regular clusters converging at tips, each cluster separated by a deeper cleft; bract submembranous in lower half; flowers usually pale pink. . . . . 45. *R. pratensis*

3. Sect. *Aggregatae*

1a Flowers carmine-red with or without whitish or yellow cup; anthers longer than filaments (ser. *Amoenae*):
2a Corm bell-shaped with circular basal rim; flowers with paler cup and dark blotches in throat; filaments whitish, puberulous below. . . . . 46. *R. pudica*
2a Corm oblique with incompletely circular basal rim; flowers uniformly carmine-red; filaments reddish, glabrous . . . . . 47. *R. sanguinalis*
1b Flowers magenta, pink, apricot-coloured, orange, yellow or white with yellow cup; anthers shorter than or as long as filaments (ser. *Aggregatae*):
3a Stem usually short; leaves filiform, glabrous; inner bracts with membranous margins unmarked:
4a Flowers white to pink, outer tepals flushed dark on reverse . . . . . 54. *R. albomarginata*
4b Flowers yellow to apricot-coloured . . . . . 53. *R. setifolia*
3b Stem usually well-developed; leaves filiform to H-shaped and winged, glabrous or median ribs pilose; inner bracts with membranous margins usually brown-flecked or edged, at least in upper part:
5a Leaves falcate, 4–6 mm wide, H-shaped in section with median ribs winged and pilose, lateral ribs not raised; bracts pilose . . . . . 52. *R. pilosa*

5b Leaves filiform to linear, 1–2 mm wide, X-shaped or I-shaped with median ribs thickened and glabrous or pilose and lateral ribs thickened and raised; bracts glabrous:
6a Corm tunics split from base into long strips fringed with converging fibrils along edges and clustered at tips, fibrous above and forming conspicuous neck; flowers pink to magenta with violet blotches in throat . . . .48. *R. fibrosa*
6b Corm tunics not split into long strips from base, with clusters of fibrils only at tips, with or without fibrous neck; flowers variously coloured:
7a Basal foliage leaves 2, median ribs glabrous or ciliate on margins; flowers pale greenish, cream-coloured, yellow or apricot-coloured, often with dark apricot-coloured veins; plants from near Port Elizabeth eastwards . . . . . 49. *R. longipes*
7b Basal foliage leaf 1 (rarely 2 but then lower leaf shorter), median ribs often villous or pilose on margins; flowers pink or yellow to orange; plants from west of Humansdorp:
8a Leaves X-shaped in cross section, lateral and median ribs subequal and angled, with secondary vein on either side of median vein (visible under microscope only); flowers orange; plants form Little Karoo mountains . . . . . .50. *R. jugicola*
8b Leaves ± I-shaped in section, lateral ribs reduced and rounded, partially concealed by arching, winged median ribs, without secondary veins; flowers pink to orange or yellow; plants from coastal mountains . . . . . 51. *R. dichotoma*

4. Sect. *Roseae*

1a Flowers salver-shaped with cylindric perianth tube 15–70 mm long; filaments inserted near top of tube, glabrous:
2a Corm pointed with straight basal teeth; peduncles not or scarcely exserted at flowering; perianth tube 35–70 mm long (ser. *Tubiformes*). . . . . 84. *R. hantamensis*
2b Corm rounded with curved or bent basal teeth; peduncles ± exserted at flowering; perianth tube 15–30 mm long (ser. *Lomurea*):
3a Flowers white; leaves conspicuously hairy, ± straight and at least twice as long as inflorescence . . . . . 83. *R. albiflora*
3b Flowers pink to purple; leaves sparsely hairy, curved outward below flowers . . . . . 82. *R. syringodeoflora*
1b Flowers cup- or funnel-shaped with perianth tube up to 6 mm long; filaments inserted near base of tube, usually pilose below:
4a Basal leaves 4-winged and H-shaped in section, with two wide lateral grooves and a strong vein up the middle of each groove, glabrous to villous; flowers pale yellow (ser. *Hirtae*) . . . . . 76. *R. hirta*
4b Basal leaves narrowly 4-grooved, without evident vein up middle of grooves:
5a Inner and often also outer bracts submembranous or at most subherbaceous in upper half:
6a Corm pointed, with straight basal teeth; flowers without dark blotches . . . . . .75. *R. membranacea*
6b Corm rounded, with curved or bent basal teeth; flowers with or without dark blotches:
7a Leaves 7 to 9; flowers with dark blotches in throat; filaments ± twice as long as anthers . . . . . .74. *R. collina*
7b Leaves 1 to 4; flowers without dark blotches in throat; filaments ± as long as anthers or only slightly longer:
8a Inner bracts without brown spotting; fruiting peduncles unknown; plants from Cederberg and Swartruggens:
9a Leaf emergent at flowering; peduncles short, flowers borne at ground level; outer bract entirely membranous or submembranous . . . . . 72. *R. fuscomontana*
9b Leaf fully developed at flowering; peduncles well-developed, flowers well exserted; outer bract ± herbaceous . . . . . .71. *R. monophylla*
8b Inner bracts with brown-speckled membranous margins; fruiting peduncles coiled; plants from Klein Roggeveld and Koo:
10a Perianth tube 10–13 mm long; tepals 23–25 mm long; anthers ± 8 mm long; style exserted beyond stamens . . . . . 70. *R. eburnea*
10b Perianth tube 5–9 mm long; tepals 8–20 mm long; anthers 3–4 mm long; style shorter than stamens . . . . . 73. *R. malaniae*
5b Inner and outer bracts ± herbaceous with membranous margins:
11a Outer bracts with well-developed membranous tips; fruiting peduncles usually coiled (ser. *Atrandrae*):
12a Flowers yellow:
13a Leaves 6 to 9; tepals unequal, inner 2–3 mm wider than outer, uniformly golden-yellow; bracteoles with colourless or pale brownish membranous margins; style exserted beyond anthers . . . . . .69. *R. diversiformis*
13b Leaves 2 to 6; tepals subequal; bracteoles usually with brown-flecked membranous margins; style not exserted beyond anthers:
14a Corm tunics woody; perianth tube cup- or funnel-shaped, less than half as long as tepals; tepals 16–35 mm long; filaments inserted near base of tube, ± as long as anthers; anthers 4–9 mm long; plants from Northern and Western Cape . . . . . .67. *R. luteoflora*
14b Corm tunics papery; perianth tube narrowly funnel-shaped, more than half as long as tepals; tepals 10–12 mm long; filaments inserted at or above middle of tube, longer than anthers; anthers 2–3 mm long; plants from Lesotho/KwaZulu-Natal Drakensberg. . . . . 68. *R. sanisensis*
12b Flowers white or lilac to magenta with yellow or white cup:
15a Corm pointed, with straight basal teeth . . . . . .63. *R. vlokii*
15b Corm rounded, with curved or bent basal teeth:
16a Style branches much-divided, stigmas usually more than 12; leaves 2 or 3 . . . . . 66. *R. multifida*
16b Style branches bifid, stigmas usually 6:
17a Perianth cup brown at base, not longitudinally striped; membranous margins of inner bract as wide as green median part throughout; anthers usually coiled; pollen usually orange or rust-red, rarely yellow . . . . . 65. *R. komsbergensis*

17b Perianth cup yellow at base, often longitudinally striped; membranous margins of inner bract narrower than green median portion at least below; anthers erect; pollen yellow to orange:
18a Outer bracts with ovate or oblong green median zone; flowers white or lilac to magenta. . . . . 62. *R. atrandra*
18b Outer bracts with triangular green median zone; flowers pale lilac-blue. . . . . 64. *R. hallii*
11b Outer bracts with inconspicuous membranous tip; fruiting peduncles never coiled:
19a Corm pointed with straight basal teeth; capsules pointed and obscurely beaked:
20a Flowers (35–)40–60 mm long, old-rose to terracotta-coloured with dark blotches in throat and with pale yellow or greenish yellow cup; filaments (6–)9–12 mm long. . . . . 59. *R. eximia*
20b Flowers 25–35 (40) mm long, magenta to lilac with dark blotches in throat and with golden-yellow or orange-yellow cup; filaments 3–6 mm long. . . . . 58. *R. cruciata*
19b Corm rounded with curved or bent basal teeth; capsule obtuse to truncate:
21a Inner bracts 2-keeled with 2 stronger veins, especially in upper half; outer bract often distinctly keeled in upper half; perianth tube cup-shaped (ser. *Bicarinatae*):
22a Flowers yellow. . . . . 81. *R. viridibracteata*
22b Flowers red, orange or pink:
23a Leaves ± 1 mm diam., filiform with 4 narrow grooves; outer bracts with membranous margins sometimes ± entirely black:
24a Filaments oblong, black, fused in a stout column or free but closely adpressed; peduncle angled. . . . 80. *R. monadelpha*
24b Filaments tapering, pale or dark, free; peduncle terete . . . . . 79. *R. sabulosa*
23b Leaves 2–5 mm wide, ± swollen with 4 wide grooves, sometimes H-shaped; outer bracts with membranous margins colourless or lightly brown-flecked:
25a Leaves 4 to 9; flowers pinkish red . . . . . 77. *R. subfistulosa*
25b Leaf 1 (rarely 2 or 3 but then additional leaves much smaller); flowers orange-red . . . . . 78. *R. unifolia*
21b Inner bracts not 2-keeled and without 2 stronger veins; outer bract not keeled; perianth tube funnel-shaped:
26a Flowers bright yellow with darker veins in throat; membranous margins of bracteoles ± as wide as central green portion; fruiting peduncles suberect or curved; from Bokkeveld and Matsikamma-Giffberg . . . . . 61. *R. monticola*
26b Flowers lilac to pink, apricot-coloured or white, rarely yellow but then membranous margins of bracteoles distinctly narrower than central green portion and fruiting peduncles widely spreading; from Cederberg southwards:
27a Leaves 3 to 12, terete, 0.5–1.5 mm diam.; flowers 2 or more; anthers ± as long as or longer than filaments:
28a Flowers apricot-, terracotta-, deep old-rose-coloured or yellow; fruiting peduncles widely spreading from base. . . . . 60. *R. obscura*
28b Flowers magenta, lilac-pink or rosy pink to white; fruiting peduncles straightening and suberect . . . . . 57. *R. rosea*
27b Leaves 1 or 2, rarely 3, filiform, ± 0.5–1.0 mm diam.; flowers 1, rarely 2; anthers half as long as filaments or less:
29a Leaves usually 2, not sticky; inner bracts with purple central portion; flowers with distinct yellow cup, tepals 7–16 mm long; stamens yellow, filaments 5–6 mm long . . . . . 55. *R. cedarbergensis*
29b Leaf 1, sticky; inner bracts ± entirely membranous; flowers yellow at base of tepals but without distinct yellow cup, tepals 16–20 mm long; stamens lilac, filaments 9–10 mm long. . . . . 56. *R. lilacina*

Sect. 1. **Romulea**

[Ser. *Romulea* is entirely European and is distinguished from ser. *Ciliatae* by the presence of fibre strands in the leaf rib margins and by a somatic chromosome number $2n = 34, 36$.]

Ser. **Ciliatae** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank and new synonym. *Romulea* subsect. *Ciliatae* M.P.de Vos in Journal of South African Botany, Suppl. 9: 60 (1972). *R.* sect. *Ciliatae* (M.P.de Vos) J.C.Manning & Goldblatt: 76 (2001). Type: *R. flava* (Lam.) M.P.de Vos

Corm subglobose, obliquely flattened toward base or almost bilaterally compressed; basal rim finely fringed. *Stem* subterranean or aerial. *Leaves* usually with secondary bundles and vascular girders, without rib marginal fibre strands or rib marginal bundles. *Chromosome number* $2n = 24, 26, 28$.

1. **Romulea schlechteri** *Bég.* in Botanische Jahrbücher für Systematik 38: 335 (1907). Type: South Africa, [Western Cape], Pakhuis Mtns, *Schlechter 8648* (B, lecto., designated by De Vos: 64 (1972); BOL, BM, G, K, Z, isolecto.).

Romulea elegans var. *parviflora* Baker: 42 (1896). Type: South Africa, [Western Cape], Swartberg, Caledon, *Zeyher 4043* (K, holo.; K, P, iso.).

Romulea ×*hybrida* Bég.: 339 (1907). Type: South Africa, [Western Cape], Swartberg near Caledon, *Zeyher 4043* (G, holo.; K, P, iso.).

Plants (20–)40–200 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 7–15 mm diam., tunics splitting into fine parallel fibrils along ridge, sometimes forming fibrous neck above. *Stem* subterranean or aerial, exserted

up to 200 mm. *Leaves* 3 to 5 (rarely more), lowermost 2 basal, terete or compressed-cylindric and narrowly 4-grooved, 0.5–1.5 mm diam., sometimes ciliolate along rib margins. *Peduncles* mostly up to 4, rarely up to 12, semiterete, sometimes ciliolate on sharp angles, suberect or spreading in fruit; outer bracts green with narrow membranous margins, 10–25 mm long, widely striate (3 or 4 veins/mm), inner bracts with broad, colourless membranous margins. *Flowers* pale violet, lilac-pink, white or cream-coloured, sometimes with dark lines in throat, cup pale to golden-yellow or orange, outer tepals green or irregularly blotched or streaked on reverse, sweetly scented; perianth tube funnel-shaped, 3–7 mm long; tepals elliptic, 12–40 × 4–12 mm. *Filaments* 4–10 mm long, pilose at base, yellow; anthers 4–9 mm long, pale or golden-yellow. *Style* dividing below or above anther tips, branches 2–4 mm long, divided halfway. *Capsules* ellipsoid, 8–10 mm long. *Flowering time*: July to September (October)

Distribution and ecology: scattered through the extreme southwestern parts of Western Cape, South Africa, from Vredendal along the coast to Mamre and inland from the Cederberg to the Kleinrivier Mtns above Hermanus; in sandy soils in fynbos.

An especially attractive race with large, cream-coloured flowers with orange cups occurs in coastal sandveld vegetation between Mamre and Yzerfontein.

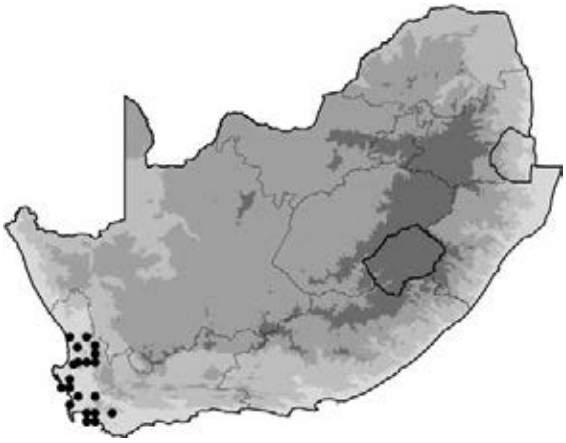
Diagnosis: a poorly defined species without any distinctive features and including those members of ser. *Ciliatae* with two basal leaves (glabrous or ciliolate on the rib margins), bracteoles with unmarked membranous margins, and lilac-pink, pale violet or white to cream-coloured flowers with a pale or golden-yellow cup. The outer tepals are greenish or irregularly blotched with purple. See *Romulea saxatilis* and *R. vinacea* for characteristics of those species. Confusion is also possible with forms of *R. tabularis* in which the basal yellow pigmentation on the tepals is reduced but this species, which favours waterlogged or marshy sandy flats, has a solitary basal leaf and the bracteole margins are flecked with brown on the edges.

2. **Romulea saxatilis** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 71 (1972). Type: South Africa, [Western Cape], Ceres, *Guthrie 18558* (BOL, holo.).

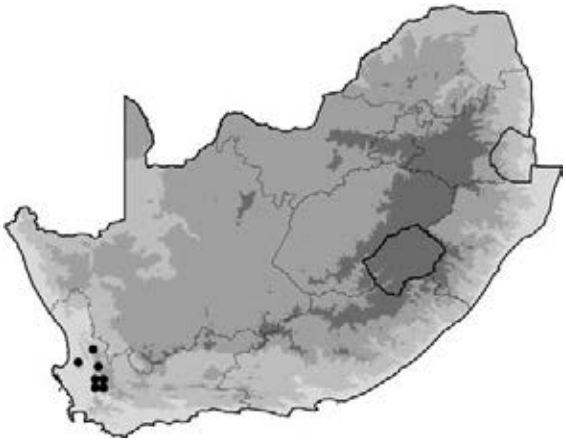
Plants (40–)70–200 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 7–15 mm diam., tunics splitting into fine parallel fibrils along ridge, sometimes forming fibrous neck above. *Stem* usually aerial, exserted up to 200 mm, very slender, almost wiry. *Leaves* 3 to 4, lowermost 2 basal, filiform and narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 3, semiterete, suberect or spreading in fruit; outer bracts green with narrow membranous margins, 8–15 mm long, finely striate (5 or 6 veins/mm), inner bracts with broad, membranous margins colourless or brown-flecked along edge. *Flowers* deep (rarely pale) pink, with short dark lines or small blotches in throat, cup golden-yellow, outer tepals streaked on reverse, rose-scented; perianth tube funnel-shaped, 4–6 mm long; tepals elliptic, 9–22 × 4–6 mm. *Filaments* 3–5 mm long, pilose at base or throughout, golden-yellow; anthers 3–4 mm long, pale yellow. *Style* dividing just below or just beyond anthers apices, branches ± 2 mm long, divided halfway. *Capsules* subglobose to ellipsoid, 5–8 mm long. *Flowering time*: September, October (November).

Distribution and ecology: a montane species endemic to the western mountains in Western Cape, South Africa, from the Cederberg through the Cold Bokkeveld and Olifants River Mtns to Tulbagh and on the Piketberg; in rocky sand in fynbos.

Diagnosis: distinguished from *Romulea schlechteri* by the very slender, almost wiry stems, mostly smaller, usually deep pink flowers with golden-yellow cup, and shorter stamens 6–8 mm long. The two species differ also in chromosome number (De Vos 1972). *Romulea saxatilis* may also be confused with *R. vinacea*, which has the outer tepals dark plum-coloured or wine-red on the reverse, and distinctly ciliate leaves and peduncles.



Distribution of ***Romulea schlechteri***.



Distribution of ***Romulea saxatilis***.

3. **Romulea vinacea** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 69 (1972). Type: South Africa, [Western Cape], Pakhuis Pass, *Lewis 2120* (SAM, holo.; PRE, iso.).

Plants 40–150(–200) mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 5–15 mm diam., tunics splitting into fine parallel fibrils along ridge, sometimes forming fibrous neck above. *Stem* subterranean or aerial, exserted up to 100 mm. *Leaves* 3 to 5, lowermost 2 basal when stem exserted, terete or filiform and narrowly 4-grooved, 1.0–1.5 mm diam., ciliate along rib margins. *Peduncles* up to 3, up to 50 mm long, semiterete, ciliolate along angles, suberect in fruit; outer bracts green with narrow membranous margins, 12–25 mm long, finely striate (5 or 6 veins/mm), inner bracts with broad, membranous margins brown-flecked along edge. *Flowers* pale lavender or lilac with darker veins or small blotch at base around cream-coloured cup marked with yellow at base, outer tepals glossy plum-coloured or wine-red on reverse, inner tepals pale lilac; perianth tube funnel-shaped, 4–6(–8) mm long; tepals elliptic, 14–28 × 6–10 mm, usually obtuse. *Filaments* 6–9 mm long, pilose throughout or only basally, cream-coloured; anthers 4–6 mm long, cream-coloured. *Style* dividing ± at anther apices, branches ± 3 mm long, divided halfway. *Capsules* subglobose to ellipsoid, 5–15 mm long. *Flowering time*: (July) August, September.

Distribution and ecology: endemic to the western mountains of Western Cape, South Africa, and originally thought to be restricted to the Pakhuis Mtns near the top of Pakhuis Pass but now including populations from the Olifants River Mountains near Graafwater and also Oorlogskloof on the Bokkeveld Mountains; in rocky sand in fynbos.

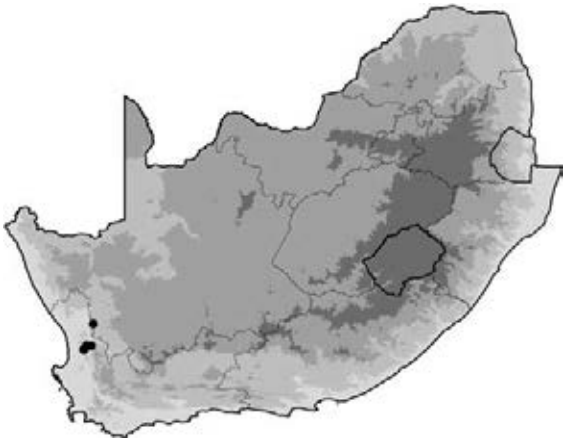
Diagnosis: distinguished from similar pink or lilac-flowered species such as *Romulea schlechteri* and *R. saxatilis* by the strongly discolorous outer segments glossy dark plum-coloured or wine-red on the reverse, contrasting strongly with the pale inner tepals. Additional features of the species are leaves with ciliate rib margins, peduncles with ciliolate angles, and inner bracts with the margins brown-flecked along the edge.

4. **Romulea flexuosa** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 400 (1882). Type: South Africa, without precise locality, *Drège 4038* (1 and 4) (S, holo.).

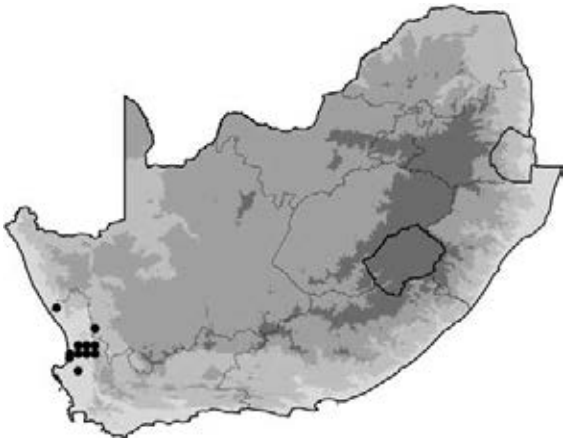
Romulea attenuata M.P.de Vos: 101 (1955). Type: South Africa, [Western Cape], Clanwilliam, Elandsfontein, *Leipoldt 4247* (BOL, holo.; STE, iso.).

Plants 50–150(–200) mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 8–20 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* usually aerial, exserted up to 200 mm. *Leaves* 3 to 5, lowermost 2 basal when stem exserted, terete or filiform and narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 3, up to 60 mm long, semiterete, arcuate in fruit; outer bracts green with narrow membranous margins, 15–30 mm long, lightly striate (5 or 6 veins/mm), inner bracts with broad, colourless membranous margins. *Flowers* white or rarely pale lilac with darker veins and buff- or cream-coloured cup, outer tepals irregularly streaked with purple or green on reverse, lightly scented; perianth tube funnel-shaped, 5–8 mm long; tepals elliptic or narrowly oblanceolate-acuminate, (20–)25–35 × 7–11 mm. *Filaments* 6–7 mm long, pilose basally, white; anthers 12–15 mm long, widely sagittate below, connective attenuate and produced 2.5–6.0 mm beyond thecae, white. *Style* dividing near middle of anthers, branches 2–3 mm long, divided halfway. *Capsules* ellipsoid, up to 10 mm long. *Flowering time*: April to July.

Distribution and ecology: an early-flowering, mainly montane species ranging along the West Coast, South Africa, recorded from west of Bitterfontein in Namaqualand, and from the Bokkeveld Escarpment in Northern Cape along the Cederberg and Olifants River Mtns to the Piketberg in Western Cape, with a single



Distribution of ***Romulea vinacea***.



Distribution of ***Romulea flexuosa***.

unlocalised and unsubstantiated collection from the Hottentots Holland Mtns; on granite or sandstone slopes among rocks.

Diagnosis: instantly recognised by the unique anthers, sagittate at the base with the connective produced apically well beyond the thecae as an attenuate membranous appendage. The white to pale lilac flowers are relatively large, with ± acuminate tepals.

5. **Romulea tabularis** *Eckl. ex Bég.* in Botanische Jahrbücher für Systematik 38: 337 (1907). Type: South Africa, [Western Cape], Cape of Good Hope, *Ecklon & Zeyher 595 Irid. 199* (B, holo.).

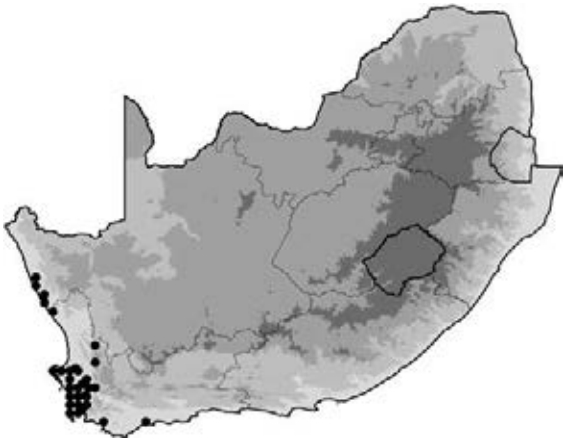
Romulea rosea var. *parviflora* Baker: 104 (1892). Type: South Africa, without precise locality, *Drège s.n. 'Trichonema recurvum* b' (K, holo. [in part]).

Romulea versicolor Bég.: 116 (1909). Type: South Africa, [Western Cape], Darling, *Schlechter 5340* (BOL, lecto., designated by De Vos: 94 (1972); GRA, K, Z, iso.).

Romulea duthieae L.Bolus: 342 (1928). Type: South Africa, [Western Cape], Stellenbosch flats, *Duthie s.n.* (BOL, holo.; NBG, iso.).

Plants 50–150(–200) mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 5–10 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* usually aerial, exserted up to 150 mm. *Leaves* 2 to 5, lowermost 1(2) basal when stem exserted, terete or compressed-cylindric and narrowly 4-grooved, 1–2 mm diam., cauline leaves clustered at stem apex. *Peduncles* up to 10, up to 80 mm long, semiterete, strongly curved initially in fruit but later suberect; outer bracts green with narrow membranous margins, 8–16(–20) mm long, lightly striate (4 or 5 veins/mm), inner bracts either green or submembranous with central part flushed purplish, with broad membranous margins speckled with brown along margins and sometimes in central area. *Flowers* usually pale or darker lavender-blue or white to cream-coloured in distal half, cup and lower half of segments orange or golden-yellow, often with pale transverse band in throat, outer tepals irregularly streaked or entirely purple or green on reverse, sometimes lightly scented; perianth tube funnel-shaped, 3–5 mm long; tepals elliptic, 10–28 × 3–7 mm. *Filaments* 3–6 mm long, pilose basally, yellow; anthers 3–6 mm long. *Style* dividing slightly below to beyond anther tips, branches 1–2 mm long, divided halfway. *Capsules* ellipsoid or cylindric, ± 10 mm long. *Flowering time*: July to October.

Distribution and ecology: largely coastal, from Hondeklip Bay in Northern Cape along the West Coast to Bredasdorp in Western Cape, South Africa; on seasonally waterlogged or marshy, sandy or loamy flats, often in dense colonies.



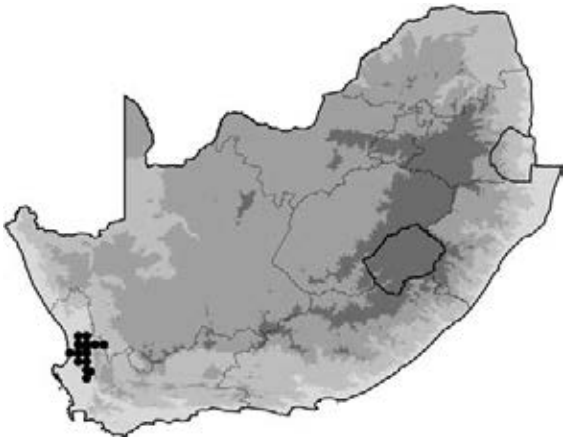
Distribution of ***Romulea tabularis***.

Diagnosis: varying in the length of the stem, number of basal leaves, flower colour, and length of the style but generally recognised by the lavender-blue (rarely white) flowers with orange or golden-yellow cup extending onto the basal half of the tepals, mostly solitary basal leaf, and often somewhat submembranous inner bracts with brown-flecked membranous margins. The species is closely allied to *Romulea leipoldtii*, which is distinguished by its invariably two basal leaves, generally larger, white or cream-coloured flowers with tepals 18–35 × 5–8 mm, the outer tepals not marked on the reverse, and inner bracts that are green and leathery in the centre.

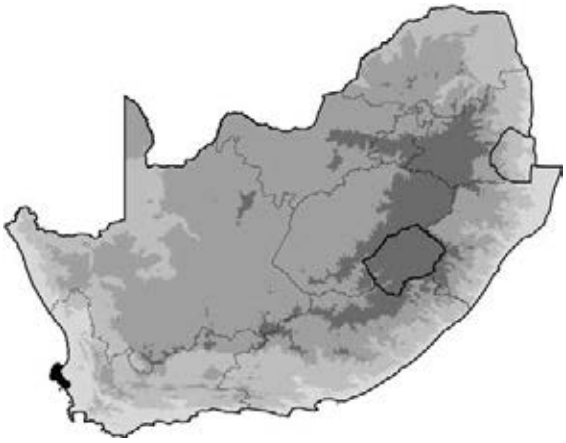
Specimens with two basal leaves may also be confused with *Romulea schlechteri* from drier situations, which has the yellow pigment restricted to the cup itself and not extending onto the lower half of the tepals, and inner bracts without brown flecks on the membranous margins.

6. **Romulea leipoldtii** *Marais* in Curtis's Botanical Magazine 175: t. 460 (1964). Type: South Africa, [Western Cape], Citrusdal, Warm Baths, *Leipoldt s.n.* (K, holo.).

Plants 60–300 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 7–15 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* usually aerial, exserted up to 200 mm. *Leaves* 3 to 5, lowermost 1 or 2 basal when stem exserted, filiform or terete and narrowly 4-grooved, 1.0–1.5 mm diam., cauline leaves clustered at stem apex. *Peduncles* up to 8, up to 70 mm long, semiterete, arcuate initially in fruit but later suberect; outer bracts green with narrow membranous margins, 12–18(–20) mm long, lightly striate (4 or 5 veins/mm), inner bracts green with broad membranous margins speckled or spotted with brown along margins and sometimes in central area. *Flowers* white to cream-coloured in distal half, cup and lower half of segments orange or golden-yellow, outer tepals sometimes fawn or greenish on reverse, sweetly scented; perianth tube funnel-shaped,



Distribution of ***Romulea leipoldtii***.



Distribution of ***Romulea saldanhensis***.

4–8 mm long; tepals elliptic, 18–35 × 5–8 mm. *Filaments* 5–8 mm long, pilose basally, yellow; anthers 5–8 mm long. *Style* dividing at or beyond anther tips, branches 2 mm long, divided halfway. *Capsules* ellipsoid or cylindric, ± 10 mm long. *Flowering time*: September, October.

Distribution and ecology: endemic to Western Cape, South Africa, from Nardousberg through Cederberg and the Olifants River Valley to Graafwater and Porterville; on seasonally waterlogged sandy flats.

Diagnosis: closely allied to *Romulea tabularis* and sharing with it the yellow pigmentation extending onto the lower half of the tepals but occurring mostly inland of that species [both species are recorded around Piketberg] and separated from it by the mostly two basal leaves, generally larger, white to cream-coloured flowers with tepals mostly more than 5 mm wide, and the firm-textured inner bracts. It can be confused with white-flowered forms of *R. schlechteri* but that species has inner bracts with unmarked membranous margins.

7. **Romulea saldanhensis** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 108 (1972). Type: South Africa, [Western Cape], Saldanha Bay, *De Vos 1772* (NBG [as STE], holo., iso.).

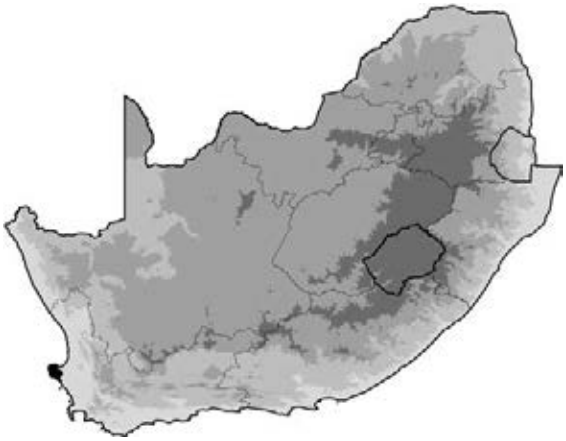
Plants 50–200 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge, 8–15 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* usually aerial, exserted up to 200 mm, elongating in fruit. *Leaves* 3 or 4, lowermost 1 basal, terete or compressed-cylindrical and narrowly 4-grooved, 1–2 mm diam., cauline leaves clustered at stem apex. *Peduncles* up to 8, up to 60 mm long, semiterete, sharply arcuate initially in fruit but later suberect; outer bracts green with narrow membranous margins, 12–20 mm long, striate or lightly ribbed (5 or 6 veins/mm), inner bracts submembranous in lower half and green or flushed maroon above, central portion sometimes conspicuously brown-spotted, with broad membranous margins usually streaked or speckled with brown. *Flowers* cadmium- or golden-yellow with slender dark lines in cup, rarely cream-coloured with golden-yellow cup, outer tepals frequently irregularly marked brown on reverse; perianth tube funnel-shaped, 3–5 mm long; tepals oblanceolate to obovate, 18–30 × 6–14 mm. *Filaments* 5–7 mm long, pilose basally, yellow; anthers 5–7 mm long, at first joined apically. *Style* dividing at or beyond anther tips, branches 2 mm long, divided halfway. *Capsules* ellipsoid or shortly cylindric, ± 10 mm long. *Flowering time*: August, September.

Distribution and ecology: a rare and local endemic around Saldanha Bay, Western Cape, South Africa, most common on the Vredenburg Peninsula but extending south toward Yzerfontein; on seasonally waterlogged sandy and loam flats on granite.

Diagnosis: allied to *Romulea flava* in the solitary, often rather thick basal leaf and submembranous inner bracts, and distinguished by the large, cadmium to golden-yellow (rarely cream-coloured) flowers with broad tepals, and the slightly firmer-textured inner bracts. The central portion of the inner bracts is sometimes spotted with brown, and plants with cream-coloured tepals and a golden-yellow cup may be confused with *R. leipoldtii* but that species has two basal leaves and narrower tepals.

8. **Romulea barkerae** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 106 (1972). Type: South Africa, [Western Cape], Vredenburg, Cape Columbine, *Barker s.n.* (NBG, holo.).

Plants 30–200 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge, 8–15 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* subterranean or aerial, exserted up to 200 mm, elongating in fruit. *Leaves* 3 or 4, lowermost 1 basal when stem exserted, ± 3-angled or narrowly3-winged, almost T-shaped in section with 2 wide grooves separating a narrow and a wider rib, 1.5–2.5 mm diam., rib margin ciliolate, cauline leaves clustered at stem apex. *Peduncles* up to 7, up to 70 mm



Distribution of ***Romulea barkerae***.

long, semiterete, often ciliolate along edges, sharply recurved in fruit; outer bracts green with narrow membranous margins, 15–18 mm long, lightly striate (5 or 6 veins/mm), inner bracts entirely membranous or scarious, central portion conspicuously brown-spotted, with broad margins streaked or speckled with brown. *Flowers* white with broad black blotch edged with yellow in throat and extending to base of cup, outer tepals green on reverse; perianth tube funnel-shaped, 5–6 mm long; tepals oblanceolate to obovate, 15–28 × 5–10 mm. *Filaments* 5–6 mm long, pilose basally, pale yellow; anthers 5–6 mm long, yellow. *Style* dividing below or beyond anther tips, branches 2 mm long, divided halfway. *Capsules* ellipsoid or shortly cylindric, ± 10 mm long. *Flowering time*: (late June) July, August.

Distribution and ecology: a rare and local endemic of the Vredenburg Peninsula, Western Cape, South Africa, from Paternoster to Saldanha; on limestone outcrops in coastal thicket.

Diagnosis: unmistakable in its unique, T-section leaves with two broad grooves separating a narrower and a broader rib and white flowers with large black blotches outlined with yellow in the throat. The solitary basal leaf and entirely membranous inner bracts ally it to *Romulea flava*.

9. **Romulea flava** *(Lam.) M.P.de Vos* in Goldblatt & Barnard in Journal of South African Botany 36: 306 (1970). *Ixia flava* Lam.: 109 (1791). *Bulbocodium flavum* (Lam.) Kuntze: 700 (1891). Type: South Africa, without precise locality or collector [P: Herb. Lamarck, lecto., designated by De Vos: 99 (1972)].

Ixia recurva F.Delaroche in P.J.Redouté: t. 251 (1809), illegitimate homonym, not *I. recurva* Vahl (1805). *Ixia recurvifolia* Poir. in Lam.: 201 (1813), as a replacement name for *I. recurva* F.Delaroche. *Trichonema recurvifolium* (Poir.) Ker Gawl.: 83 (1827). *Geissorhiza recurvifolia* (Poir.) Klatt: 655 (1866). *Trichonema recurvum* Spreng.: 149 (1824), as a replacement name for *Ixia recurva* F.Delaroche. *Romulea recurva* Eckl.: 20 (1827), as a replacement name for *Ixia recurva* F.Delaroche. Type: South Africa, without precise locality, illustration in P.J.Redouté: t. 251, lower figure (1809).

Trichonema caulescens Ker Gawl.: t. 1392 (1811). *Trichonema hypoxidiflorum* Salisb.: 316 (1812), illegitimate superfluous name for *T. caulescens* Ker Gawl. *Romulea caulescens* (Ker Gawl.) Klatt: 399 (1882). Type: South Africa, without precise locality, illustration in Ker Gawl.: t. 1392 (1811).

Ixia reflexa Thunb.: 220 (1811), illegitimate homonym, not *I. reflexa* Andrews (1797). *Romulea reflexa* Eckl.: 18 (1827), as a replacement name for *I. reflexa* Thunb. *Trichonema reflexum* (Eckl.) Steud.: 702 (1841). *Romulea rosea* var. *reflexa* (Eckl.) Bég.: 158 (1908). [misapplied to *R. rosea*, also by De Vos: 63 (1983)]. Type: South Africa, without precise locality, *Thunberg s.n.* [UPS–THUNB 984, lecto., designated by De Vos: 27 (1983)].

Romulea similis Eckl.: 19 (1827). *Trichonema simile* (Eckl.) Steud.: 702 (1841). *Bulbocodium simile* (Eckl.) Kuntze: 700 (1891). Type: South Africa, without precise locality, *Ecklon s.n.* (BM, OXF, ?S, syn.).

?*Trichonema candidum* Ten. 12: 4 (1842). *Romulea candida* (Ten.) Ten.: 95 (1845). Type: Unknown.

Romulea latifolia Baker: 237 (1876). *Bulbocodium latifolium* (Baker) Kuntze: 700 (1891). *Romulea bulbocodioides* var. *latifolia* (Baker) Bég.: 163 (1908). Type: South Africa, without precise locality or collector, illustration of W. Herbert as *Trichonema latifolium* (? at K).

Romulea bulbocodioides var. *elongata* Baker: 38 (1896). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB 988, holo.). [Incorrectly cited by De Vos: 27 (1983) as 'Thunb. ex Baker']

Romulea bachmannii Bég.: 161 (1908). Type: South Africa, [Western Cape], Clanwilliam, Modderfontein, *Schlechter 7970* (G, holo.; BM, BOL, GRA, K, NU, P, PRE, S, iso.).

Romulea cruciata var. *hirsuta* Bég.: 158 (1908). *R. flava* var. *hirsuta* (Bég.) M.P.de Vos: 105 (1972), syn. nov. Type: South Africa, without precise locality, *Verreaux s.n.* in 1830 (G, holo.).

Romulea bulbocodioides var. *minor* Bég.: 163 (1908), syn. nov. *R. flava* var. *minor* (Bég.) M.P.de Vos: 103 (1972). Type: South Africa, [Western Cape], Clanwilliam, Langekloof, *Schlechter 8396* (G, lecto., designated by De Vos: 104 (1972); BM, GRA, K, P, PRE, S, isolecto.).

Romulea bulbocodioides var. *viridiflora* Bég.: 110 (1909), syn. nov. *R. flava* var. *viridiflora* (Bég.) M.P.de Vos: 104 (1972). Type: South Africa,

without precise locality, *Bachman 1856* (B, lecto., designated by De Vos: 105 (1972); Z, isolecto.).

[*Ixia bulbocodium* sensu Thunb.: 6 (1783), not *I. bulbocodium* L. (1753). A Eurasian species, but the name was applied by Thunberg to *Romulea flava* and other South African species.]

[*Ixia pudica* Herb. Banks ex Ker Gawl.: t. 575 (1802), only in synonymy.]

[*Romulea vulgaris* Eckl.: 18 (1827), invalid name without description.]

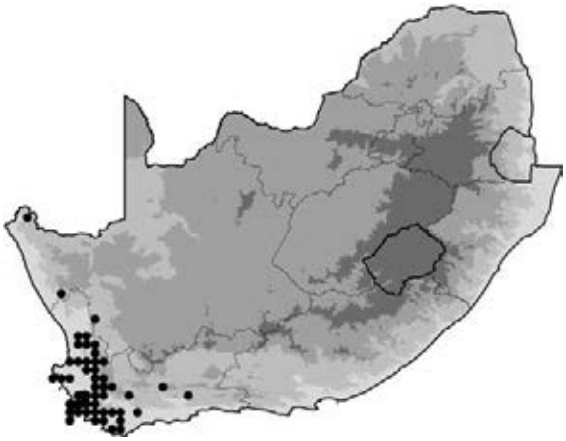
[*Romulea arenaria* Eckl.: 18 (1827), invalid name without description. *Trichonema arenarium* Eckl. ex Steud.: 702 (1841), invalid name without description. *Bulbocodium arenarium* Eckl. ex Kuntze: 700 (1891), invalid name without description.]

Plants 50–300 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge, 6–15 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* subterranean or aerial, exserted up to 200 mm, elongating in fruit. *Leaves* 3 or 4, lowermost 1 basal, terete or compressed-cylindrical, narrowly or widely 4-grooved, 1–3 mm diam., glabrous or ciliolate along rib margins, cauline leaves clustered at stem apex, sheaths often wide. *Peduncles* up to 8, up to 70 mm long, semiterete, glabrous or ciliolate along angles, sharply arcuate in fruit or ultimately suberect; outer bracts green with narrow membranous margins, 8–20(–28) mm long, striate or lightly ribbed (4 to 6 veins/mm), inner bracts entirely membranous or sometimes submembranous in centre, central portion sometimes conspicuously brown-spotted, with broad membranous margins streaked or speckled with brown. *Flowers* pale or sulphur-yellow, white, pale blue or rarely pink, with yellow or greenish cup, outer tepals frequently green or greenish brown on reverse, white forms sometimes scented; perianth tube funnel-shaped, 3–7 mm long; tepals elliptic or oblanceolate, 10–30 × 2–12 mm. *Filaments* 4–7 mm long, pilose basally, yellow; anthers 3–7 mm long. *Style* dividing shortly below or beyond anther tips, branches 2 mm long, divided halfway. *Capsules* ellipsoid or shortly cylindric, ± 10 mm long. *Flowering time*: June.

Distribution and ecology: widespread through the coastal and near-inland parts of Northern and Western Cape, South Africa, from the Richtersveld to Swellendam, with isolated records from Riversdale, Albertinia and Humansdorp; in seasonally damp or moist places.

Diagnosis: recognised by the solitary, often rather swollen basal leaf, the cauline leaves typically with wide sheathing bases, the entirely membranous or submembranous inner bracts, and the canary-yellow or white to pale blue flowers.

A common, widely distributed and polymorphic species varying greatly in size, growth form, leaf thickness and ciliation, and flower colour. Flower colour is genetically determined but growth form is at least partly influenced by growing conditions.

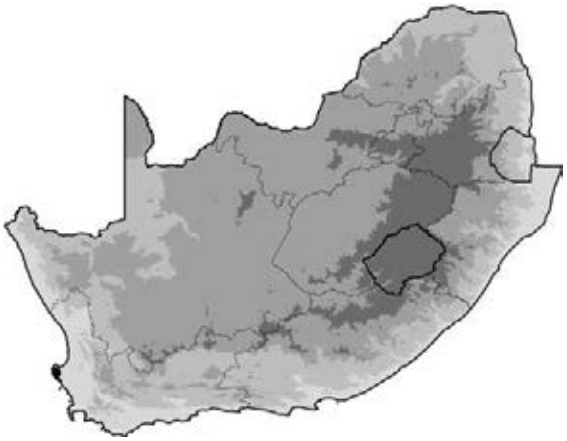


Distribution of ***Romulea flava***.

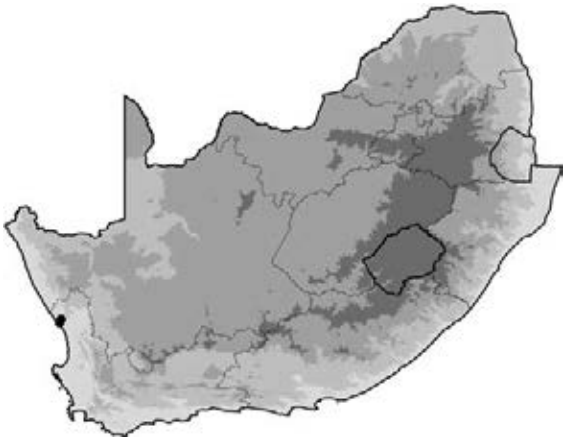
Many of the variants were described as separate species and De Vos (1972) maintained some of them at varietal level as follows: var. *flava* for plants with glabrous leaves 1–3 mm diam. and yellow, white or blue flowers; var. *minor* (Bég.) M.P.de Vos for similar forms with smaller, invariably yellow flowers less than 25 mm long; var. *hirsuta* (Bég.) M.P.de Vos for plants with mostly ciliolate leaves 2–3 mm diam., short stems, and white to blue flowers; and var. *viridiflora* (Bég.) M.P.de Vos for similar plants with frequently elongated stems and leaves less than 1 mm diam. At least one population of the latter was polyploid, $2n = 48$. We are unable, however, to retain the varieties in view of the existence of numerous intermediates among them, their widespread occurrence throughout the range of the species, and the existence of other combinations of characters, notably plants with ciliolate leaves and yellow flowers.

10. **Romulea elliptica** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 83 (1972). Type: South Africa, [Western Cape], Vredenburg to Saldanha, *De Vos 2226* (PRE [as STE], holo.; PRE, iso.).

Plants 50–200(–300) mm high. *Corm* globose, obliquely flattened with crescent-shaped basal ridge as wide as or slightly wider than corm, 5–10 mm diam., tunics splitting into fine, parallel fibrils along ridge. *Stem* short or exserted up to 200 mm. *Leaves* 3 or 4, lower 2 basal, filiform to terete, narrowly 4-grooved, 0.5–1.5 mm diam. *Peduncles* up to 4, semiterete, up to 40 mm long, suberect in fruit; outer bracts green with narrow membranous margins, 13–30 mm long, lightly striate (5 or 6 veins/mm), conduplicate, inner bracts with narrow, unmarked membranous margins widening toward base. *Flowers* buttercup-yellow, sometimes with few short dark veins in cup, outer tepals lime-green on reverse with reddish brown flecks along margins; perianth tube funnel-shaped, 4–5 mm long; tepals ± obtuse, outer



Distribution of ***Romulea elliptica***.



Distribution of ***Romulea lutea***.

elliptic, inner slightly wider and oblanceolate, 18–27 × 4–9 mm. *Filaments* 6–7 mm long, pilose toward base, yellow; anthers 4–6 mm long, yellow. *Style* dividing near anther apices, branches ± 2 mm long, divided halfway. *Capsules* shortly cylindric, 10–18 mm long. *Flowering time*: August.

Distribution and ecology: a rare and narrow endemic from west of Vredenburg, Western Cape, South Africa; in deep sands in coastal thicket.

Diagnosis: distinguished by the plain yellow flowers, the outer tepals narrower than the inner and lime-green on the reverse with distinctive brownish flecks along the margins, and the green inner bracts with narrow, colourless membranous margins widened only at the base. Superficially similar yellow-flowered species of *Romulea* with two basal leaves have inner bracts with broad, brownish or brown-flecked membranous margins and inner tepals coloured differently on the reverse.

11. **Romulea lutea** *J.C.Manning & Goldblatt* in Bothalia 38: 78 (2008). Type: South Africa, Western Cape, coastal sandveld west of Koekenaap at Farm Skaapkraal, local in drainage line, 24 Aug. 2007, *P. Goldblatt & J.C. Manning 12868* (NBG, holo.; MO, PRE, iso.).

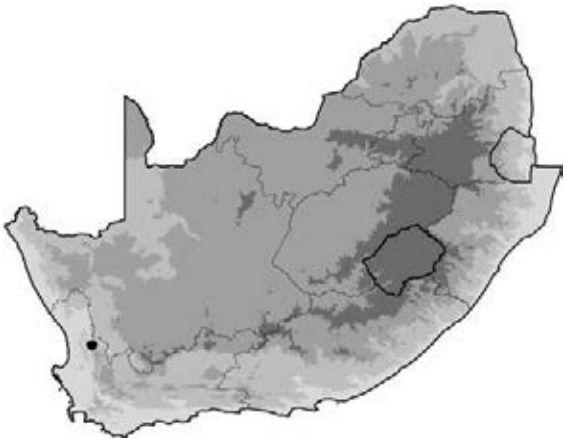
Plants 50–100 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 8–15 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* usually subterranean, or shortly exserted up to 30 mm. *Leaves* 3 or 4, lowermost 1 basal when stem exserted, terete, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 4, up to 80 mm long, semiterete, strongly curved initially in fruit; outer bracts green with narrow membranous margins, 8–10 mm long, lightly striate (3 or 4 veins/mm), inner bracts thin-textured or submembranous with central part flushed green or purplish, with broad membranous margins speckled with brown along margins and sometimes in central area. *Flowers* golden-yellow with darker cup, outer tepals pale green on reverse, lightly scented; perianth tube funnel-shaped, 3–4 mm long; tepals elliptic, 11–13 × 4–5 mm. *Filaments* 4 mm long, pilose basally, yellow; anthers 4 mm long. *Style* dividing below anther tips, branches 1 mm long, divided halfway. *Capsules* ellipsoid, ± 8 mm long. *Flowering time*: August, September.

Distribution and ecology: a local endemic from west of Koekenaap in southern Namaqualand in Western Cape, South Africa; in loamy soil in seasonally moist drainage lines and depressions.

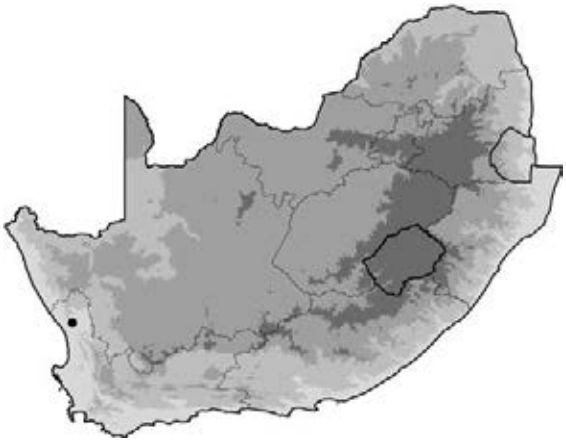
Diagnosis: resembling *Romulea tabularis* in the solitary basal leaf (when stem exserted) but differing in the golden-yellow flowers with relatively short bracts, 8–10 mm long. The solitary basal leaf and distribution separate *R. lutea* from similar yellow-flowered species.

12. **Romulea sulphurea** *Bég.* in Botanische Jahrbücher für Systematik 38: 331 (1907). Type: South Africa, [Western Cape], Pakhuis Pass, *Schlechter 10818* (Z, lecto., designated by De Vos: 87 (1972); B, BM, BOL, GRA, K, PRE, S, US, isolecto.).

Plants 50–150 mm high. *Corm* subglobose, 5–10 mm diam., obliquely flattened toward base with crescent-shaped basal ridge, tunics splitting into fine parallel fibrils along basal ridge. *Stem* subterranean or exserted up to 150 mm. *Leaves* 3 to 5, lower 2 basal, filiform, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 4, semiterete, ciliolate along angles; outer bracts green with narrow membranous margins, widely striate (3 or 4 veins/mm), 8–15 mm long, inner bracts with wide membranous margins brown-speckled along edges. *Flowers* golden-yellow dark marks at base of tube, outer tepals copper-coloured on reverse with dark feathering; perianth tube funnel-shaped, 4–5 mm long; tepals elliptic, 12–25 × 3.5–7.0 mm. *Filaments* 6–9 mm long, pilose, yellow; anthers 3–4.0 mm long, yellow. *Style* dividing below anther apices, branches 2 mm long, divided halfway. *Capsules* and *seeds* unknown. *Flowering time*: mid-July, August.



Distribution of ***Romulea sulphurea***.



Distribution of ***Romulea quartzicola***.

Distribution and ecology: a rarely collected local endemic from the Pakhuis Pass in the Cederberg, Western Cape, South Africa; on seasonally wet sandstone pavement.

Diagnosis: distinctive among the yellow-flowered species in sect. *Romulea* in its relatively long filaments, ± twice as long as the anthers. Similar stamens are also characteristic of *R. quartzicola* from the Knersvlakte but that species has diagnostic broadly ovate or suborbicular outer and inner bracts, the inner with unusually narrow membranous margins < 1 mm wide.

13. **Romulea quartzicola** *J.C.Manning & Goldblatt* in Bothalia 41: 274 (2011). Type: South Africa, Western Cape, Knersvlakte, Farm Moedverloor, ± 15 km NE of Lutzville, *A.D. Harrower & J.C.Manning 4395* (NBG, holo.; MO, iso.).

Plants 50–80 mm high. *Corm* subglobose, ± 10 mm diam., obliquely flattened toward base with crescent-shaped basal ridge, tunics splitting into fine parallel fibrils along basal ridge. *Stem* shortly exserted up to 35 mm. *Leaves* 2 or 3, lower 2 basal, mostly ± as long as flowering stem, terete, obtuse or subclavate, narrowly 4-grooved, 1.5–2.5 mm diam. *Peduncles* 1 or 2; outer bracts broadly elliptic-suborbicular, concave, obtuse, green with narrow, often purplish membranous margins, widely striate (3 veins/mm), 8–13 mm long, inner bracts similar with narrow membranous margins minutely brown-speckled along edges. *Flowers* bright chrome-yellow or rarely peach-coloured with 3 to 5 inconspicuous dark veins at base of cup, outer tepals rarely flushed copper or pale green on reverse, weakly clove-scented; perianth tube funnel-shaped, 7–8 mm long; tepals oblanceolate, 20–22 × 6–10 mm. *Filaments* 7–9 mm long, pilose, base, yellow; anthers 4–5 mm long, thecae well separated by broad connective, yellow. *Style* dividing opposite upper half of anthers, branches ± 3 mm long, divided to base into six filiform branchlets. *Capsules* and *seeds* unknown. *Flowering time*: mid-June to July.

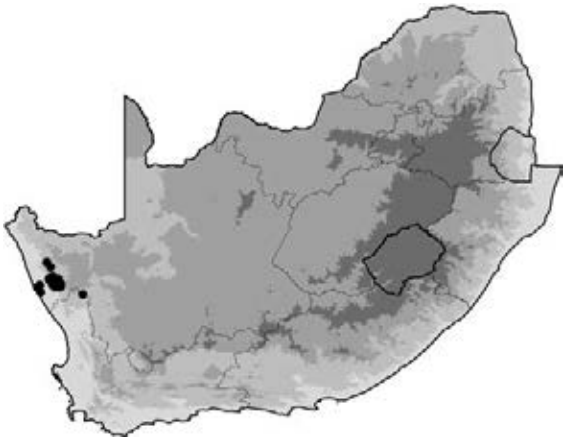
Distribution and ecology: a rare and local endemic of the Moedverloor drainage basin near Lutzville, Western Cape, South Africa; on cooler quartzite slopes and outcrops.

Diagnosis: an unusual, early-flowering species with short, rather blunt leaves and broad, almost suborbicular outer and inner bracts, the inner similar to the outer with unusually narrow membranous margins only slightly wider than on the outer bracts, relatively long filaments ± twice as long as the anthers, and style branches divided to the base. Similarly long filaments are also characteristic of *R. sulphurea* from the Cederberg but that species has inner bracts with typically broad membranous margins.

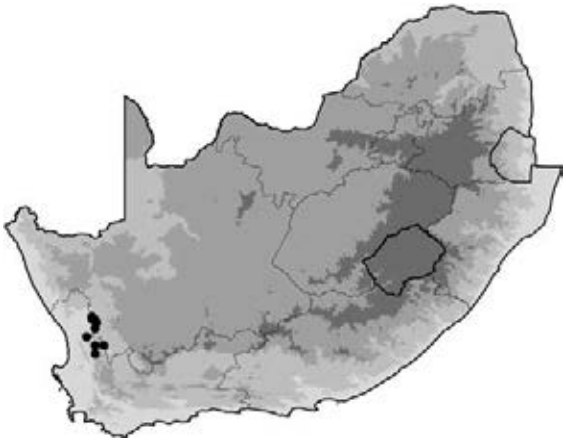
14. **Romulea citrina** *Baker* in Handbook of the Irideae: 100 (1892). Type: South Africa, [Northern Cape], Namaqualand, near Modderfontein, *H. Bolus 6619* (K, holo.; BOL, GRA, iso.).

Plants 50–200 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge, 8–15 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* subterranean or exserted up to 150 mm. *Leaves* 3 to 5, lower 2 basal when stem exserted, filiform or terete to compressed-terete, narrowly 4-grooved, 0.5–1.5 mm diam. *Peduncles* up to 4, up to 80 mm long, semiterete, strongly curved initially in fruit but later erect; outer bracts green with narrow membranous margins, 8–10 mm long, lightly ribbed (5 or 6 veins/mm), inner bracts with broad, brown-streaked or -edged membranous margins and sometimes speckled in central area below. *Flowers* lemon- or canary-yellow, sometimes paler or darker in cup and veins sometimes darker, outer tepals often greenish or brownish on reverse; perianth tube funnel-shaped, 4–7 mm long; tepals elliptic, 15–32 × 4–10 mm. *Filaments* 5–8 mm long, pilose basally, yellow; anthers 4–7 mm long, yellow. *Style* dividing shortly below to shortly above anther tips, branches 2–3 mm long, divided halfway. *Capsules* shortly cylindric, 10–15 mm long. *Flowering time*: August, September.

Distribution and ecology: endemic to the higher-lying parts of central Namaqualand, Northern Cape, South



Distribution of ***Romulea citrina***.



Distribution of ***Romulea montana***.

Africa, between Springbok and Bitterfontein in Western Cape; in seasonal washes on granite.

Diagnosis: the common, yellow-flowered *Romulea* species of central Namaqualand, *Romulea citrina*, is relatively undistinguished among the yellow-flowered members of sect. *Romulea*, and is diagnosed by the crescent-shaped basal ridge, two basal leaves when the stem is exserted, and lemon- or canary-yellow flowers lacking dark blotches or streaks in the throat. The leaves are distinctive in the development of marginal fibre strands in the ribs, a feature also of the Namaqualand species in ser. *Namaquana*.

15. **Romulea montana** *Schltr. ex Bég.* in Botanische Jahrbücher für Systematik 38: 332 (1907). Type: South Africa, [Northern Cape], Bokkeveld Mtns, Oorlogskloof, *Schlechter 10949* (G, holo.; B, BOL, GRA, K, PRE, S, iso.).

Romulea hirsuta var. *aurantiaca* Schltr.: 90 (1899). *Romulea ambigua* var. *aurantiaca* (Schltr.) Bég.: 80 (1909). Type: South Africa, [Western Cape], Clanwilliam, Matjiesrivier, *Schlechter 8847* (B, holo.; BM, BOL, GRA, K, PRE (in part), S, US, Z, iso.).

Romulea rosea var. *flavescens* Bég.: 63 (1909). Type: South Africa, *Mund & Maire 580* (B, holo.).

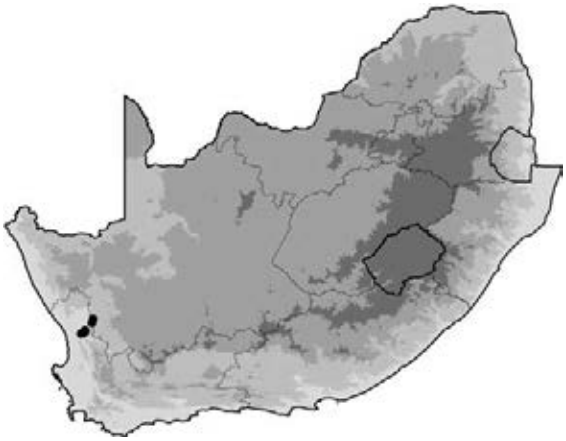
Plants 50–200 mm high. *Corm* globose, obliquely flattened with wide, fan- or crescent-shaped basal ridge as wide as or wider than corm and sometimes almost circular, 8–15 mm diam., tunics splitting into fine, parallel fibrils clustered into scalloped fascicles along ridge. *Stem* subterranean or exserted up to 150 mm. *Leaves* 4 to 6, lower 2 basal when stem developed, filiform to terete or compressed-terete, 4-grooved, 0.5–1.5 mm diam. *Peduncles* up to 5, semiterete, up to 60 mm long, spreading in fruit, each pair diverging at ± 90°; outer bracts green with narrow membranous margins, 10–22 mm long, striate (5 or 6 veins/mm), inner bracts with broad, brownish or brown-edged membranous margins. *Flowers* buttercup-yellow with yellow cup usually edged with dark brown blotches sometimes reduced to dark veins or rarely absent, outer tepals brown or reddish or faintly feathered on reverse; perianth tube funnel-shaped, 4–6 mm long; tepals elliptic, 15–35 × 5–10 mm. *Filaments* 5–6 mm long, pilose toward base, yellow; anthers 4–8 mm long, yellow. *Style* dividing near anther apices, branches ± 2 mm long, divided halfway. *Capsules* ellipsoid, 8–10 mm long. *Flowering time*: July to September.

Distribution and ecology: common on the Bokkeveld Escarpment in Northern Cape, South Africa, extending onto the Pakhuis Mtns to the northern Cederberg but absent from the Matsikamma–Gifberg; on seasonally moist or waterlogged sandy soils or seepages and sandstone pavement.

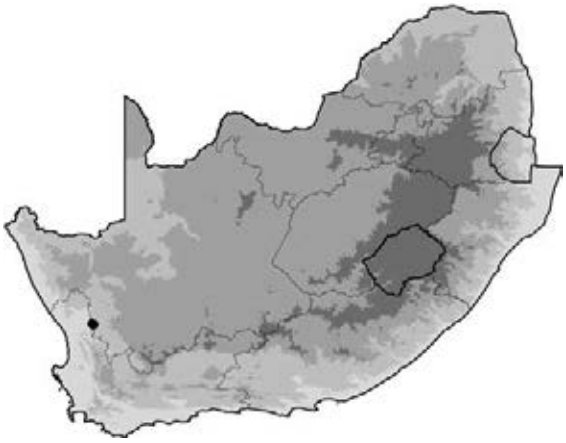
Diagnosis: resembling white-flowered *Romulea toximontana* in the wide, scalloped basal ridge on the corm but distinguished by its bright yellow flowers, usually with dark blotches or streaks in the throat. The species is essentially identical in flower to the Bokkeveld endemic *R. discifera*, but that species has a conspicuously depressed corm with a complete, circular, similarly scalloped basal rim. Another common, yellow-flowered species, *R. monticola* (sect. *Roseae*), has flowers without dark markings, bracts with narrow, brown-speckled markings, and corms with coarse, bent teeth.

16. **Romulea toximontana** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 89 (1972). Type: South Africa, [Western Cape], Gifberg, *De Vos 2020* (NBG [as STE], holo.; PRE, iso.).

Plants 30–200 mm high. *Corm* globose, obliquely flattened with wide, fan- or crescent-shaped basal ridge wider than corm, 10–15 mm diam., tunics splitting into fine, parallel fibrils clustered into scalloped fascicles along ridge. *Stem* subterranean or exserted up to 150 mm. *Leaves* 3 to 6, lower 2 basal when stem developed, filiform, 4-grooved, 0.5–1.0 mm diam., sometimes sparsely ciliolate on rib margins. *Peduncles* up to 5, clustered at stem apex, semiterete, up to 30 mm long, spreading in fruit, each pair diverging at ± 90°; outer



Distribution of ***Romulea toximontana***.



Distribution of ***Romulea singularis***.

bracts green with narrow membranous margins, 10–20 mm long, striate (3 or 4 veins/mm), inner bracts with broad, brown-edged membranous margins. *Flowers* white to cream-coloured with yellow cup, outer tepals green or purple or irregularly blotched on reverse; perianth tube funnel-shaped, 4–5 mm long; tepals elliptic, 13–22 × 4–9 mm. *Filaments* 3–5 mm long, pilose toward base, yellow; anthers 4–6 mm long, pale yellow. *Style* dividing near anther apices, branches ± 2 mm long, divided halfway. *Capsules* ellipsoid, 5–8 mm long. *Flowering time*: August, September.

Distribution and ecology: a local endemic restricted to the Matsikamma–Gifberg massif in Western Cape, South Africa; on seasonally waterlogged sandstone pavement.

Diagnosis: one of two species in ser. *Ciliatae* with a wide, fan-shaped basal ridge on the corm and green bracts, *Romulea toximontana* is distinguished from yellow-flowered *R. montana*, which occurs on the Bokkeveld Mtns and Cederberg but is absent from the Gifberg, by its white or cream-coloured flowers with pale yellow anthers and a chromosome number $2n = \pm 28$. It is readily confused in flower with another Gifberg endemic, *R. sladenii*, which has a bell-shaped corm with circular basal ridge and more widely spreading peduncles diverging at ± 180°.

17. **Romulea singularis** *J.C.Manning & Goldblatt* in Bothalia 36: 142 (2006). Type: South Africa, Northern Cape, Oorlogskloof Nature Reserve, farm Uitkomst, 4 km east of Arrie-se-Punt, overlooking Saaikloof, seasonally moist sandstone pavement in Bokkeveld Sandstone fynbos, 830 m, 18 Sept. 2005, *N.A. Helme 3564* (NBG, holo.).

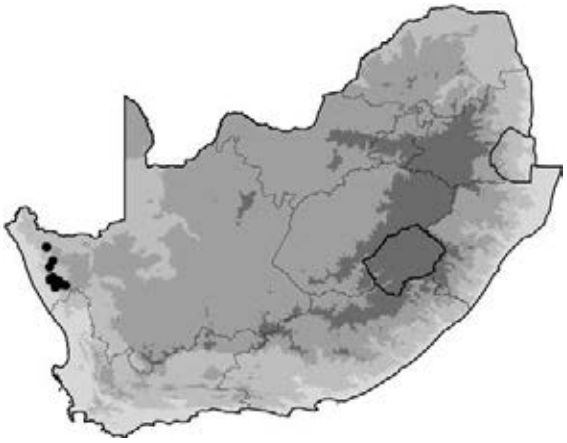
Plants 20–40 mm high. *Corm* globose, obliquely flattened with wide, crescent-shaped basal ridge wider than corm, 10–12 mm diam., tunics splitting into fine, parallel fibrils clustered into scalloped fascicles along ridge. *Stem* subterranean or shortly exserted up to 5 mm. *Leaves* 4 to 6, lower 2 basal when stem developed, short and spreading, compressed, 4-grooved, 0.5–1.5 mm diam. *Peduncles* up to 4, semiterete, short, up to 15 mm long; outer bracts green with narrow membranous margins, 7–15 mm long, striate (3 or 4 veins/mm), inner bracts green in centre with broad membranous margins flecked or flushed light brown. *Flowers* narrowly funnel-shaped, mauve to lilac or pink with yellow throat streaked with purple, tube reddish ochre-coloured on outside; perianth tube narrowly funnel-shaped, 10–13 mm long; tepals lanceolate, ± 13 × 3 mm. *Filaments* inserted in lower half of tube 3–4 mm from base, 8–9 mm long, exserted ± 2 mm, pilose at base; anthers ± 3 mm long, pale yellow. *Style* dividing between base and middle of anthers, branches ± 2 mm long, divided halfway. *Capsule* unknown. *Flowering time*: August, September.

Distribution and ecology: endemic to the Bokkeveld Mtns in Northern Cape, South Africa, along the edges of the Oorlogskloof and Koebee River gorges; on seasonally wet sandstone pavement.

Diagnosis: a distinctive species with narrowly funnel-shaped, mauve to lilac or pink flowers with yellow tube 10–13 mm long, and uniquely long filaments, 8–9 mm long inserted in the lower half of the tube and exserted ± 2 mm. In other species with a long perianth tube the elongation is of the lower portion of the tube below the filaments, which remain short and are inserted near the top of the tube. The wide, scalloped basal ridge on the corm suggests a possible relationship with *Romulea toximontana*.

18. **Romulea namaquensis** *M.P.de Vos* in Journal of South African Botany 21: 103 (1955). Type: South Africa, [Northern Cape], Kamiesberg, Witsand to Leliefontein, *Pearson sub Sladen Expedition 6656* (BOL, holo.; K, iso.).

    Romulea namaquensis subsp. *bolusii* M.P.de Vos: 79 (1972). Type: South Africa, [Northern Cape], near Okiep, *H.Bolus 6620* (NBG, holo.; BOL, K, iso.).



Distribution of ***Romulea namaquensis***.

Plants 40–200 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 6–10 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* subterranean or aerial, exserted up to 150 mm. *Leaves* 3 to 5, lowermost 2 basal when stem exserted, filiform and narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 3, up to 60 mm long, semiterete, suberect in fruit; outer bracts green with narrow membranous margins, 12–30 mm long, sometimes keeled above, closely ribbed (3 or 4 veins/mm), inner bracts with broad, brown-flecked or -edged membranous margins. *Flowers* glossy rose-coloured to coppery salmon-pink, brick-red or pale pink to white, with small dark blotches or lines in throat, sometimes pale yellow at base of tube, outer tepals irregularly blotched pink and yellow on reverse; perianth tube narrowly funnel-shaped, 4–12 mm long; tepals elliptic or oblanceolate, 16–40 × 5–10 mm. *Filaments* inserted in middle of tube or slightly above, 4–10 mm long, pilose basally, yellow or maroon; anthers 5–10 mm long, golden-yellow. *Style* dividing shortly below to shortly beyond anther apices, branches 2–3 mm long, divided halfway. *Capsules* ellipsoid, up to 12 mm long. *Flowering time*: July to September.

Distribution and ecology: restricted to the higher-lying parts of Namaqualand, Northern Cape, South Africa, from Steinkopf to Garies but most commonly seen on the Kamiesberg; in seasonally moist places on granite.

Diagnosis: variable in colour and distinguished by the narrowly funnel-shaped perianth tube with the filaments inserted at or above the middle, often black or reddish, with very little yellow in the cup. The leathery bracts are closely ribbed and often keeled in the upper part. Forms with glossy rose-coloured to coppery salmon-pink or brick-red flowers are especially attractive.

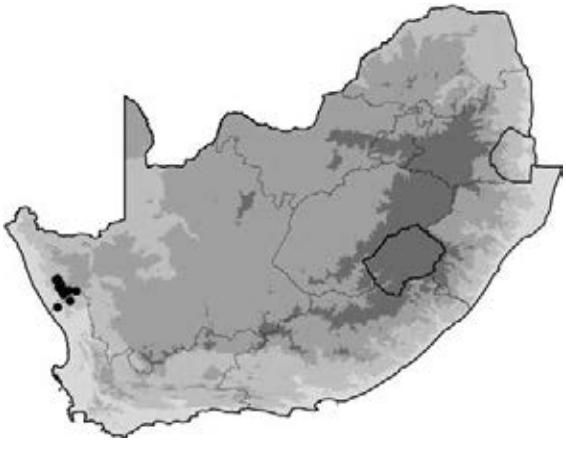
19. **Romulea kamisensis** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 81 (1972). Type: South Africa, [Northern Cape], Kamiesberg, Studer's Pass, *Stayner s.n.* (NBG, holo.).

Plants 40–150 mm high. *Corm* globose, obliquely flattened with narrow, crescent-shaped basal ridge as wide as corm, 7–15 mm diam., tunics splitting into fine, parallel fibrils along ridge. *Stem* subterranean or exserted up to 50 mm. *Leaves* 3 to 7, lower 2 basal when stem developed, suberect, terete, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 3, semiterete, suberect; outer bracts green with narrow membranous margins, 13–25 mm long, leathery, ± keeled above, closely ribbed (3 or 4 veins/mm), inner bracts similar but with wider, translucent membranous margins, rarely with a few brown flecks. *Flowers* narrowly funnel–salver-shaped, magenta-purple with violet veins and blotch at mouth, throat white with purple lines; perianth tube narrowly funnel-shaped, 17–25 mm long; tepals lanceolate or elliptic, 11–16 × 3.5–5.0 mm. *Filaments* inserted in upper ½ of tube; 4–5 mm long, included, glabrous; anthers 4–5 mm long, golden-yellow. *Style* dividing opposite upper ½ of anthers, branches ± 2.5 mm long, divided halfway. *Capsule* ellipsoid, 10–12 mm long. *Flowering time*: August, September.

Distribution and ecology: endemic to the higher-lying parts of central Namaqualand in Northern Cape, South Africa, centred on the Kamiesberg but extending south to Bitterfontein in Western Cape and east to Loeriesfontein; restricted to moist cracks and seepages in granite outcrops.

Diagnosis: a distinctive species recognised by the narrowly funnel- or salver-shaped, magenta-purple flowers with perianth tube 17–25 mm long with relatively short, glabrous filaments 4–5 mm long inserted in the upper half of the tube and included within it. The inner and outer bracts are unusually similar in texture for the genus, both green and leathery with the inner differing only by their relatively broader, colourless membranous margins.

A relationship with *Romulea namaquensis* was proposed by De Vos (1972), and both species have leaves lacking secondary veins, filaments inserted above the middle of the perianth tube, and a chromosome number $2n = 26$.



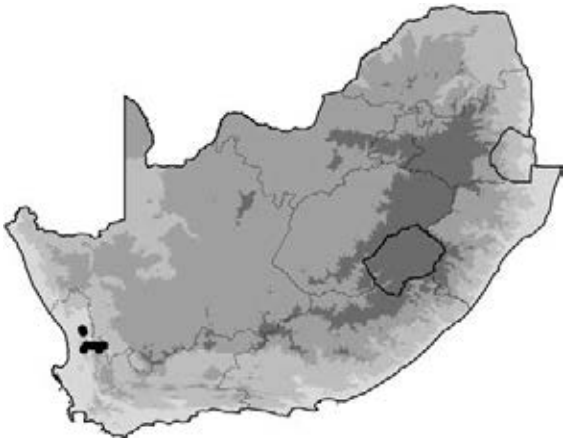
Distribution of ***Romulea kamisensis***.

20. **Romulea biflora** *(Bég.) M.P.de Vos* in Journal of South African Botany, Suppl. 9: 75 (1972). *Romulea ambigua* var. *biflora* Bég.: 80 (1909). Type: South Africa, [Western Cape], Biedouw Mtns, *Schlechter 8694* (G, holo.; B, BM, GRA, K, PRE, S, iso.).

Plants 40–150(–200) mm high. *Corm* globose, obliquely flattened toward base with crescent- or horseshoe-shaped basal ridge ± as wide as corm, 10–15 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* subterranean or aerial, exserted up to 150 mm. *Leaves* 3 to 5, lowermost 2 basal when stem exserted, terete or filiform and narrowly 4-grooved, 1.0–1.5 mm diam. *Peduncles* up to 4, up to 50 mm long, semiterete, suberect or bent in fruit; outer bracts green with narrow membranous margins, 12–25 mm long, widely striate (3 or 4 veins/mm), inner bracts with broad, brown-flecked membranous margins. *Flowers* bright pink to old rose-coloured with large, violet to purple blotches around small, golden-yellow cup with dark veins in cup, outer tepals mottled or striped red and greenish on reverse; perianth tube funnel-shaped, 4–6 mm long; tepals elliptic, 18–35 × 6–10 mm. *Filaments* 5–7 mm long, pilose basally, orange-yellow; anthers 5–8 mm long, yellow or rarely violet. *Style* dividing below or beyond anther apices, branches ± 2 mm long, deeply divided. *Capsules* subglobose to ellipsoid, up to 12 mm long. *Flowering time*: August (September).

Distribution and ecology: locally endemic in Western Cape, South Africa, at the foot of the Gifberg–Matsikamma near Vanrhynsdorp and around the Biedouw Valley; in seasonally moist clay or loamy soils in renosterveld shrublands.

Diagnosis: distinguished from other species in the section with an oblique corm by the pink flowers with conspicuous violet or purple blotches in the throat of a yellow cup. Similarly coloured and marked flowers are characteristic of *Romulea hirsuta* and may indicate a relationship between them (De Vos 1972) but the corm in *R. hirsuta* is bell-shaped with a circular basal rim. Plants from the foot of the Gifberg have smaller yellow cups than those from the Biedouw Valley.



Distribution of ***Romulea biflora***.

Ser. **Stellanthe** *(M.P.de Vos) J.C.Manning & Goldblatt*, new rank. *Romulea* sect. *Stellanthe* M.P.de Vos in Journal of South African Botany, Suppl. 9: 291 (1972). Type: *R. stellata* M.P.de Vos

[*Romulea* ser. *Stellatae* (as *Stellata*) in Manning & Goldblatt: 87 (2001), name only.]

Corm subglobose, obliquely flattened toward base; basal rim finely fringed. *Stem* subterranean. *Leaves* without secondary bundles, vascular girders, rib marginal fibre strands or rib marginal bundles. *Flowers* salver-shaped, violet. *Stamens* inserted near mouth of tube; filaments glabrous. *Chromosome number* unknown.

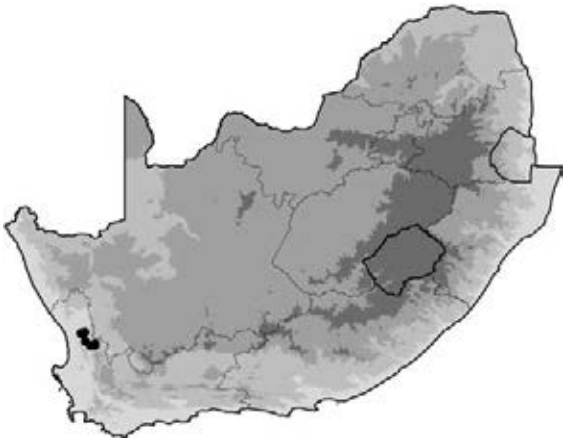
21. **Romulea stellata** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 291 (1972). Type: South Africa, [Western Cape], Pakhuis Pass, *De Vos 2171* (NBG [as STE], holo.).

Plants 15–50 mm high but leaf up to 150 mm long. *Corm* subglobose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 5–10 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* subterranean. *Leaf* 1(2), basal, filiform and conduplicate for most of its length, distal portion narrowly 4-grooved, 0.5–0.8 mm diam. *Peduncles* 1 or 3, semiterete, 5–20 mm long, suberect in fruit; outer and inner bracts entirely membranous and colourless or flushed reddish brown or greenish in upper half. *Flowers* salver-shaped, lilac to purple with darker ring around throat and yellow or orange in upper part of tube, outer tepals mottled purple on reverse; perianth tube narrowly tubular widening slightly above, 11–17 mm long; tepals spreading, elliptic, 7–11 × 2–4 mm. *Filaments* inserted almost at top of tube, 2.0–3.5 mm long, glabrous; anthers 2–3 mm long, violet with paler pollen. *Style* dividing near top of anthers, branches ± 1 mm long, divided for half their length. *Capsules* ellipsoid, 5–8 mm long. *Flowering time*: May to July.

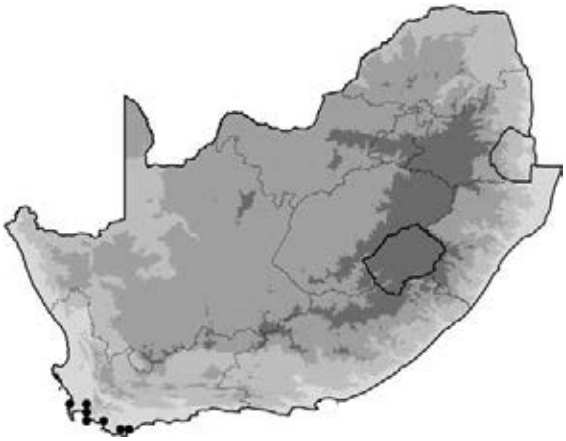
Distribution and ecology: a local endemic of the western mountains of the Western Cape, South Africa, from the Matsikamma–Gifberg south along the Nardousberg to the northern Cederberg; on seasonally waterlogged sandstone pavement in shallow soils.

Diagnosis: a distinctive species recognised by its one or two filiform conduplicate leaves and small, violet to purple, salver-shaped flowers with stamens inserted at the mouth of the tube, and entirely membranous bracts outer and inner bracts.

Its relationships are obscured by the highly derived flowers but the absence of secondary veins in the leaves is an unusual character found in relatively few species in the genus, typically in members of sect. *Tortuosae* which also have a tendency for conduplicate leaves but which are uniformly yellow-flowered, and have the



Distribution of ***Romulea stellata***.



Distribution of ***Romulea gracillima***.

derived chromosome number $2n$ = 30 or 32. A more likely alliance is with species such as *R. vinacea*, with similar leaf anatomy and lilac flowers.

Ser. **Hirsutae** *(Bég.) J.C.Manning & Goldblatt*, new rank. *Romulea* "Stirps" *Hirsutae* Bég. in Annuaire du Conservatoire du Jardin Botaniques de Genève: 159 (1908). *Romulea* subsect. *Hirsutae* (Bég.) M.P.de Vos: 120 (1972). *Romulea* sect. *Hirsutae* (Bég.) J.C.Manning & Goldblatt: 89 (2001). Type: *Romulea hirsuta* (Steud. ex Klatt) Baker

Corm bell-shaped with circular basal rim; basal rim finely fringed, sometimes scalloped. *Stem* subterranean or aerial. *Leaves* usually without secondary bundles, without vascular girders, rib marginal fibre strands or rib marginal bundles. *Chromosome number* $2n$ = 24 (?22).

22. **Romulea gracillima** *Baker*, Handbook of the Irideae: 103 (1892); De Vos: 133 (1972). Type: South Africa, [Western Cape], Drakenstein Mtns, *Drège s.n.* (K, holo.; BM, G, OXF, P, iso.).

Plants 50–100 mm high. *Corm* bell-shaped with flat base and pronounced circular basal rim, 5–10 mm diam., tunics woody, basal rim irregularly fringed. *Stem* short, subterranean or exserted up to 40 mm. *Leaves* 3 to 6, lower 2 basal, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 4, hemiterete, erect fruit; outer bracts green with narrow, colourless membranous margins, 7–15 mm long, finely striate (4 or 5 veins/mm), inner bracts with narrow, colourless membranous margins. *Flowers* pale pink or salmon-pink, sometimes with red lines in throat, with yellow cup, outer tepals darker on reverse; perianth tube funnel-shaped, ± 3 mm long; tepals elliptic, 12–18 × 3–5 mm. *Filaments* 3–5 mm long, pilose in lower part; anthers 2–4 mm long, yellow. *Style* dividing at anther apices, branches divided. *Capsules* oblong, 6–8 mm long. *Flowering time*: August, September.

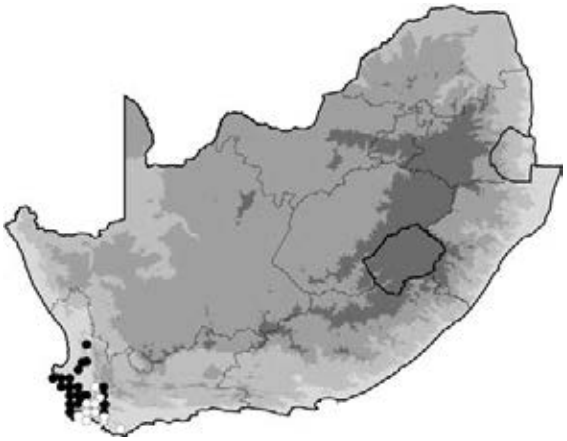
Distribution and ecology: endemic to the mountains in the southwestern Western Cape, from Table Mt to Bredasdorp; on sandstone in fynbos.

Diagnosis: distinguished from *Romulea hirsuta* essentially by its more slender habit and smaller, pale pink to salmon-coloured flowers with tepals 12–18 × 3–5 mm. It may represent merely a small variant of that species (De Vos 1972).

23. **Romulea hirsuta** *(Steud. ex Klatt) Baker* in Journal of the Linnean Society, Botany 16: 89 (1877); De Vos: 125 (1972). *Trichonema hirsutum* Steud. ex Klatt: 665 (1866). Type: South Africa, [Western Cape], Cape Peninsula, Devil's Peak, *Ecklon 703* [S, neo., designated by M.P.de Vos: 127 (1972); B, G, K, M, PRE, Z, iso.].

Plants 50–200 mm high. *Corm* bell-shaped with flat base and pronounced circular basal rim, 5–10 mm diam., tunics woody, basal rim irregularly fringed, sometimes scalloped. *Stem* short and subterranean or aerial and exserted up to 150 mm, sometimes extensively branched. *Leaves* 3 to 9, lower 2 basal, straight or weakly to strongly sinuous, terete and narrowly 4-grooved or compressed and broadly 4-grooved, 0.5–4.0 mm diam., glabrous or ciliate on rib margins. *Peduncles* up to 9, hemiterete, glabrous or ciliolate along angles, suberect or spreading in fruit; outer bracts green with narrow, colourless or brown-flecked membranous margins, 10–25 mm long, finely striate (4 or 5 veins/mm), inner bracts with narrow or wider, colourless or brown-flecked membranous margins. *Flowers* magenta to salmon-pink, apricot-coloured or coppery orange, with or without reddish or violet blotches in the throat, with pale or golden-yellow cup, outer tepals mostly darker on reverse, sometimes with paler median stripe; perianth tube funnel-shaped, 3–6 mm long; tepals oblanceolate to elliptic, 15–35 × 6–12 mm. *Filaments* 4–8 mm long, pilose in lower part, yellow; anthers 3–7 mm long, yellow or with dark streaks. *Style* dividing shortly below to shortly above anther apices, branches 2–3 mm long, divided, rarely multifid. *Capsules* oblong, ± 10 mm long. *Flowering time*: August, September.

Distribution and ecology: relatively common along the West Coast and adjacent mountains of Western Cape,



Distribution of ***Romulea hirsuta*** subsp. ***hirsuta***, ●; subsp. ***cuprea***, ○.

South Africa, from the northern Cederberg to the Cape Peninsula in the south and east to Elim; on damp sandy flats.

Diagnosis: distinguished by the bell-shaped corm and moderate-sized to large flowers with the distal part of the tepals ranging in colour from magenta through salmon-pink to coppery orange or pale apricot-coloured, with or without dark markings around the cup. The presence of some pink anthocyanin pigment in the tepals is essentially what separates *Romulea hirsuta* from yellow-flowered *R. triflora* [see further under subsp. *cuprea*].

Romulea hirsuta is relatively common in the lowlands and coastal mountains of the Western Cape, and is highly variable in habit, width and vestiture of the leaves, and in the size, colour and markings of the flowers. Apart from orange-flowered plants, which were treated as var. *cuprea*, De Vos (1972) segregated two additional variants as varieties but there seems to be little to be gained by this as the extremes of the last two varieties are connected to the typical variety by intermediates, even within populations. Even with their segregation, typical *R. hirsuta* remains a variable species with numerous local forms. We have accordingly reduced the following two varieties to synonymy: var. *framesii* (L.Bolus) M.P.de Vos, recorded from between Darling and Yzerfontein, was distinguished by its relatively broad tepals, 12–20 mm wide, marked with a narrow median dark blotch flanked by cream-coloured patches; and var. *zeyheri* (Baker) M.P.de Vos, which is scattered along the West Coast, especially around Saldanha Bay, was distinguished by its mostly broader leaves, 1.5–4.0 mm wide but grades imperceptibly into the typical variety, and plants corresponding to both frequently co-occur. We continue to recognise orange plants as a separate taxon on account of their distinctively coloured flowers and possible uncertainty about their specific affinity [see below for further discussion]. We treat them at subspecific level as subsp. *cuprea* (Bég.) J.C.Manning & Goldblatt on account of their largely separate distribution, to the east and the south of the typical, pink-flowered form.

Another taxon recognised by De Vos (1972), *Romulea tortilis* Baker (= *R. torta* Baker), was separated from *R. hirsuta* solely by its tightly sinuous leaves. Although all collections of the typical variant of the species are consistent in this feature, the type of *R. torta* var. *dissecta* includes plants with both straight and sinuous leaves. In addition, some plants of *R. hirsuta* have moderately sinuous leaves, making the distinction between the two species tenuous. Other members of the genus, e.g. *R. tortuosa* (Licht. ex Roem. & Schult.) Baker, vary greatly in the degree of flexing of the leaves, and retaining the two taxa on the basis of the degree of leaf flexing alone is unjustified in our opinion.

Key to subspecies

1a Tepals apricot-coloured or coppery orange in upper part, without dark blotches around cup. . . . . 23b. subsp. *cuprea*

1b Tepals magenta to salmon-pink in upper part, usually with dark blotches around cup. . . . . 23a. subsp. *hirsuta*

23a. subsp. **hirsuta**

?*Ixia campanulata* Lam.: 109 (1791), illegitimate homonym, not *I. campanulata* Houtt. (1782). *Bulbocodium campanulatum* Kuntze: 700 (1891), as a replacement name for *I. campanulata* Lam., illegitimate homonym. Type: Unknown, not cited by the author. Apparently a new name for *Ixia bulbocodium* [Thunb.?] var. δ.

Romulea uncinata Klatt: 401 (1882). Type: South Africa, without precise locality, *Pappé s.n.* (S, holo.).

Romulea rosea var. *zeyheri* Baker: 103 (1892), new synonym. *Romulea zeyheri* (Baker) Eckl. ex Bég.: 338 (1907). *R. hirsuta* var. *zeyheri* (Baker) M.P.de Vos: 129 (1972). Type: South Africa, [Western Cape], without precise locality, *Zeyher s.n.* (K, holo.).

Romulea tortilis Baker: 1003 (1904), new synonym. Type: South Africa, [Western Cape], near Porterville, *Schlechter 4890* (Z, holo.; B, G, GRA, K, PRE, SAM, iso.).

Romulea torta Baker: 24 (1906), new synonym. Type: South Africa, [Western Cape], Clanwilliam, Olifants River, *Penther 687* (K, lecto., designated by De Vos: 55 (1983); BM, BOL, M, isolecto.).

Romulea rubrolutea Baker: 25 (1906). Type: South Africa, [Western Cape], Clanwilliam, Olifants River, *Penther 678* [K, lecto., designated by De Vos: 3 (1983)].

Romulea klattii Bég.: 333 (1907), new synonym. Type: South Africa, [Western Cape], Hopefield, *Bachmann 1579* (B, Z, syn.); Darling, *Bachmann 513* (B, syn.).

Romulea bulbocodioides var. *ambigua* Bég.: 163 (1908), new synonym. Type: South Africa, [Western Cape], without locality, as *Drege Irid 208*, probably in error for *Ecklon & Zeyher Irid. 208* [G, holo.—cited as lecto. by De Vos: 31 (1983)].

Romulea framesii L.Bolus: 13 (1931), new synonym. *R. hirsuta* var. *framesii* (L.Bolus) M.P.de Vos: 132 (1972). Type: South Africa, [Western Cape], near Darling, *Ross Frames s.n.* (BOL, holo.).

Romulea torta var. *dissecta* M.P.de Vos: 133 (1972), new synonym. Type: South Africa, [Western Cape], Clanwilliam District, near The Rest, *Bolus 21265* (BOL, holo.).

[*Romulea hirsuta* Eckl.: 19 (1827), invalid name without description.]

[*Romulea ramosa* Eckl.: 19 (1827), invalid name without description.]

[*Trichonema ramosum* Eckl. ex Steud.: 702 (1841), invalid name without description.]

Flowers magenta, rosy-pink or dark apricot-pink with golden or yellow cup or sometimes very little yellow, usually with dark brownish or violet blotches in the throat but sometimes unmarked.

Distribution and ecology: as for the species.

23b. subsp. **cuprea** *(Baker) J.C.Manning & Goldblatt*, name at new rank. *Romulea cuprea* Baker in Journal of Botany, British and foreign 14: 236 (1876). *Bulbocodium cupreum* (Baker) Kuntze: 700 (1891). *Romulea rosea* var. *cuprea* (Baker) Bég.: 63 (1909). *Trichonema cupreum* Herb. ex Baker: 89 (1877), listed in synonymy. *Romulea hirsuta* var. *cuprea* (Baker) M.P.de Vos: 131 (1972). Type: South Africa, [Western Cape], without precise locality or collector, painting in Lindley Library, Royal Horticultural Society, London.

Flowers apricot-coloured or coppery orange with yellow cup, without dark blotches around cup.

Distribution and ecology: distributed mainly in the east and the south of the range of the species, and especially common from Ceres into the Worcester Valley and along the Hottentots Holland Mtns to Hermanus; on damp sandy flats.

Plants with unmarked tepals coloured apricot or coppery orange in the upper half are currently segregated as subsp. *cuprea* of *Romulea hirsuta*, but the recorded occurrence of individuals with both pure yellow as well as orange and yellow flowers in a population from near Wolseley [*De Vos 1882* (NBG)] may indicate a closer relationship with *R. triflora*. Experimental crosses between subsp. *cuprea* and *R. triflora* were unsuccessful (De Vos 1972) and this, plus the occasional occurrence of marked and unmarked plants in the same population, prompted De Vos (1972) to retain the taxon in *R. hirsuta*. We follow her taxonomy in the absence of additional insights.

24. **Romulea triflora** *(Burm.f.) N.E.Br.* in Bulletin of Miscellaneous Information, Kew 1929: 131 (1929); De Vos: 122 (1972). *Crocus triflorus* Burm.f.: 2 (1768). Type: South Africa, without locality or collector (G – Herb. Burman, holo.).

Ixia sublutea Lam.: 335 (1789). *Geissorhiza sublutea* (Lam.) Ker Gawl.: 224 (1804). *Romulea sublutea* (Lam.) Baker: 88 (1877). *Bulbocodium subluteum* (Lam.) Kuntze: 700 (1891). Type: Unknown.

Ixia filifolia F.Delaroche in Redouté: t. 251 (1809). *Romulea filifolia* (F.Delaroche) Eckl.: 20 (1827). *Trichonema filifolium* (F.Delaroche) Ker Gawl.: 82 (1827). *Bulbocodium filifolium* (F.Delaroche) Kuntze: 700 (1891). Type: South Africa, [Western Cape], without precise locality, illustration in Redouté: t. 251 fig. 2 (1809).

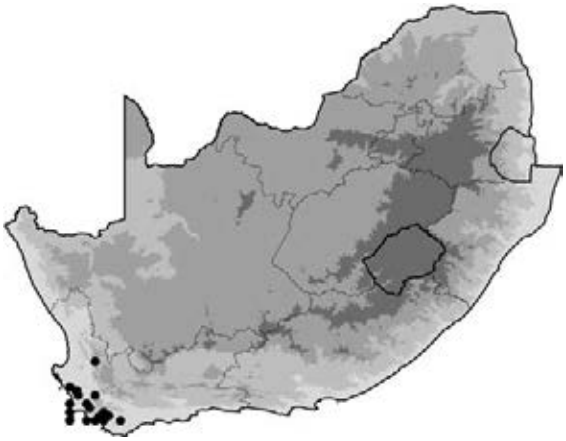
Ixia crocea Thunb.: 218 (1811). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB 946, holo.).

Romulea schlechteriana Schinz: 395 (1895). Type: South Africa, [Western Cape], Cape Town, Rondebosch, *Schlechter 852* (Z, holo.).

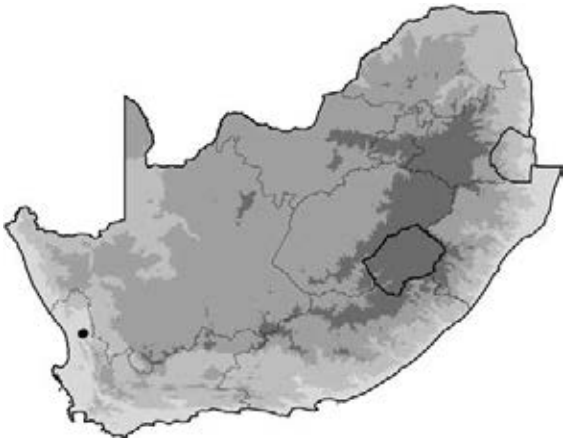
Plants 50–200 mm high. *Corm* bell-shaped with flat base and pronounced circular basal rim, 5–10 mm diam., tunics woody, basal rim irregularly fringed, sometimes scalloped. *Stem* aerial and exserted up to 150 mm or rarely short and subterranean, sometimes extensively branched. *Leaves* 3 to 7, lower 2 basal, terete and narrowly 4-grooved, 0.5–1.0 mm diam., glabrous. *Peduncles* up to 7, hemiterete, spreading in fruit; outer bracts green with narrow, colourless or rarely brown-flecked membranous margins, 10–20 mm long, finely striate (4 or 5 veins/mm), inner bracts with narrow or wider, colourless or rarely brown-flecked membranous margins. *Flowers* golden-yellow or rarely white, sometimes with a dark median line or diffuse brown zone in throat, outer tepals sometimes greenish or brown on reverse; perianth tube funnel-shaped, 4–6 mm long; tepals oblanceolate to elliptic, 15–30 × 7–12 mm, often obtuse. *Filaments* 4–7 mm long, pilose in lower part, yellow; anthers 3–7 mm long, yellow. *Style* dividing shortly below to shortly above anther apices, branches divided. *Capsules* oblong, ± 10 mm long. *Flowering time*: August to October.

Distribution and ecology: largely restricted to the West Coast lowlands of Western Cape, South Africa, from Citrusdal southward along the coastal plain to the Cape Peninsula, where it is most commonly collected, and east to Caledon; on seasonally wet, sandy or loamy flats.

Diagnosis: readily distinguished by its exserted stem, ± unmarked golden-yellow flowers (rarely white with a yellow cup), and bell-shaped corm. White morphs are



Distribution of ***Romulea triflora***.



Distribution of ***Romulea sladenii***.

known only from near Stanford, and the populations in the Overberg near Caledon are unusual in having the outer tepals flushed dark brown on the reverse – all other populations have the tepals yellow on both sides. Plants with ± bicoloured tepals in which the outer half is tinged salmon-coloured or orange are referred to *Romulea hirsuta* subsp. *cuprea* [see that taxon for further discussion].

25. **Romulea sladenii** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 135 (1972). Type: South Africa, [Western Cape], Matsikamma Mtns, *De Vos 2018* (NBG [as STE], holo.).

Plants 30–150(–200) mm high. *Corm* bell-shaped, 5–10 mm diam., tunics woody, basal rim irregularly fringed and scalloped. *Stem* aerial and exserted up to 150 mm. *Leaves* 3 to 5, lower 2 basal, subterete and 4-grooved, 0.5–1.0 mm diam., glabrous. *Peduncles* up to 5, subterete, spreading in fruit; outer bracts green, with narrow, colourless or brown-edged membranous margins, 10–18 mm long, finely striate (4 veins/mm), inner bracts with narrow, colourless or brown-edged membranous margins. *Flowers* white with orange-yellow cup, outer tepals greenish or pink to purple on reverse; perianth tube funnel-shaped, 4–5 mm long; tepals oblanceolate, 15–25 × 4–8 mm. *Filaments* inserted near base of tube, 5–7 mm long, puberulous below, orange-yellow; anthers 4–6 mm long, yellow. *Style* dividing at tips of anthers, branches forked. *Capsules* oblong, 8–10 mm long. *Flowering time*: August, September.

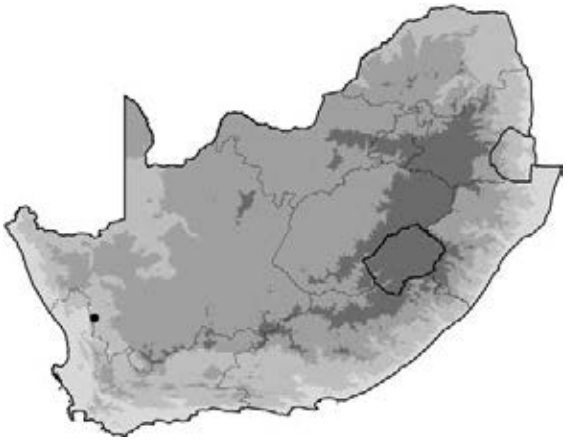
Distribution and ecology: a local endemic of the Matsikamma–Gifberg massif in Western Cape, South Africa; on seasonally wet sandstone rock sheets and flushes in fynbos.

Diagnosis: recognised by the white flowers with orange-yellow cup, the outer tepals flushed green or pink on the reverse, and the bell-shaped corm. The presence of secondary veins in the leaf ribs appears to be unique in the section. In the field the species is easily confused with another Gifberg endemic, *Romulea toximontana*, unless excavated, when the latter is readily identified by its laterally compressed, oblique corm with wide basal ridge. The two species differ slightly in their flowers, with the bright yellow anthers in *R. sladenii* partially exserted from the cup on filaments 5–7 mm long and the cream-coloured anthers of *R. toximontana* included in the cup on shorter filaments 3–5 mm long.

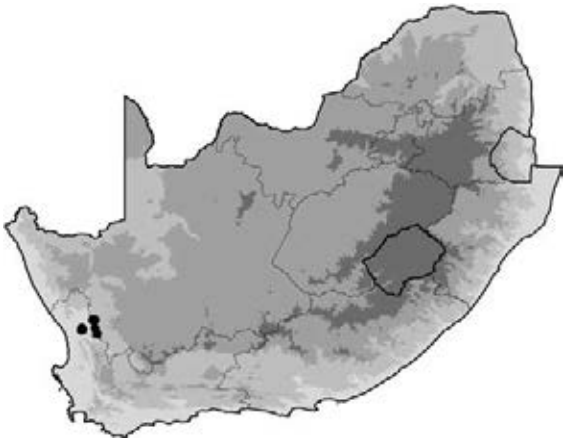
26. **Romulea discifera** *J.C.Manning & Goldblatt* in Adansonia, ser. 3, 23: 91 (2001). Type: South Africa, Northern Cape, Bokkeveld Plateau, north of Nieuwoudtville, west of road to waterfall, 27 July 1999, *Goldblatt & Manning 11075* (NBG, holo.; K, MO, PRE, iso.).

Plants 100–150(–200) mm high. *Corm* flattened bell-shaped, 15–20 mm diam., tunics woody, basal rim irregularly fringed and scalloped. *Stem* subterranean or aerial and exserted up to 80 mm. *Leaves* 3 to 5, lower 2 basal, subterete and 4-grooved, 1.2–2.0 mm diam., glabrous or ciliolate on rib margins. *Peduncles* up to 3, subterete, suberect in fruit; outer bracts green, often flushed purple, with narrow, colourless membranous margins, 15–28 mm long, finely striate (4 veins/mm), inner bracts with narrow, colourless membranous margins. *Flowers* bright yellow with a darker yellow cup, inner tepals with narrow dark median line and sometimes diffuse dark zone in throat, outer tepals with dark median blotch in throat, streaked with reddish longitudinal bands on reverse; perianth tube funnel-shaped, ± 5 mm long; tepals oblanceolate, 25–35 × 6–10 mm. *Filaments* inserted near base of tube, 5–6 mm long, densely pilose below; anthers 6–7 mm long, yellow. *Style* dividing opposite middle of anthers, branches 2–3 mm long, divided for half their length. *Capsules* oblong-ovoid, ± 8 mm long. *Flowering time*: July (August).

Distribution and ecology: a local endemic of the Bokkeveld Mountains north of Nieuwoudtville in Northern Cape, South Africa; on seasonally damp clay flats in renosterveld shrubland.



Distribution of ***Romulea discifera***.



Distribution of ***Romulea multisulcata***.

Diagnosis: a distinctive species with large, yellow flowers with dark brown blotches on the inner tepals and unique, flattened bell-shaped corm much wider than high.

Ser. **Aquaticae** *(M.P.de Vos) J.C.Manning & Goldblatt*, new rank. *Romulea* subsect. *Aquaticae* M.P.de Vos in Journal of South African Botany, Suppl. 9: 139 (1972). Type: *R. aquatica* G.J.Lewis

[*Romulea* ser. *Aquaticae* in Manning & Goldblatt: 62 (2001), name only]

Plants aquatic. *Corm* subglobose, obliquely flattened toward base; basal rim finely fringed. *Stem* aerial. *Leaves* 5- to 8-grooved, with secondary bundles, with or without vascular girders, with rib marginal fibre strands but without rib marginal bundles. *Chromosome number* 2*n* = 24.

27. **Romulea multisulcata** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 139 (1972). Type: South Africa, [Northern Cape], between top of Vanrhyn's Pass and Nieuwoudtville, *De Vos 2183* (NBG [as STE], holo.).

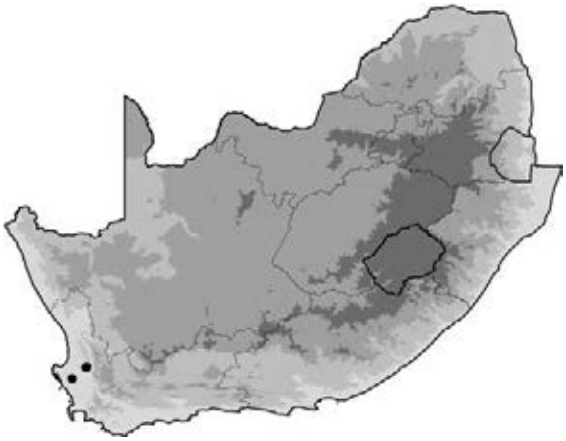
Plants 100–450 mm high. *Corm* subglobose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 6–15 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* aerial, exserted (20–)60–150 mm, sometimes branching above. *Leaves* 3 or 4, lower 2 basal, the second usually sheathing the stem, terete and narrowly 6- to 8-grooved, 1–2 mm diam. *Peduncles* semiterete, 30–70 mm long, deflexed and widely spreading in fruit and 50–90 mm long; outer bracts green and thin-textured with narrow or well-developed, finely brown-speckled membranous margins and sometimes submembranous tips, 18–25(–30) mm long, inner bracts with very broad, brown-flecked or -speckled membranous margins and narrow green centre. *Flowers* white with golden-yellow cup or entirely golden-yellow, sometimes paler toward tips, outer tepals greenish or brown-striped on reverse, sweetly scented; perianth tube funnel-shaped, 3–5 mm long; tepals 15–25 long, outer oblanceolate, ± 7 mm wide, inner obovate-spathulate, ± 9 mm wide. *Filaments* 4–6 mm long, pilose basally; anthers 6–8 mm long, pale yellow. *Style* dividing at or just beyond anther apices, branches 1–2 mm long, divided for half their length. *Capsules* subglobose, 5–8 mm long. *Flowering time*: August, September.

Distribution and ecology: an aquatic species locally endemic to a few vernal pools on the Bokkeveld Escarpment in Northern Cape and the adjacent flats around Vanrhynsdorp in Western Cape, South Africa; flowering in the water with the corm and stem submerged.

Diagnosis: one of two truly aquatic species with more than four longitudinal grooves in the leaves, *Romulea multisulcata* is characterised by two basal leaves, the upper usually sheathing the stem, funnel-shaped perianth tube with filaments 4–6 mm long and anthers 6–8 mm long, style dividing near the top of the anthers, and widely spreading fruiting peduncles elongating slightly in fruit and ultimately 50–90 mm long. The type and other collections from around Nieuwoudtville on the northern Bokkeveld Escarpment have yellow flowers but populations from the southern Bokkeveld and from the flats below Vanrhyn's Pass around Vanrhynsdorp have white flowers with a yellow cup.

28. **Romulea aquatica** *G.J.Lewis* in Journal of South African Botany 4: 8 (1938). Type: South Africa, [Western Cape], Elandsvlei north of Piketberg, *Barker 190* (NBG, holo.).

Plants 100–250 mm high. *Corm* subglobose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 10–20 mm diam., tunics splitting into fine parallel fibrils along ridge. *Stem* aerial, exserted (20–)50–150 mm, peduncles congested at apex. *Leaves* 2 or 3(4), lower 1 basal, terete and narrowly 5- to 8-grooved, 0.8–1.5 mm diam. *Peduncles* semiterete, 10–30 mm long, suberect and up to 50 mm long in fruit; outer bracts green with narrow colourless or finely brown-speckled membranous margins, 7–16 mm long, finely veined (5 or 6 veins/mm), inner bracts with very



Distribution of ***Romulea aquatica***.

broad, brown-speckled membranous margins. *Flowers* white with golden-yellow cup with three slender dark lines in lower half, sweetly scented; perianth tube cup-shaped, 4 mm long; tepals 16–20 long, outer obovate, 6–9 mm wide, inner spathulate, 9–13 mm wide. *Filaments* 2–3 mm long, pilose at base; anthers 3–5 mm long, erect or slightly spreading, pale yellow. *Style* dividing near base or lower half of anthers, branches ± 2 mm long, divided for half their length. *Capsules* subglobose, 8–10 mm long. *Flowering time*: August, September.

Distribution and ecology: a locally endemic aquatic species known from two vernal pools in the Swartland in Western Cape, South Africa, one at Pools near Piketberg and the other at Koperfontein near Hopefield; flowering in the water with the corm and stem submerged. Both known localities are surrounded by agricultural lands and the species is highly endangered.

Diagnosis: one of a pair of allied aquatic species with more than four longitudinal grooves in the leaves, *Romulea aquatica* is recognised by its solitary basal leaf, cup-shaped perianth tube with short filaments, 2–3 mm long, short anthers 3–5 mm long, and short, suberect fruiting peduncles, 10–30(–50) mm long.

Ser. **Namaquanae** *J.C.Manning & Goldblatt*, new series. Type: *R. rupestris* J.C.Manning & Goldblatt

Plants from Namaqualand hardeveld. *Corm* subglobose, obliquely flattened toward base; basal rim finely fringed. *Stem* aerial. *Leaves* 4-grooved, with secondary bundles, vascular girders and rib marginal fibre strands. Outer bracts with well-developed membranous margins and tips. *Chromosome number* unknown.

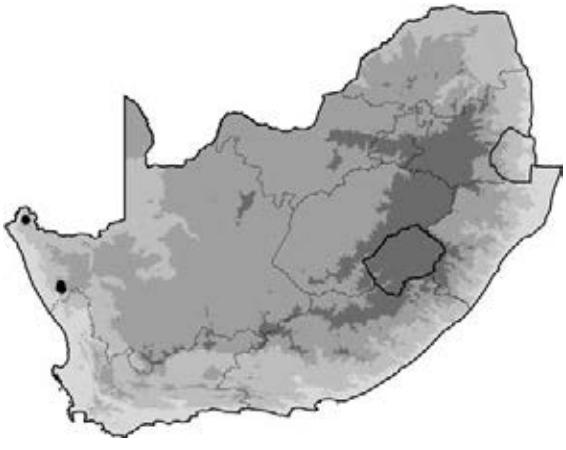
29. **Romulea rupestris** *J.C.Manning & Goldblatt* in Adansonia, 3, 23: 80 (2001). Type: South Africa, [Northern Cape], Rooiberg, granite hills at Welkom, 9 June 1980, *Goldblatt 5567* (NBG, holo.; MO, iso.).

Plants 150–300 mm high. *Corm* globose, obliquely flattened toward base with crescent-shaped basal ridge ± as wide as corm, 10–15 mm diam., tunics splitting into fine parallel fibrils along ridge and forming fibrous neck above. *Stem* aerial, exserted 100–250 mm, cauline leaves clustered at apex. *Leaves* 2 or 3, lowermost 1 basal, oval in section and narrowly 4-grooved, 1.0–1.5 mm diam. *Peduncles* 1 to 3, rather short, up to 35 mm long, semiterete; outer bracts green with well-developed colourless or brown-speckled membranous margins and brown-flecked tips, 18–25(–30) mm long, finely striate (5 or 6 veins/mm), inner bracts with broad, brown-flecked membranous margins and narrow green centre. *Flowers* white to pale mauve with pale yellow cup with dark veins in cup, outer tepals streaked with maroon or dark green on reverse; perianth tube funnel-shaped, 5–6 mm long; tepals elliptic, 25–30 × 5–8 mm. *Filaments* inserted near base or middle of tube, 5–6 mm long, pilose basally; anthers 8–10 mm long, pale yellow. *Style* dividing opposite upper third of anthers, branches ± 2 mm long, divided for half their length. *Flowering time*: May to August.

Distribution and ecology: a poorly collected endemic of the higher-lying parts of northern and central Namaqualand in Northern Cape, South Africa, recorded from Vandersterrberg in the Richtersveld and from Rooiberg in the Kamiesberg; on rocky slopes in fynbos.

Diagnosis: readily distinguished by the solitary basal leaf, well-exserted stem with cauline leaves clustered at the apex, outer bracts with brown-flecked membranous margins and inner bracts with very wide, brown-flecked membranous margins, and white to pale mauve flowers with pale yellow cup.

Superficially resembling *Romulea tabularis*, a coastal species extending north to Hondeklip Bay with similar aerial stem, solitary basal leaf, and pale blueish but generally much smaller flowers, the tepals 10–28 mm long, and shorter bracts 8–16 mm long with scarcely visible membranous margins.



Distribution of ***Romulea rupestris***.

30. **Romulea speciosa** *(Ker Gawl.) Baker* in Journal of the Linnean Society, Botany 16: 89 (1877). *Trichonema speciosum* Ker Gawl.: 223 (1804). *Bulbocodium speciosum* (Ker Gawl.) Kuntze: 700 (1891). *Romulea rosea* var. *speciosa* (Ker Gawl.) Baker: 103 (1892). *Ixia neglecta* Schult.: 279 (1822), as a replacement name for *Trichonema speciosum* Ker Gawl. [not *Ixia speciosa* Andrews (1801a)]. Type: South Africa, without precise locality or collector, illustration in Andrews: t. 170 '*Ixia bulbocodium* var. *flore speciosissimo*' (1801b).

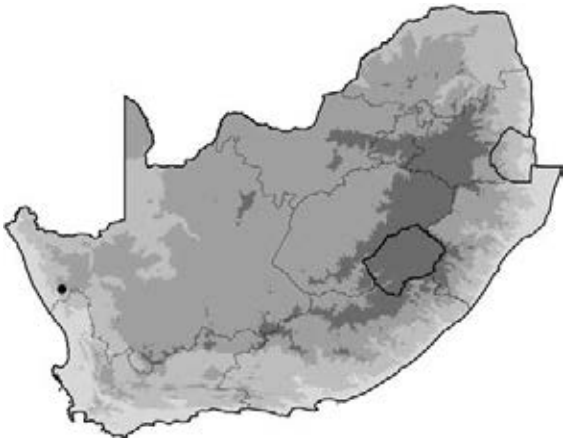
Romulea oliveri M.P.de Vos: 116 (1972). Type: South Africa, [Northern Cape], Kamiesberg, Farm Welkom, *Oliver 3169* (NBG [as STE], holo.; PRE, iso.).

Romulea neglecta M.P.de Vos: 29 (1983), illegitimate homonym, not *R. neglecta* Jord. & Fourr. (1868). Type: South Africa, without precise locality, possibly collected by J. Niven, illustration in Ker Gawl.: t. 1476 '*Ixia speciosa*' (1812).

Plants 50–150(–200) mm high. *Corm* subglobose, obliquely flattened toward base with crescent-shaped basal ridge, ± 15 mm diam.; tunics woody, split into fine parallel fibrils on basal ridge and forming fibrous neck. *Stem* subterranean or exserted up to 100(–120) mm. *Leaves* 2 or 3, lowermost 1 basal or evidently all basal when stemless, ± 1 mm diam., narrowly 4-grooved. *Peduncles* 1 to 3, hemiterete; outer bracts green with distinct, brownish or brown-flecked membranous margins, 15–30 mm long, closely ribbed (10–12 veins/mm), sometimes with stronger median vein, inner bracts with broad, dark brown-flecked membranous margins, central portion green with ± 20 closely spaced raised veins. *Flowers* carmine-red with pale yellow cup with black veins in cup, outer tepals feathered with yellow and purple on reverse; perianth tube funnel-shaped, 4–5 mm long, tepals oblanceolate, (20–)25–35 × (5–)7–10 mm. *Filaments* inserted near base of tube, 4.0–4.5 mm long, pilose at base, yellow to orange or darker toward base; anthers 8–10 mm long, pale yellow. *Style* dividing between middle and below anther apices, branches ± 2 mm long, divided for half their length. *Flowering time*: September.

Distribution and ecology: a poorly collected species known with certainty only from the Farm Welkom on the Kamiesberg in Northern Cape, South Africa; on cooler, southeast-facing gravelly slopes in renosterveld shrubland.

Diagnosis: distinguished by the well-developed brownish or brown-flecked membranous margins to the outer bracts and the large, carmine-red flowers with anthers longer than the filaments. The membranous bract margins and the leaf anatomy (sclerenchyma strands present along the groove margins and sclerenchyma girders developed on the main vascular bundles) associate it with a small group of Namaqualand species including white-flowered *Romulea maculata* and *R. rupestris*, and yellow-flowered *R. pearsonii*.



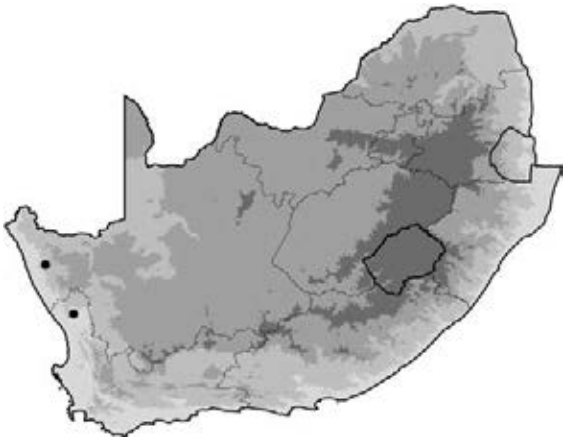
Distribution of ***Romulea speciosa*** .

The confused nomenclatural history of the species was clarified by Manning et al. (2011).

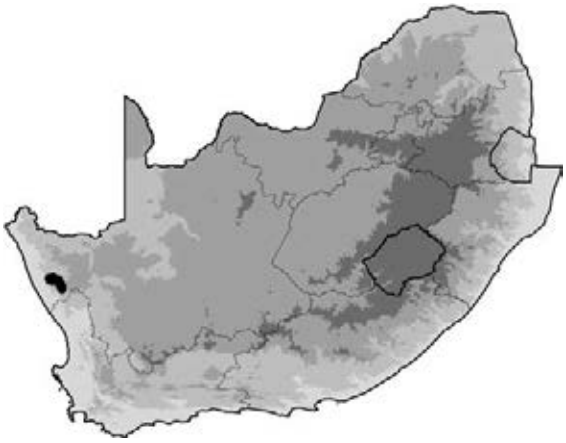
31. **Romulea maculata** *J.C.Manning & Goldblatt* in Adansonia, 3, 23: 81 (2001). Type: South Africa, [Western Cape], northern Knersvlakte, Flaminkberg (also Rooiberg), north-facing upper slope in rocky loam on quartzite, *IPC-NGS Expedition 7* (NBG, holo.).

Plants 50–100 mm high. *Corm* subglobose, obliquely flattened toward base with crescent-shaped basal ridge, 10–15 mm diam.; tunics woody, split into fine parallel fibrils on basal ridge and forming short fibrous neck. *Cataphylls* purple, upper speckled with white above ground. *Stem* subterranean or shortly exserted. *Leaves* 3 or 4, lowermost basal or evidently all basal when stemless, 1.0–1.5 mm diam., oval in section, narrowly 4-grooved. *Peduncles* 1 to 3, hemiterete; outer bracts green with narrow or broader, brown-flecked membranous margins widening to prominent, brown-flecked membranous tip, 21–23 mm long, ribbed (5 or 6 veins/mm), sometimes with stronger median vein, inner bracts with broad, dark brown-flecked membranous margins, central portion green with ± 12 well-spaced raised veins. *Flowers* white with pale yellow cup, outer tepals feathered with dark purple on reverse; perianth tube funnel-shaped, 7–8 mm long, tepals oblanceolate, 27–30 × 10–13 mm. *Filaments* ± 6 mm long, puberulous basally; anthers ± 11 mm long, yellow. *Style* dividing opposite upper third of anthers, branches ± 1 mm long, divided for half their length. *Flowering time*: August, September.

Distribution and ecology: a poorly collected species known from south of Springbok in Northern Cape and near Nuwerus in Western Cape, South Africa; on south-facing or seasonally moist, rocky slopes in succulent karoo shrubland.



Distribution of ***Romulea maculata***.



Distribution of ***Romulea pearsonii***.

Diagnosis: one of a small group of Namaqualand species with prominent, brown-flecked membranous apices to the outer bracts, distinguished by the stemless or short-stemmed habit, large white flowers with outer tepals feathered purple on the reverse, and the purple upper cataphyll conspicuously and finely speckled with white above ground.

32. **Romulea pearsonii** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 113 (1972). Type: South Africa, [Northern Cape], Kamiesberg, Khomsoap Ravine, *Pearson sub Sladen Expedition 6550* (BOL, holo.; K, iso.).

Plants 50–100 mm high. *Corm* subglobose, obliquely flattened toward base with crescent-shaped basal ridge, 8–10 mm diam., tunics woody, split into fine parallel fibrils on basal ridge. *Stem* subterranean. *Leaves* (2)3 to 5, all evidently basal, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 4, hemiterete, suberect or slightly arching in fruit; outer bract green, with narrow, brown-flecked membranous margins widening above into prominent, brown-flecked membranous apex, 15–25 mm long, ribbed (± 6 veins/mm), inner bracts with broad, brown-flecked membranous margins, central portion green with 16 to 18 raised veins. *Flowers* pale to buttercup yellow, sometimes with orange throat, outer tepals greenish streaked brown on reverse; perianth tube ± cup-shaped, 4–5 mm long; tepals oblanceolate to elliptic, 25–40 × 8–14 mm. *Filaments* 6–8 mm long, pilose near base; anthers 7–10 mm long, yellow. *Style* dividing near anther apices, branches divided. *Capsules* shortly cylindric, 10–15 mm long. *Flowering time*: August, September.

Distribution and ecology: endemic to central Namaqualand in Northern Cape, South Africa, between Garies and Kamieskroon, especially on the Kamiesberg.

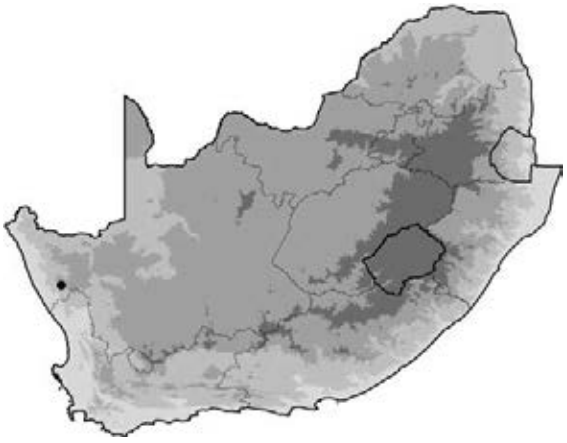
Diagnosis: one of a small group of Namaqualand species with prominent, brown-flecked membranous apices to the outer bracts, distinguished by the stemless habit and yellow, funnel-shaped flowers. This group shares similar leaf anatomy, notably the development of sclerenchyma vascular girders and rib marginal fibre strands, and absence of phloem caps on the secondary bundles.

33. **Romulea tubulosa** *J.C.Manning & Goldblatt* in Bothalia 38: 80 (2008). Type: South Africa, Northern Cape, Kamiesberg, ± 2 km SE of Leliefontein near Naras Farm, local in renosterveld, *R. & R. Saunders sub J.C. Manning 3117* (NBG, holo.).

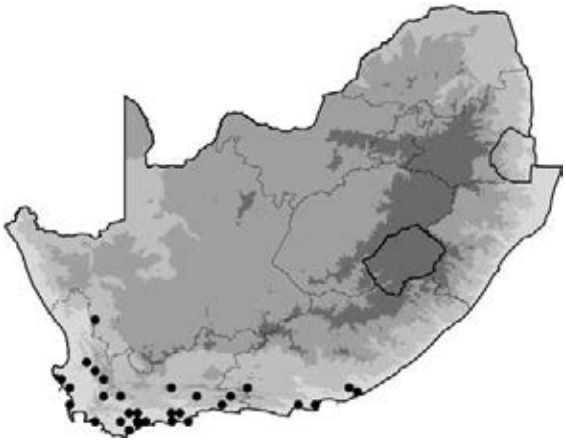
Plants 30–40 mm high. *Corm* subglobose, obliquely flattened toward base with crescent-shaped basal ridge, 5–10 mm diam., tunics woody, split into fine parallel fibrils on basal ridge. *Stem* subterranean. *Leaves* 3 to 6, all evidently basal, narrowly 4-grooved, ± 0.5 mm diam., ciliate on rib margins. *Peduncles* up to 4, hemiterete; outer bract submembranous or green with broad, colourless membranous margins widening above into prominent, brown-flecked membranous apex, 10–15 mm long, ribbed above (5 or 6 veins/mm), inner bracts submembranous or with broad, brown-flecked membranous margins. *Flowers* ± salver-shaped, pale canary-yellow with orange throat, tepals with median brown streak near base, outer tepals streaked reddish brown on reverse; perianth tube subcylindric, widening slightly from base to apex, 13–14 mm long; tepals elliptic, 9–10 × 2.0–2.5 mm. *Filaments* inserted near top of tube ± 1 mm below mouth, shortly decurrent, glabrous, 1.5–3.0 mm long; anthers 3–4 mm long, yellow. *Style* dividing opposite middle of anthers, branches ± 1 mm long, divided for ± halfway. *Flowering time*: August to early September.

Distribution and ecology: a rare endemic of the higher parts of the Kamiesberg in Northern Cape, South Africa, on Rooiberg and Sneeuberg; occurring in small communities in renosterveld shrubland and on gravel pans on granite rock sheets in fynbos.

Diagnosis: the only species in the genus with yellow, salver-shaped flowers, the perianth tube 13–14 mm long with the stamens inserted near the top of the tube. Other species in sect. *Ciliatae* with this perianth type



Distribution of ***Romulea tubulosa***.



Distribution of ***Romulea minutiflora***.

have purple to mauve flowers. The glabrous filaments are typical of species with salver-shaped flowers. The broad, membranous outer bract margins place it in a small group of Namaqualand species with similar bracts and leaf anatomy, viz. the development of vascular girders and rib marginal fibre strands but no phloem caps on the secondary bundles. The stemless habit and yellow perianth suggest a close relationship with *Romulea pearsonii*, also from the Kamiesberg.

Ser. **Minutiflorae** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank. *Romulea* subsect. *Minutiflorae* M.P.de Vos in Journal of South African Botany, Suppl. 9: 143 (1972). Type: *R. minutiflora* Klatt

Corm somewhat elongated, higher than wide, obliquely flattened toward base with high, somewhat flattened basal ridge; basal ridge finely fringed. *Stem* subterranean. *Leaves* with secondary bundles, with or without vascular girders, with rib marginal fibre strands, without rib marginal bundles. *Chromosome number* 2*n* = 26, c. 50.

34. **Romulea minutiflora** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 399 (1882). Type: South Africa, [Western Cape], Worcester, Hex River Mtns, *Drège 538* [S, lecto., designated by De Vos: 146 (1972)].

Plants 30–150 mm high. *Corm* obovoid to oblong, obliquely flattened toward base with high, crescent-shaped or ± flattened or wavy basal ridge, 10–15 × 5–10 mm, tunics splitting into fine parallel fibrils along ridge. *Stem* subterranean. *Leaves* 4 to 12, apparently all basal, often 2-ranked, lowermost arcuate or spreading, terete to oval in section and narrowly 4-grooved, 1.0–1.5 mm diam. *Peduncles* 1 to 4, rather short, up to 50 mm long, semiterete, initially arcuate in fruit but later erect; outer bracts submembranous or greenish in upper half, finely rust- or brown-speckled, finely and widely striate (3 to 5 veins/mm), with colourless or brown-spotted membranous margins, 6–10 mm long, inner bracts membranous or somewhat herbaceous in centre near tip with wide, prominently brown-spotted or -blotched membranous margins. *Flowers* pale mauve to lilac or rarely white, with greenish yellow cup, usually with violet circle in throat, outer tepals greenish or mottled on reverse; perianth tube funnel-shaped, 1.5–3.5 mm long; tepals elliptic, 4–9 × 1.5–2.5 mm. *Filaments* 2–4 mm long, glabrescent; anthers 1.5–2.0 mm long, pale yellow. *Style* dividing near tops of anthers, branches ± 1 mm long, divided. *Capsules* ellipsoid, 9–15 mm long. *Flowering time*: (July) August, September.

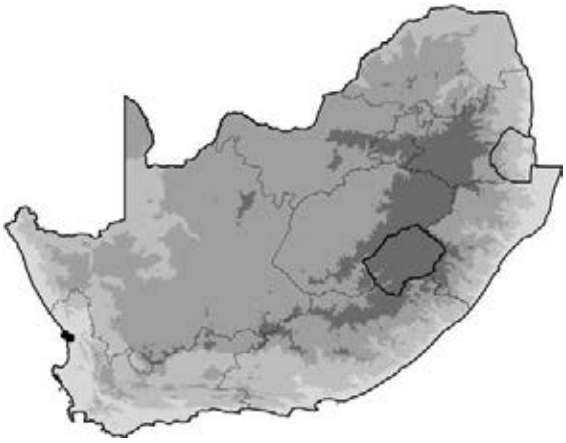
Distribution and ecology: widely scattered through the Cape Floristic Region , South Africa, from the Bokkeveld Escarpment in Northern Cape through the southern parts of Western Cape into Eastern Cape to Port Elizabeth and also Grahamstown (introduced to Australia); mostly in sandy soils, usually in ruderal situations such as roadsides and grassy swards.

The propensity of the species for disturbed places and road verges makes it difficult to assess its natural distribution. Early records indicate a native range in the southwestern Cape, but the records from Grahamstown are from lawns and may be introductions.

Diagnosis: recognised by its stemless habit and small, mostly pale mauve flowers, the tepals 4–9 mm long, submembranous outer bracts finely speckled with rusty brown throughout and inner bracts with prominently brown-spotted margins, and corm with a high, almost spathulate basal ridge. *Romulea sinispinosensis* from coastal sands north of Lamberts Bay on the West Coast has larger, white flowers, the tepals 10–12 mm long, pale bracts, and bracteoles with weakly spotted margins.

35. **Romulea sinispinosensis** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 147 (1972). Type: South Africa, [Western Cape], Vredendal, Doringbaai, *De Vos 2106* (NBG [as STE], holo.).

Plants 30–100 mm high. *Corm* obovoid to oblong, obliquely flattened toward base with high, crescent-shaped



Distribution of ***Romulea sinispinosensis***.

or ± flattened or wavy basal ridge, 12–15 × 8–12 mm, tunics splitting into fine parallel fibrils along ridge. *Stem* subterranean. *Leaves* 5 to 12, apparently all basal, mostly arcuate or spreading, terete to oval in section and narrowly 4-grooved, 1.0–1.5 mm diam. *Peduncles* up to 5, rather short, up to 50 mm long, semiterete, initially arcuate in fruit but later erect; outer bracts thin-textured or submembranous, reddish green in upper half, finely and widely striate (3 to 5 veins/mm), with narrow, ± colourless membranous margins, 8–10 mm long, inner bracts largely membranous or somewhat herbaceous in centre near tip with wide, membranous margins weakly or sparsely brown-spotted near tip. *Flowers* white with greenish yellow cup, outer tepals greenish on reverse; perianth tube funnel-shaped, 2.5–3.5 mm long; tepals elliptic, 10–12 × 3–4 mm. *Filaments* 3–4 mm long, minutely puberulous; anthers 3.5–4.0 mm long, pale yellow. *Style* dividing near tops of anthers, branches ± 1 mm long, divided. *Capsules* ellipsoid, 10–15 mm long. *Flowering time*: August.

Distribution and ecology: a local endemic known only from the West Coast between Doringbaai and Lamberts Bay, South Africa, with a possible sight record further south near Velddrif; in sandy, often hard-packed soil, typically in open places along paths or in yards.

Diagnosis: a polyploid species closely allied to *Romulea minutiflora* from more southerly and inland locations, which has smaller, mostly pale lilac or mauve flowers with tepals 4–9 × 1.5–2.5 mm, often with a dark ring in the throat, finely rust-coloured speckled outer bracts, and inner bracts with membranous margins only inconspicuously brown-spotted or -speckled near the tips.

Ser. **Tetragonae** *J.C.Manning & Goldblatt*, new series. Type: *R. tetragona* M.P.de Vos

Corm subglobose, obliquely flattened toward base; basal rim finely fringed. *Stem* subterranean. *Leaves* 4-winged with lateral ribs reduced and median ribs winged, glabrous or ciliate on wing margins; peduncles and bracts ± pubescent. *Chromosome number* 2*n* = 26.

36. **Romulea tetragona** *M.P.de Vos* in Flowering Plants of Africa 29: t. 1136 (1952c). Type: South Africa, [Western Cape], Ceres, Theronsberg Pass, *De Vos 1569* (NBG [as STE], holo.).

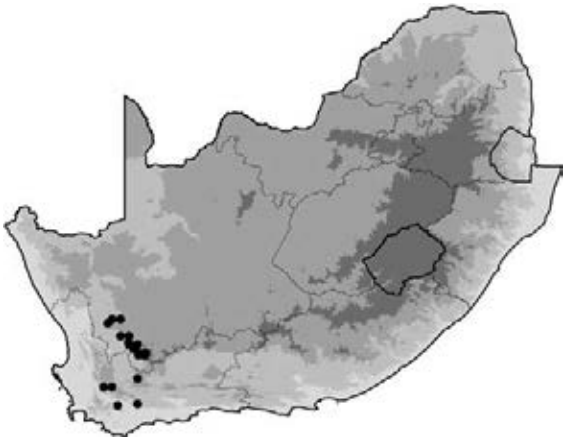
Romulea tetragona var. *flavandra* M.P.de Vos: 273 (1972), new synonym. Type: South Africa, [Western Cape], Tweedside, *De Vos 1800B* (NBG [as STE], holo.).

Plants 20–100(–150) mm high. *Corm* subglobose, oblique with crescent-shaped basal ridge, 8–10 mm diam., tunics splitting into fine parallel fibrils along ridge; stem subterranean. *Leaves* (2)3 to 10(–15), lower mostly falcate, H-shaped in section, lower leaves 2–5(–7) mm wide but narrowed toward base, uppermost leaves generally narrower and as little as 1 mm wide, lateral ribs reduced and median (apparently marginal) ribs produced into flange-like wings, variously and sparsely or densely ciliolate, ciliate or ciliolate-ciliate along margins of wings or subglabrous. *Peduncles* up to 5, subterete, hirsute or villous, spreading but ultimately suberect in fruit; outer bracts green with brownish, brown-streaked or colourless margins widening upward to prominent membranous tip, 10–18 mm long, finely striate (± 5 veins/mm), hirsute or villous in lower half or throughout, inner bracts green with broad brown-speckled or colourless margins, hirsute along veins or rarely glabrous. *Flowers* pale lilac to magenta, sometimes with blue tips, rarely white, with small yellow or violet cup with darker violet blotch or band in throat, outer tepals greenish with purple feathering on reverse; perianth tube cup-shaped, 3–6 mm long; tepals obovate to elliptical, 12–28 × 5–8 mm. *Filaments* 3–4 mm long, minutely pilose basally, whitish; anthers 2–6 mm long, suberect to apically incurved, purple with reddish or orange pollen or rarely yellow with yellow pollen. *Style* dividing between base and apices of anthers, branches 2–5 mm long, deeply forked, whitish. *Capsules* oblong, 8–10 mm long. *Flowering time*: August to mid-September.

Distribution and ecology: distributed from the summit of the Hantamsberg along the Roggeveld Escarpment to the Komsberg and down to Tweedside in Northern Cape, with outlying stations to the south on the Theronsberg near Ceres and Kwadousberg near Worcester in Western Cape, South Africa; in seasonally waterlogged clay soils or seeps in renosterveld shrubland.

Diagnosis: a very distinct species without evident close allies, readily recognised by its distinctive H-shaped leaves, usually variously pubescent on the wing-margins, the pubescent peduncles and outer bracts, which have relatively broad membranous margins and apices, and the relatively small, lilac to magenta (rarely white) flowers with yellowish or violet cup. The leaves are often relatively short, not longer than the flowering stems.

Both yellow-flowered *Romulea hirta* (sect. *Roseae*) and orange-flowered *R. pilosa* (sect. *Aggregatae*) have developed remarkably similar 4-winged leaves.



Distribution of ***Romulea tetragona***.

The development of sclerenchyma strands in the wing (= lateral rib) margins of the leaves of *Romulea tetragona* is relatively uncommon in sect. *Romulea* and this, plus a shared chromosome number $2n = 26$, may indicate an alliance with *R. minutiflora*, which also has relatively broad, brown-streaked outer bract margins.

The species is variable in the colouring of the floral cup, anthers and pollen, and in the length of the style. Two populations from near Sutherland and one from Tweedside with yellow anthers and pollen were segregated by De Vos (1972) as var. *flavandra* but we prefer not to recognise these populations formally as they differ in no other way from typical plants with dark anthers.

Ser. **Tortuosae** *(Bég.) J.C.Manning & Goldblatt*, name at new rank. *Romulea* "Stirps" *Tortuosae* Bég. in Annuaire du Conservatoire du Jardin Botaniques de Genève: 160 (1908). *Romulea* sect. *Tortuosae* (Bég.) M.P.de Vos: 151 (1972). Type: *Romulea tortuosa* Baker

Romulea subsect. *Longitubae* M.P.de Vos: 163 (1972), new synonym. Type: *R. macowanii* Baker

[*Romulea* sect. *Macowania* M.P.de Vos: 283 (1970), invalid name without description.]

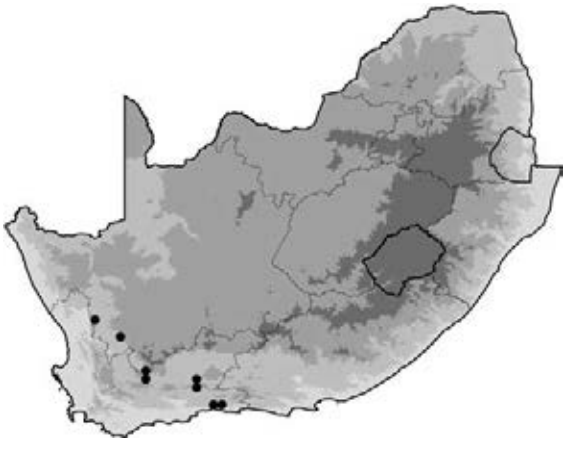
Corm hemispherical, obliquely flattened with wide or fan-shaped basal rim. *Stem* subterranean. *Leaves* largely or entirely bifacial, without secondary bundles, vascular girders or rib marginal fibre strands or rib marginal bundles. *Outer* and *inner bracts* submembranous in basal half or entirely membranous. *Flowers* golden-yellow, often orange in cup. *Chromosome number* $2n = 30, 32$.

37. **Romulea austinii** *E.Phillips* in Flowering Plants of South Africa 3: t. 90 (1923). Type: South Africa, [Western Cape], Laingsburg, Matjesfontein, *Austin 2572* (PRE, holo.; BOL, K, iso.).

Plants 30–100 mm high. *Corm* hemispherical, 5–15 mm diam., obliquely flattened on one side and convex on the other, with wide, crescent-shaped basal ridge as wide as corm, tunics woody, split into parallel fibrils along ridge. *Stem* subterranean. *Leaves* 2 to 4(6), all basal, subterete, bifacial in lower ± half with adaxial groove open, narrowly 4-grooved distally, 0.5–1.0 mm diam., sometimes sparsely ciliolate along rib margins. *Peduncles* 1 to 3, up to 50 mm long, subterete, curved or slightly flexuose in fruit; outer bracts submembranous or greenish in lower half, green and subherbaceous distally, with narrow membranous margins, 10–22 mm long, widely striate (3 or 4 veins/mm), inner bracts submembranous in lower half and subherbaceous distally, with wide, brown-stippled membranous margins. *Flowers* canary-yellow with golden-yellow cup, usually with spade-shaped brownish markings in throat, outer tepals dark veined or feathered on reverse; perianth tube funnel-shaped, 4–5 mm long; tepals oblanceolate to elliptic, 14–25 × 5–9 mm. *Filaments* 5–7 mm long, pilose basally, yellow; anthers 3–6 mm long, yellow. *Style* dividing shortly below or beyond anther apices, branches 2 mm long, divided halfway. *Capsules* ellipsoid, 6–10 mm long. *Flowering time*: May to July.

Distribution and ecology: distributed through the drier interior southwestern parts of Western Cape, South Africa, from the Tanqua Karoo and western Great Karoo into the Little Karoo as far as the Long Kloof; on seasonally damp, stony clay flats in renosterveld.

Diagnosis: diagnosed by the hemispherical corm with broadly crescent-shaped basal ridge not wider than the corm itself, subterranean stem, leaves that are unifacial in the lower half, canary-yellow flowers with golden-yellow cup, usually with brown markings around the throat, and inner and outer bracts that are submembranous in the basal half but green and subherbaceous above. *Romulea austinii* is difficult to separate from forms of *R. tortuosa* lacking strongly compressed corms with a wide, fan-shaped basal ridge but that species typically has entirely papery or membranous bracts and more numerous leaves, bifacial almost to the tips and usually flexuous or twisted and sometimes conspicuously ciliate. Although De Vos (1972) cited the relatively



Distribution of ***Romulea austinii***.

shorter anthers in *R. austinii* as another character separating it from *R. tortuosa*, this is not infallible as some populations of *R. tortuosa* have similarly short anthers. The two species are largely parapatric, with *R. tortuosa* ranging to the north and west, from Namaqualand onto the Bokkeveld, Cold Bokkeveld and Roggeveld as far south as Worcester, thus overlapping with *R. austinii* on the Bokkeveld Plateau between Nieuwoudtville and Calvinia, and below the escarpment in the western Great Karoo between Matjiesfontein and Laingsburg.

38. **Romulea tortuosa** *(Licht. ex Roem. & Schult.) Baker* in Journal of the Linnean Society, Botany 16: 88 (1877). *Ixia tortuosa* Licht. ex Roem. & Schult.: 375 (1817). *Trichonema tortuosum* (Licht. ex Roem. & Schult.) Ker Gawl.: 83 (1827). *Bulbocodium tortuosum* (Licht. ex Roem. & Schult.) Kuntze: 701 (1891). Type: South Africa, without precise locality, *Lichtenstein s.n.* (B, holo.).

Romulea tridentifera Klatt: 398 (1882). Type: South Africa, [Northern Cape], Hantam Mtns, *Meyer s.n.* in 1869 (B†, holo.; S, iso.).

Romulea aurea Klatt: 399 (1882), new synonym. *R. tortuosa* subsp. *aurea* (Klatt) M.P.de Vos: 157 (1972). Type: South Africa, [Northern Cape], Hantam Mtns, *Meyer s.n.* in 1869 (B†, holo.; S, iso.).

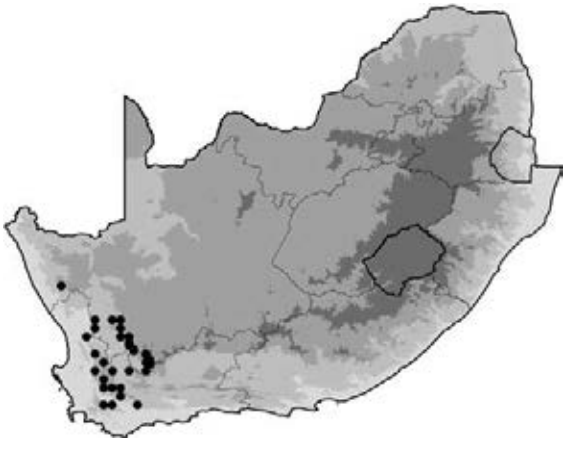
Romulea tortuosa subsp. *depauperata* M.P.de Vos: 159 (1972), new synonym. Type: South Africa, [Western Cape], summit Gydo Pass, *De Vos 1273* (NBG [as STE], holo.).

Plants 30–100 mm high. *Corm* hemispherical, 7–20 mm diam., obliquely flattened on one side and convex on the other, with wide, crescent- or fan-shaped, sometimes almost vertical basal ridge as wide as corm or wider, tunics woody, split into parallel fibrils irregularly grouped along ridge. *Stem* subterranean. *Leaves* 4 to 8, all basal, sometimes flexuous or twisted, conduplicate and bifacial almost to tip with adaxial groove open, narrowly 4-grooved beneath, 0.5–1.0 mm diam., glabrous or ciliolate to ciliate or pilose along rib margins. *Peduncles* 1 to 4, up to 80 mm long, subterete, curved or reflexed to spirally twisted in fruit; outer and inner bracts largely membranous or submembranous, greenish apically or with green or reddish veins, white or brownish to brown-stippled, 10–25 mm long, widely striate (3 or 4 veins/mm). *Flowers* pale to golden-yellow with darker cup sometimes extending onto base of tepals, unmarked or with tridentate or spade-shaped black blotch in throat, sometimes reduced to black veins, outer tepals sometimes greenish brown on reverse, sweetly scented; perianth tube funnel-shaped, 3–10 mm long; tepals oblanceolate to elliptic, 10–40 × 2–12 mm. *Filaments* 3–10 mm long, pilose basally, yellow; anthers 3–10 mm long, yellow. *Style* dividing shortly below or beyond anther apices, branches 2–6 mm long, divided halfway. *Capsules* subglobose to ellipsoid, 6–10 mm long. *Flowering time*: June to September.

Distribution and ecology: distributed through the near interior of the Northern and Western Cape, South Africa, on the Kamiesberg and the Bokkeveld Escarpment south through the Cold Bokkeveld and Swartruggens to Worcester and inland across the Hantam Plateau to Williston and along the Roggeveld to Laingsburg; on seasonally wet, loamy or clay flats and seepages, mainly in renosterveld shrublands, often forming dense colonies.

Diagnosis: usually readily recognised by the several, often flexuous leaves bifacial to the tips and sometimes conspicuously ciliate or pilose, the yellow flowers subtended by ± entirely membranous inner and outer bracts, and the often strongly vertically flattened corm with broad, fan-like basal rim. Some forms of *Romulea tortuosa* have been confused with *R. austinii*, but that species has fewer leaves, 2 to 4(6) that are unifacial in the upper half and never more than sparsely ciliolate, and only partially membranous inner and outer bracts that are green and herbaceous or subherbaceous in the upper half.

Romulea tortuosa varies greatly in the size and markings of the flowers, which range from less than 25 mm long and pale yellow with conspicuous dark black or brown blotches to over 40 mm long and golden-yellow without markings. Three subspecies were recognised by De Vos (1972) to accommodate this variation: subsp. *tortuosa* for plants with golden-yellow flowers mostly more than 25 mm long, usually with dark markings in the throat and occurring throughout the range of the species; subsp. *aurea* for similar large-flowered forms without markings, from the Bokkeveld and Roggeveld; and subsp. *depauperata* for plants with smaller, paler yellow flowers mostly less than 25 mm long with or without dark markings, from the Cold Bokkeveld to Worcester. The morphological and geographical distinctions between these three variants is, however, inconsistent, and that between subsp. *aurea* and subsp. *tortuosa* is especially untenable given the intra-population variation evident on the Bokkeveld and Roggeveld.



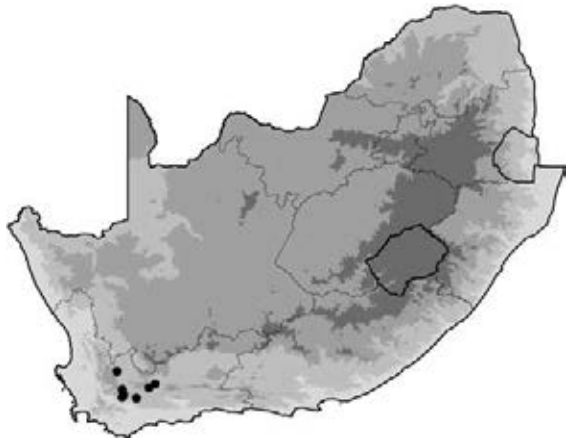
Distribution of ***Romulea tortuosa***.

39. **Romulea sphaerocarpa** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 161 (1972). Type: South Africa, [Western Cape], Sandvlei, 23 km from Matroosberg Station to Koo, *De Vos 2102* (NBG [as STE], holo.).

Plants 30–100 mm high. *Corm* hemispherical, 8–18 mm diam., obliquely flattened on one side and convex on the other, with wide crescent-shaped basal ridge as wide as corm, tunics woody, split into parallel fibrils along ridge. *Stem* short, subterranean, elongating to 40 mm after flowering. *Leaf* 1, basal, subterete, bifacial in lower ± third with adaxial groove open, narrowly 4-grooved distally, ± 1 mm diam., with adhering sand grains. *Peduncles* 1 or 2, up to 50 mm long, subterete, reddish and with adhering sand grains, arcuate and elongating slightly in fruit; outer bracts submembranous flushed purple in lower half, green and subherbaceous distally, with narrow, colourless, membranous margins, 15–18 mm long, widely striate (3 or 4 veins/mm), with adhering sand grains, inner bracts submembranous flushed purple in lower half and subherbaceous distally, with wide, brown-stippled membranous margins. *Flowers* golden-yellow with 3 or 5 brownish veins in throat, outer tepals brownish, yellowish or veined or feathered on reverse; perianth tube funnel-shaped, 5–7 mm long; tepals oblanceolate to elliptic, 15–30 × 5–12 mm. *Filaments* 5–7 mm long, pilose basally, yellow; anthers 6–8 mm long, yellow. *Style* dividing shortly below or beyond anther apices, branches 2 mm long, divided halfway. *Capsules* globose, 6–10 mm long. *Flowering time*: June, July.

Distribution and ecology: endemic to the interior mountains of Western Cape, South Africa, from the Swartruggens and Waboomsberg to Anysberg; locally common in sandy pockets in arid fynbos.

Diagnosis: a distinctive species recognised by the obliquely hemispherical corm, solitary leaf up to 200 mm long with adhering sand grains, and one or two golden-yellow flowers with both outer and inner bracts submembranous and flushed purple in the lower half and also with adhering sand grains. The corm, partially bifacial leaf, submembranous outer and inner bracts, yellow flower, and chromosome number $2n$ = ± 30, 32 all indicate a relationship with *Romulea tortuosa* and its allies but the solitary leaf with mucilage secretions is diagnostic.



Distribution of ***Romulea sphaerocarpa***.

40. **Romulea macowanii** *Baker* in Journal of Botany, British and foreign 14: 236 (1876). *Bulbocodium macowanii* (Baker) Kuntze: 700 (1891). Type: South Africa, [Eastern Cape], Somerset East, Boschberg, *MacOwan 1547* (K, lecto., designated by De Vos: 166 (1972); BM, BOL, G, GRA, PRE, isolecto.).

Syringodea luteonigra Baker: 281 (1897). Type: South Africa, [Eastern Cape], Queenstown, summit of Andriesberg and Hangklip, *Galpin 1516* (K, holo.; BOL, PRE, iso.).

Romulea longituba L.Bolus: 342 (1928). Type: South Africa, [KwaZulu-Natal], Mt Ingele. *Tyson 1267* (syntypes, GRA, SAM).

Romulea longituba G.J.Lewis: 43 (1941), illegitimate homonym, not *R. longituba* L.Bolus (1928) and an illegitimate superfluous name for *R. longituba* L.Bolus. Type: South Africa, [KwaZulu-Natal], Mt Ingele, *Tyson 1267* (SAM, holo.).

Romulea longituba var. *alticola* B.L.Burtt, new synonym: t. 515 (1967). *Romulea macowanii* var. *alticola* (B.L.Burtt) M.P.de Vos: 168 (1972). Syntypes: Lesotho, without precise locality, *Milford s.n.* (possibly not preserved) and illustrated in Burtt: t. 515 (1967).

Romulea macowanii var. *oreophila* M.P.de Vos: 169 (1972), new synonym. Type: South Africa, [Eastern Cape], Naude's Nek, summit of road, *De Vos 2186* (NBG [as STE], holo.).

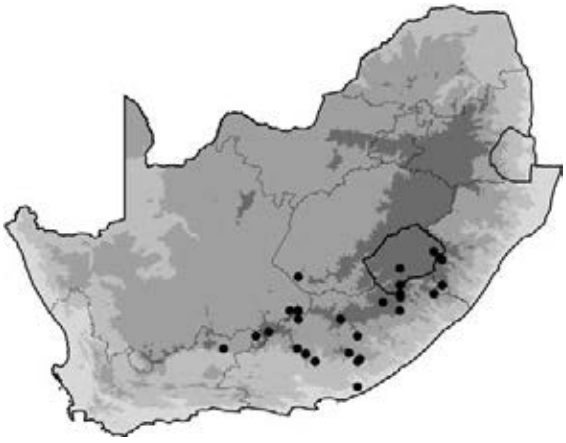
Plants 20–100 mm high. *Corm* hemispherical, 8–15 mm diam., obliquely flattened on one side and convex on the other, with crescent-shaped basal ridge as wide as corm, tunics woody, split into parallel fibrils irregularly grouped along ridge. *Stem* subterranean. *Leaves* 3 to 6, all basal, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* 1 to 3, subterranean or shortly exserted, subterete, recurved in fruit; outer bracts submembranous below, green and subherbaceous in distal half, 20–60 mm long, widely striate (3 or 4 veins/mm), inner bracts largely membranous or subherbaceous above, sometimes with wide, colourless membranous margins. *Flowers* golden-yellow with orange cup often extending onto lower half of tepals, outer tepals often brownish or purplish or striped or feathered on reverse; perianth tube narrowly funnel-shaped, (13–)20–60 mm long, tubular below widening distally; tepals oblanceolate to elliptic, (10–)15–45 × 5–15 mm. *Filaments* 5–10 mm long, pilose basally or glabrescent, yellow; anthers 5–12 mm long, yellow. *Style* dividing shortly below or beyond anther apices, branches ± 2 mm long, divided

halfway. *Capsules* ellipsoid, 10–12 mm long. *Flowering time*: mainly January to May.

Distribution and ecology: a high-altitude species from the southeastern central plateau and adjacent mountains, ranging from Lesotho and Ngele in southern KwaZulu-Natal through the southern Free State westward as far as the Sneeuberge in Eastern Cape and Murraysburg in Western Cape, South Africa, and south to Grahamstown, with an isolated record near Fraserburg; in moist, open grassland and on rock sheets.

Diagnosis: readily distinguished by the very shortly pedunculate, yellow flowers with relatively long, funnel-shaped perianth tube, (13–)20–65 mm long, and correspondingly long, submembranous bracts, 20–60 mm long.

Three varieties were recognised by De Vos (1972): var. *macowanii* for plants with large flowers mostly more than 55 mm long and tepals 8–15 mm wide; var. *oreophila* for plants with smaller flowers mostly less than 55 mm long and narrower tepals 4–7 mm long; and var. *alticola* for plants with longer perianth tubes, 35–65 mm long. These differences are trivial in light of the variation evident in the species, and in some instances at least merely reflect growing conditions, with multiple collections from the same locality blurring these distinctions.



Distribution of ***Romulea macowanii***.

Sect. 2. **Autumnales** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank. *Romulea* subsect. *Autumnales* M.P.de Vos in Journal of South African Botany, Suppl. 9: 202 (1972). Type: *R. autumnalis* L.Bolus

Corms with oblique, crescent-shaped basal ridge usually less than half as wide as corm; tunics splitting into slender teeth. *Leaves* with secondary bundles, usually with vascular girders and rib marginal fibre strands but without rib marginal bundles.

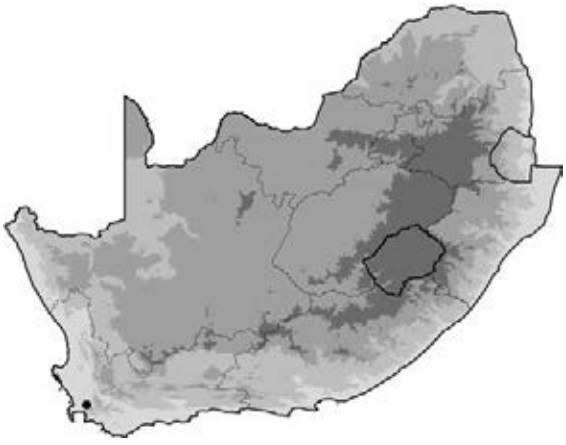
Ser. **Alticolae** *J.C.Manning & Goldblatt*, new series. Type: *R. alticola* J.C.Manning & Goldblatt

Corm with inconspicuous basal ridge much less than half as wide as corm, tunics papery with long, slender teeth curving over basal ridge. *Stem* exserted. *Leaves* with secondary bundles and vascular girders, without rib marginal strands.

41. **Romulea alticola** *J.C.Manning & Goldblatt* in South African Journal of Botany 95: 132 (2014). Type: South Africa, Western Cape, Jonkershoek, lower slopes, *Kerfoot 6010* (NBG, holo.; PRE, iso.).

Plants 50–100(–200) mm high. *Corm* ovoid, 5–7 mm diam., obliquely pointed with small basal ridge, tunics papery, split into slender teeth bent over ridge, ± fibrous and extending upward in a softly fibrous neck. *Stem* usually exserted up to 50 mm. *Leaves* (2)3 or 4, lower (1)2 basal, terete-filiform, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 3, subterete-angled; outer bracts green with narrow, colourless membranous margins, 10–16 mm long, laxly ribbed (± 5 veins/mm) with papillate grooves between ribs, inner bracts with wide, brown-speckled membranous margins. *Flowers* purple with orange-yellow cup, outer tepals pale green with purple feathering on reverse; perianth tube funnel-shaped, ± 4 mm long; tepals oblanceolate to elliptic, 14–20 × 4–6 mm. *Filaments* shortly exserted from cup, ± 5 mm long, puberulous or pilose basally; anthers ± 4 mm long, yellow. *Style* dividing just below anther apices, branches ± 1.5 mm long, shortly divided. *Flowering time*: September, October.

Distribution and ecology: known from two collections from the Jonkershoek Mtns above Stellenbosch in Western Cape, South Africa.



Distribution of ***Romulea alticola***.

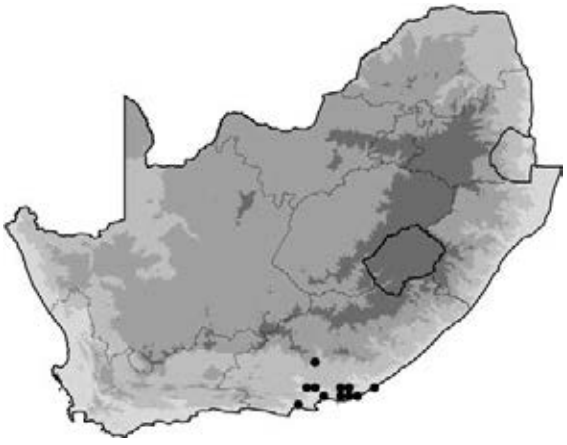
Diagnosis: distinctive in its softly papery corm tunics splitting at the base into slender teeth curved over a small basal ridge, the tunics becoming almost fibrous with age and forming a softly fibrous neck above, and in the exserted stem. The purple flowers with an orange-yellow cup are subtended by unusual bracts with prominently ridged veins separated by wide, distinctly papillate stomatiferous grooves. The tunics splitting into narrow teeth are consistent with sect. *Autumnales* but the papery tunics with teeth curved over a small basal ridge, exserted stem, and leaves without rib marginal strands are anomalous in the section.

Ser. **Autumnales** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank. *Romulea* subsect. *Autumnales* M.P.de Vos in Journal of South African Botany, Suppl. 9: 202 (1972). Type: *R. autumnalis* L.Bolus

Corm with inconspicuous basal ridge much less than half as wide as corm, tunics with small teeth converging on basal point. *Leaves* with secondary bundles, vascular girders and rib marginal strands.

42. **Romulea autumnalis** *L.Bolus* in Journal of Botany, British and foreign 69: 12 (1931); De Vos: 203 (1972). Type: South Africa, [Eastern Cape], Grahamstown, *Dyer 2414* [BOL, lecto., designated by De Vos: 205 (1972)].

Plants 50–150(–200) mm high. *Corm* ovoid, 10–20 mm diam., obliquely pointed with small basal ridge, tunics woody or papery, split into fine teeth below. *Stem* short, subterranean. *Leaves* 3 to 8, all basal, subterete, narrowly 4-grooved, 1–2 mm diam. *Peduncles* up to 4, subterete, erect in fruit; outer bracts green or greenish with narrow, colourless membranous margins, 17–25 mm long, finely striate (5 or 6 veins/mm), inner bracts with wide, colourless membranous margins. *Flowers* pink to white with yellow cup, outer tepals pale green with purple feathering on reverse; perianth tube funnel-shaped, 5–7 mm long; tepals oblanceolate to elliptic, 18–30 × 6–12 mm. *Filaments* ± included in cup, 4–10 mm long, pilose basally, orange-yellow; anthers (5–)6–8 mm long, yellow. *Style* dividing below anther apices, branches 2–3 mm long, shortly divided. *Capsules* oblong, 8–10 mm long. *Flowering time*: April to July.



Distribution of ***Romulea autumnalis***.

Distribution and ecology: endemic to Eastern Cape, South Africa, from the Zuurberg through Grahamstown and Port Alfred to Hogsback and the Boschberg near Somerset East; in grassland or grassy fynbos up to 1 000 m elevation.

Diagnosis: allied to the widespread African *Romulea camerooniana* and sharing with it a corm with a small, narrowly toothed basal ridge but distinguished by the often larger flowers with finely veined bracts and short stamens and style, not reaching the middle of the perianth and thus included in the floral cup.

43. **Romulea camerooniana** *Baker* in Journal of Botany, British and Foreign 14: 236 (1876); Goldblatt: 63 (1993), 36 (1996). *Bulbocodium cameroonianum* (Baker) Kuntze: 700 (1891). *Romulea campanuloides* var. *camerooniana* (Baker) Cufod.: 1585 (1972). Type: Cameroon, Mt. Cameroon, *Mann 2135* (K, holo.).

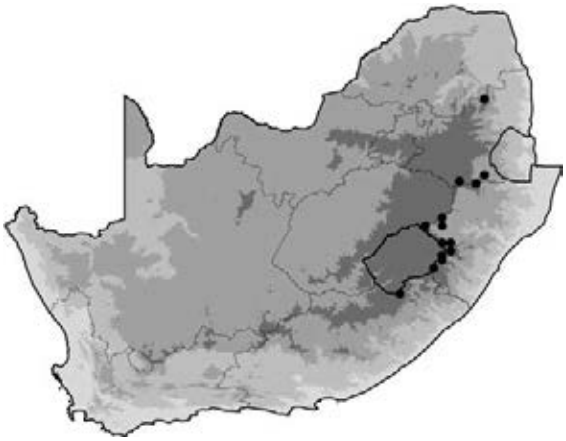
Romulea campanuloides Harms: 28 (1894); De Vos: 207 (1972). Type: Tanzania, Mt Kilimanjaro, above Mambam, *Volkens 782* (B, holo.; K, iso.).

Romulea alpina Rendle: 401 (1895). Type: Tanzania, Mt Kilimanjaro, above Morang, 1888, *Taylor s.n.* (BM, holo.).

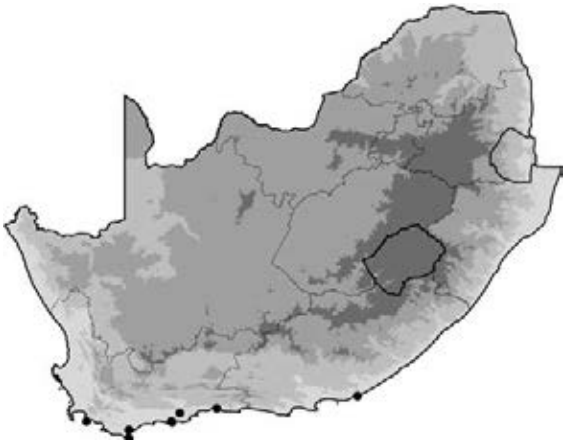
Romulea thodei Schltr.: 318 (1898). Type: South Africa, [Free State], Mont-aux-Sources, *Thode s.n.* (B, BOL, NBG, syn.).

Romulea thodei subsp. *gigantea* M.P.de Vos: 106 (1955). *Romulea campanuloides* var. *gigantea* (M.P.de Vos) M.P.de Vos: 209 (1972). Type: South Africa, [Free State], Van Reenen's Pass, *Thode s.n.* (NBG, holo.).

Plants 50–100(–200) mm high. *Corm* ovoid, 8–20 mm diam., obliquely pointed with small basal ridge, tunics woody or cartilaginous, split into fine teeth below, often extending upward in a fibrous neck. *Stem* short, subterranean. *Leaves* (1)2 to 4(6), all basal, subterete, narrowly 4-grooved, 1–2 mm diam. *Peduncles* up to 4, subterete, erect in fruit; outer bracts green or greenish with narrow, colourless membranous margins, 10–20 mm long, closely ribbed (± 8 veins/mm) or rarely softer basally, inner bracts similar or with wider colourless margins basally. *Flowers* magenta to white with yellow or greenish cup, outer tepals pink or green with or without purple feathering on reverse; perianth tube funnel-shaped, 4–8 mm long; tepals oblanceolate to elliptic, (9–)12–20(–35) × 4–8 mm. *Filaments* inserted in lower half of tube, shortly exserted from cup, 4–10 mm long, puberulous or pilose basally; anthers 3–7 mm long, yellow or with purplish lines. *Style* dividing below or up to 4 mm beyond anther apices, branches 1–2 mm long, shortly



Distribution of ***Romulea camerooniana***.



Distribution of ***Romulea gigantea***.

divided. *Capsules* ovoid-oblong, 7–10 mm long. *Flowering time*: October to February.

Distribution and ecology: widely distributed along the eastern Escarpment in southern and tropical Africa, in the Drakensberg from Naude's Nek in Eastern Cape through eastern Free State, KwaZulu-Natal and Lesotho to southern Mpumalanga and Eswatini, and thence from the Eastern Highlands of Zimbabwe to southern Sudan; in montane grasslands and on stony plateaus, from ± 1 500–3 000 m elevation.

Diagnosis: allied to *Romulea autumnalis* from lower altitudes in the Eastern Cape and sharing with it a corm with a small, narrowly toothed basal ridge but distinguished by the mostly smaller flowers with closely ribbed bracts and longer stamens and style, typically more than half as long as the perianth and thus exserted from the floral cup.

Ser. **Pratenses** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank. *Romulea* sect. *Pratenses* M.P.de Vos in Journal of South African Botany, Suppl. 9: 196 (1972). Type: *R. pratensis* M.P.de Vos

Corm with basal ridge at least half as wide as corm, tunic teeth bent over and fracturing on basal ridge.

44. **Romulea gigantea** *Bég.* in Botanische Jahrbücher für Systematik 38: 333 (1907); De Vos: 117 (1972). Type: South Africa, [Western Cape], Riversdale, *Rust 622* (B, holo.).

Plants (50–)100–200 mm high. *Corm* ovoid, 7–15 mm diam., oblique with crescent-shaped basal ridge, tunics woody or cartilaginous, split into fine, parallel fibril-like teeth sharply bent over ridge, ultimately breaking into slender, hooked teeth 2–3 mm long. *Stem* short, subterranean or exserted up to 20 mm. *Leaves* 5 to 7, lower 2 basal, compressed-cylindric, narrowly 4-grooved, 1–3 mm diam. *Peduncles* mostly 3 to 5, angled, erect in fruit; outer bracts green with narrow, colourless membranous margins, 10–20 mm long, closely ribbed (± 8 veins/mm), inner bracts with wide brown-flecked membranous margins. *Flowers* white to pale pink or blue with or without darker median line, with greenish yellow cup, outer tepals green and ± irregularly marked on reverse; perianth tube funnel-shaped, 2–3 mm long; tepals elliptic, 10–15 × 3–4 mm. *Filaments* 3–7 mm long, puberulous or pilose basally, pale yellow; anthers 3–4 mm long, yellow. *Style* dividing shortly below anther apices. *Capsules* oblong, 8–10 mm long. *Flowering time*: September, October.

Distribution and ecology: distributed along the coast from Kleinmond in Western Cape eastward to Port Alfred in Eastern Cape, South Africa; on damp grassy flats or along salt marshes.

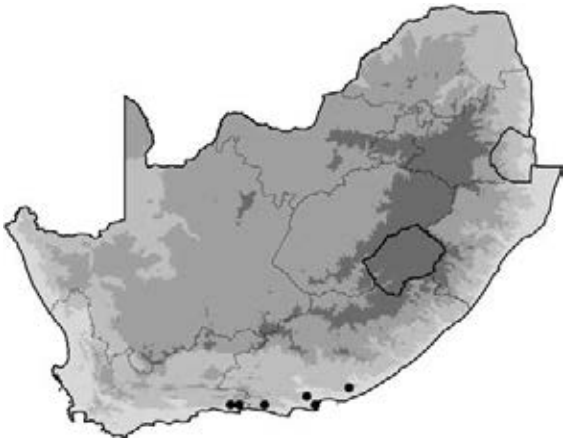
Diagnosis: a polyploid species like *Romulea pratensis* and distinguished from it by the corm tunics splitting on the crescent-shaped basal ridge into slender, hooked teeth not aggregated into clusters, and by the uniformly green bracts. Plants of *R. gigantea* with smaller basal ridges on the corms may be confused with *R. autumnalis*, but that species has almost pointed corms with straight teeth converging on the very narrow basal ridge, and the inner bracts have colourless, not brown-flecked membranous margins.

45. **Romulea pratensis** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 198 (1972). Type: South Africa, [Eastern Cape], Grahamstown, *Dyer 1619* (GRA, holo.; PRE, iso.).

Plants 50–100 mm high. *Corm* ovoid, 7–10 mm diam., oblique with crescent-shaped basal ridge, tunics woody, split into strips comprising clusters of fibril-like teeth converging at the tips and sharply bent over ridge. *Stem* short, subterranean. *Leaves* 5 to 8, mostly spreading, terete to compressed-cylindric, narrowly 4-grooved, 1–2 mm diam. *Peduncles* mostly 3 to 5, angled, erect in fruit; outer bracts green, often paler and submembranous in lower half, with narrow, colourless or brown-speckled membranous margins, 10–20 mm

long, closely ribbed above but striate below (± 7 veins/mm), inner bracts submembranous in lower half with wide brown-speckled membranous margins. *Flowers* pale pink to almost white, often with 1 or 3 darker lines in throat, with greenish yellow cup, outer tepals purple or green with purple stripes on reverse; perianth tube funnel-shaped, 2.0–3.5 mm long; tepals elliptic, 8–15 × 3–5 mm. *Filaments* 3–4 mm long, puberulous or pilose basally; anthers 3–4 mm long, yellow. *Style* dividing shortly below or at anther apices. *Capsules* oblong, 10–13 mm long. *Flowering time*: July to September.

Distribution and ecology: endemic to Eastern Cape, South Africa, from the Tsitsikamma Mtns to Grahamstown, where it may become weedy in lawns; in damp grassland and grassy fynbos. The species has weedy tendencies in the east of its range.



Distribution of ***Romulea pratensis***.

Diagnosis: distinguished by the characteristic corms, splitting at the basal ridge into longitudinal strips that are finely split at the tips into clusters of converging fibril-like teeth, and by the inner and outer bracts paler and submembranous in the lower half. The membranous margins of the inner bracts are spotted with brown rather than flecked, as in *R. gigantea*, which also differs in its corm tunics splitting into slender parallel teeth.

Sect. 3. **Aggregatae** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 170 (1972). Type: *Romulea setifolia* N.E.Br.

Corm usually ovoid with oblique, crescent-shaped basal ridge or rarely bell-shaped with complete or incomplete basal rim; basal ridge fringed small clusters of converging fibrils with roots emerging from each cluster. *Leaves* usually with secondary bundles but without vascular girders, and rib marginal fibre strands or bundles.

Ser. **Amoenae** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank. *Romulea* subsect. *Amoenae* M.P.de Vos in Journal of South African Botany, Suppl. 9: 191 (1972). Type: *R. amoena* Bég. = *R. pudica* (Ker Gawl.) Baker

Corm ± bell-shaped with circular or horseshoe-shaped basal rim. *Leaves* ± without vascular girders. *Flowers* deep carmine-red. *Filaments* shorter than anthers. *Chromosome number* 2*n* = 24.

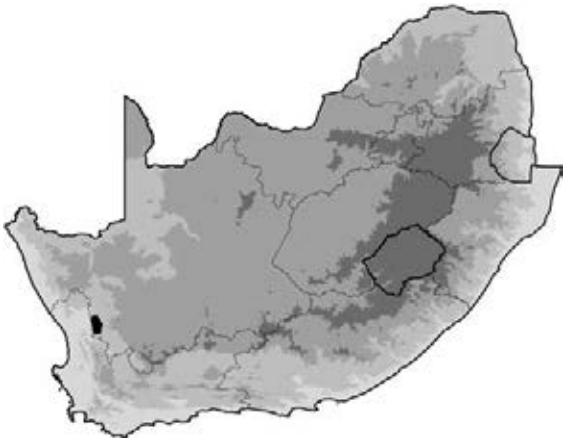
46. **Romulea pudica** *(Sol. ex Ker Gawl.) Baker* in Journal of the Linnean Society, Botany 16: 89 (1877). *Trichonema pudicum* Soland. ex Ker Gawl.: t. 1244 (1810). *Ixia pudica* (Soland. ex Ker Gawl.) Roem. & Schult.: 377 (1817). *Geissorhiza pudica* (Soland. ex Ker Gawl.) Klatt: 655 (1866). *Bulbocodium pudicum* (Soland. ex Ker Gawl.) Kuntze: 700 (1891). *Romulea rosea* var. *pudica* (Soland. ex Ker Gawl.) Baker: 42 (1896). Lectotype: South Africa, without precise locality, illustration in Ker Gawl.: t. 1244 (1810), designated by Manning et al.: 274 (2011).

Romulea amoena Schltr. ex Bég.: 334 (1907); De Vos: 194 (1972). Type: South Africa, [Northern Cape], Bokkeveld Mtns, Papkuilsfontein, *Schlechter 10896* (G, holo.; BM, BOL, GRA, K, MO, PRE, S, Z, iso.).

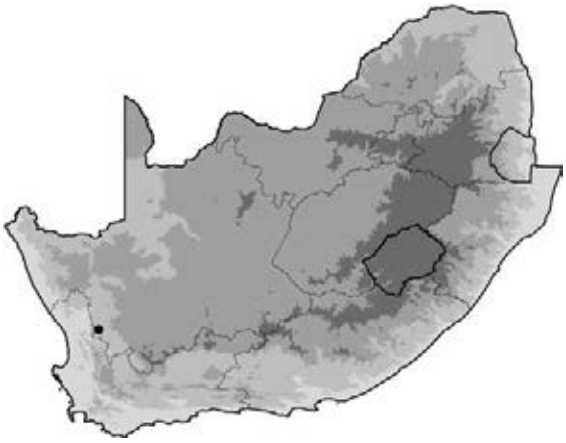
[*Trichonema pudicum* Ker Gawl.: 223 (1804) and Ker Gawl: sub t. 1225 (1809), invalid name without description.]

Plants 50–200 mm high. *Corm* bell-shaped with circular basal rim, 5–10 mm diam., tunics woody, basal rim with clusters of converging fibrils. *Stem* subterranean or shortly aerial and exserted up to 20 mm. *Leaves* 3 to 5, all or lower 2 basal, subterete and narrowly 4-grooved, 0.5–1.5 mm diam., glabrous. *Peduncles* up to 3, subterete, green or reddish brown; outer bracts green, with narrow, colourless margins,17–30 mm long, finely ribbed (5 or 6 veins/mm), inner bracts with wide, brown-flecked membranous margins. *Flowers* carmine-red to deep rosy-pink with yellow or white cup finely streaked with black and with V-shaped marks at base, with black blotches in throat, outer tepals irregularly marked with red and yellow; perianth tube funnel-shaped, 5–7 mm long; tepals oblanceolate, 18–35(–50) × 9–15 mm. *Filaments* inserted in lower half of tube, 3–5 mm long, puberulous below, whitish; anthers 8–10 mm long, yellow. *Style* dividing between middle and apex of anthers, branches forked. *Flowering time*: August.

Distribution and ecology: a narrow endemic of the Bokkeveld Mtns south of Nieuwoudtville in Northern Cape, South Africa, from Oorlogskloof to Lokenburg; locally common on seasonally wet or waterlogged sandy flats over sandstone pavement in fynbos.



Distribution of ***Romulea pudica***.



Distribution of ***Romulea sanguinalis***.

Diagnosis: distinctive in its large, carmine- or deep rosy-red flowers with a white or rarely yellow cup finely lined with black and with black blotches in the throat, and bell-shaped corm with small fibril clusters on the basal rim. The species was known until recently under the name *R. amoena* Schltr. ex Bég., when the identity of the earlier name *R. pudica* (Soland. ex Ker Gawl.) Baker was established (Manning et al. 2011).

47. **Romulea sanguinalis** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 191 (1972). Type: South Africa, [Northern Cape], Bokkeveld Mtns, Menzies Kraal, *Burger s.n.* (NBG, holo.).

Plants 100–200 mm high. *Corm* obliquely flattened at base with horseshoe-shaped basal rim, 8–10 mm diam., tunics woody, basal rim with clusters of converging fibrils. *Stem* subterranean or aerial and exserted up to 80 mm. *Leaves* ± 3, lower 2 basal, subterete and narrowly 4-grooved, ± 1 mm diam., glabrous. *Peduncles* up to 2, subterete, reddish brown; outer bracts green, with narrow, colourless margins,18–28 mm long, finely ribbed (5 or 6 veins/mm), inner bracts with wide, colourless or brown-flecked membranous margins. *Flowers* carmine-red, outer tepals irregularly marked with red and yellow; perianth tube funnel-shaped, 5–6 mm long; tepals oblanceolate, 22–35 × 8–12 mm. *Filaments* inserted in middle of tube, ± 5 mm long, glabrous, reddish; anthers 8–10 mm long, golden-yellow. *Style* dividing at or shortly above apex of anthers, branches forked. *Flowering time*: Aug.

Distribution and ecology: known only from the type collection made on the farm Menzieskraal on the Bokkeveld Mtns south of Nieuwoudtville in Northern Cape, South Africa.

Diagnosis: an enigmatic species unique in the genus in its entirely red flowers without a paler cup. It might be considered a colour form of *R. amoena* but also differs from that species in the incomplete basal rim on the corm and in its glabrous, reddish filaments. The type comprises two plants that flowered in cultivation in 1952 and the species has not been seen again.

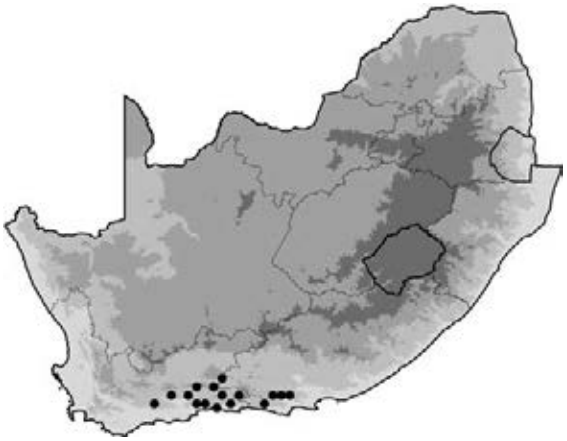
Ser. **Aggregatae** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank. *Romulea* sect. *Aggregatae* M.P.de Vos in Journal of South African Botany, Suppl. 9: 170 (1972). Type: *Romulea setifolia* N.E.Br.

[*Romulea* subsect. *Aggregatae* in M.P.de Vos: 171 (1972), invalid name without author.]

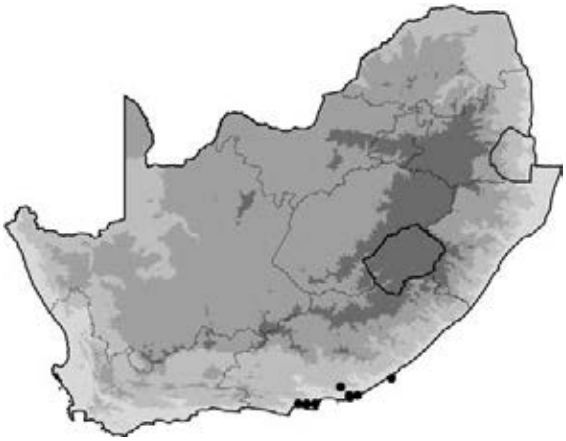
Corm oblique with crescent-shaped basal ridge. *Leaves* usually with well-developed vascular girders. *Flowers* variously coloured, never carmine-red. *Filaments* longer than anthers. *Chromosome number* 2*n* = 30, 32.

48. **Romulea fibrosa** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 183 (1972), as a replacement name for *Romulea alpina* L.Bolus: 342 (1928), illegitimate homonym, not *R. alpina* Rendle (1895). Type: South Africa, [Western Cape], Uniondale, Bloubosberg, *Fourcade 2831* (BOL, lecto., designated by De Vos: 184 (1972); K, isolecto.).

Plants 60–250(–500) mm high. *Corm* ovoid, 10–20 mm diam., oblique with crescent-shaped basal ridge, tunics cartilaginous or papery, with clusters of converging fibrils on ridge, each cluster splitting longitudinally into narrow strips fringed on margins, decaying above into a softly fibrous neck 20–80 mm long. *Stem* aerial, filiform, exserted up to 300 mm, branching near apex. *Leaves* 3 or 4, lower 1 or 2 basal, terete-filiform, narrowly 4-grooved, 0.5–1.0 mm diam., glabrous or ciliolate on rib margins, cauline leaves much shorter and clustered near top of stem. *Peduncles* up to 4, terete, suberect in fruit; outer bracts green or submembranous with narrow colourless or reddish membranous margins and tips, 10–25 mm long, lightly striate (5 to 7 veins/mm), inner bracts with wide membranous margins, usually



Distribution of ***Romulea fibrosa***.



Distribution of ***Romulea longipes***.

rusty-red in upper half or colourless. *Flowers* pink to purple with yellow or orange cup and with diffuse purple blotches in throat, outer tepals reddish purple or veined and feathered on reverse; perianth tube funnel-shaped, 4–7 mm long; tepals oblanceolate or obovate, 16–25 × 7–10 mm. *Filaments* 5–8 mm long, sparsely puberulous basally or glabrous, yellow; anthers 4–6 mm long, yellow to mauve. *Style* dividing shortly below anther apices. *Capsules* oblong, ± 8 mm long. *Flowering time*: October to December.

Distribution and ecology: a high altitude species from the southern coastal and inland mountains of the Western and Eastern Cape, South Africa, ranging from the Langeberg and Swartberg to the Great Winterhoek Mtns in the east; on damp sandstone slopes and along drainage lines from 1 000–1 800 m elevation.

Diagnosis: a montane species distinguished by the corm tunics splitting longitudinally into narrow, fringed strips with a well-developed fibrous neck above, and the pink to purple flowers. The species may have 1 or 2 basal leaves, and colourless or ± densely brown-flecked membranous margins to the outer and inner bracts.

49. **Romulea longipes** *Schltr.* in Journal of Botany 36: 377 (1898); De Vos: 181 (1972). Type: South Africa, [Eastern Cape], Bathurst, Port Alfred, *Galpin 3023* (B, holo.; PRE, iso.).

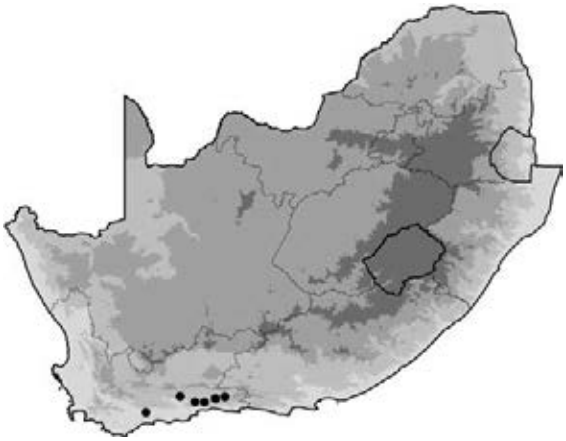
Plants 100–200(–500) mm high. *Corm* ovoid, 6–15 mm diam., oblique with crescent-shaped basal ridge, tunics woody, with spreading clusters of converging fibrils on ridge. *Stem* aerial, exserted up to 500 mm, branching near apex. *Leaves* 2 to 5, lower (1)2 basal, terete-filiform, narrowly 4-grooved, 0.5–1.0 mm diam., glabrous or ciliate on margins of median ribs, cauline leaves clustered near top of stem. *Peduncles* up to 8, terete, glabrous or ciliolate on angles, suberect or slightly spreading in fruit; outer bracts green or submembranous toward base with narrow colourless membranous margins, 12–20 mm long, lightly striate (5 to 7 veins/mm), inner bracts with wide brown-edged membranous margins. *Flowers* white or pale yellow to pale apricot-coloured, often with darker veins, cup yellow with brown marks, outer tepals greenish or darkly feathered on reverse; perianth tube funnel-shaped, 3–5 mm long; tepals oblanceolate, 15–30 × 6–8 mm. *Filaments* included in cup, 3–8 mm long, pilose basally, yellow; anthers 5–7 mm long, apically connate when young, yellow or rarely purple. *Style* dividing near anther apices. *Capsules* oblong, ± 10 mm long. *Flowering time*: July to –December.

Distribution and ecology: a coastal and lowland species of Eastern Cape, South Africa, extending from west of Port Elizabeth to East London and inland to Grahamstown; on sandy flats in grasslands.

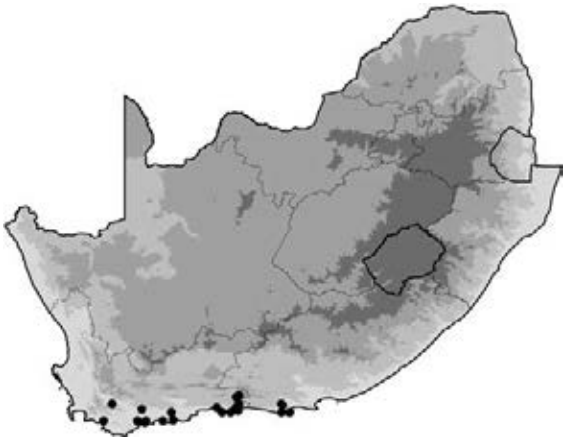
Diagnosis: distinguished from other species in the section with aerial stems by its mostly two basal leaves with narrow grooves, white or pale yellow to pale apricot-coloured flowers, and more easterly distribution.

50. **Romulea jugicola** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 185 (1972). Type: South Africa, [Western Cape], Little Karoo, 31 km SE of Dysseldorp, *Acocks 20592* (PRE, holo.; K, M, iso.).

Plants (50–)100–200(–300) mm high. *Corm* ovoid, 6–15 mm diam., oblique with crescent-shaped basal ridge, tunics woody, with clusters of converging fibrils on ridge. *Stem* aerial, exserted up to 200 mm, branching near apex, glabrous or ciliate on angles in upper part. *Leaves* 2 or 3, lower 1 basal, terete, narrowly 4-grooved, 0.5–1.5 mm diam., pubescent or villous on margins of median ribs, cauline leaves clustered near top of stem. *Peduncles* up to 3, terete, glabrous or ciliolate on angles, suberect or slightly spreading in fruit; outer bracts green with narrow colourless membranous margins, 12–20 mm long, striate (5 to 7 veins/mm), inner bracts with wide brown-flecked membranous margins. *Flowers* orange with small yellow cup, outer tepals greenish or reddish on reverse; perianth tube funnel-shaped,



Distribution of ***Romulea jugicola***.



Distribution of ***Romulea dichotoma***.

4–6 mm long; tepals oblanceolate, 15–30 × 6–12 mm. *Filaments* included in cup, 6–7 mm long, pilose basally, yellow; anthers 4–6 mm long, apically connate when young, yellow. *Style* dividing near anther apices. *Capsules* oblong, 10–15 mm long. *Flowering time*: August, September.

Distribution and ecology: restricted to the interior mountains of the Little Karoo from Ladismith to Uniondale in Western Cape, South Africa, on the Kammanassie Mtns, Witberg, Rooiberg and Gamkaberg; on clay soils in renosterbos shrubland from 800–1 000 m elevation.

Diagnosis: recognised by the solitary, narrowly grooved basal leaf with pilose median ribs, and orange flowers.

51. **Romulea dichotoma** *(Thunb.) Baker* in Journal of the Linnean Society, Botany 16: 89 (1877); De Vos: 187 (1972). *Gladiolus dichotomus* Thunb.: 10 (1784). *Trichonema dichotomum* (Thunb.) Klatt: 666 (1866). *Bulbocodium dichotomum* (Thumb.) Kuntze: 700 (1891). *Romulea rosea* var. *dichotoma* (Thumb.) Baker: 104 (1892). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB 1019, holo.).

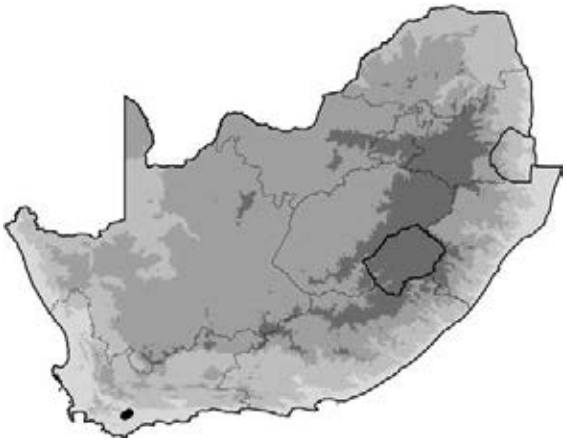
Romulea caplandica Bég.: 332 (1907). Type: South Africa, [Western Cape], Riversdale, *Rust 556B* [as *s.n.* 1891–93] (B, holo.).

Plants (50–)100–200(–400) mm high. *Corm* ovoid, 6–15 mm diam., oblique with crescent-shaped basal ridge, tunics woody, with clusters of converging fibrils on ridge. *Stem* aerial, exserted up to 300 mm, branching near apex, glabrous or ciliate on angles in upper part. *Leaves* 2 to 5, lower 1 basal, linear and ± I-shaped in section, ± broadly 4-grooved, 1–2 mm diam., marginal ribs reduced and rounded, without secondary veins, median ribs flange-like or narrowly winged, curving over partially obscuring lateral ribs, often pubescent or villous on margins, cauline leaves clustered near top of stem. *Peduncles* up to 3, terete, glabrous or ciliolate on angles, spreading in fruit; outer bracts green with narrow colourless membranous margins, 12–20 mm long, striate (5 to 7 veins/mm), inner bracts with wide, reddish or brown-flecked membranous margins. *Flowers* yellow, orange or pink to purple, with small yellow cup with V-shaped marks in base, outer tepals greenish or reddish or darkly veined or feathered on reverse; perianth tube funnel-shaped, 3–5 mm long; tepals oblanceolate, 15–32 × 6–10 mm. *Filaments* ± included in cup, 4–8 mm long, minutely pilose basally, yellow; anthers 4–7 mm long, apically connate when young, yellow. *Style* dividing near anther apices. *Capsules* oblong, ± 10 mm long. *Flowering time*: (late July) August to October.

Distribution and ecology: a species of the forelands and coastal mountain ranges, South Africa, from the Riviersonderend Mtns in Western Cape eastward to Humansdorp in Eastern Cape; on sandy or gravelly flats and slopes in fynbos or transitional fynbos.

Diagnosis: the only species in the genus that includes plants with yellow as well as pink flowers, *Romulea dichotoma* is recognised by its characteristic basal leaf, the median ribs reduced and much smaller than the marginal ones and the blade thus almost I-shaped in section. The median ribs are flange-shaped or winged and curve over and partially conceal the marginal veins, which are rounded in section and lacking secondary veins (visible only under the microscope). Plants with pale orange flowers can be confused with *R. jugicola* from the inland mountains ranges unless the leaves are examined carefully. That species has terete leaves with all four ribs subequal in size and form. Similarly, plants at the east of the range with pale flowers may be confused with *R. longipes*, but that species has two basal leaves.

52. **Romulea pilosa** *J.C.Manning & Goldblatt* in Bothalia 41: 271 (2011). Type: South Africa, Western Cape, Farm Fonteinkloof, between Riviersonderend and Protem, hill W of homestead, *Manning 3220* (NBG, holo.; MO, iso.).



Distribution of ***Romulea pilosa***.

Plants ± 60 mm high. *Corm* subglobose, oblique with crescent-shaped basal ridge, tunics woody, split into clusters of convergent fibrils on basal ridge; stem subterranean or shortly aerial. *Leaves* 2, lowermost basal, falcate, H-shaped in section, 4–6 mm wide, lateral ribs reduced and median (apparently marginal) ribs produced into flange-like wings, densely villous along margins of wings with hairs in two diverging rows. *Peduncles* 1 or 2, villous along angles in distal part, spreading in fruit; outer bracts green with narrow colourless margins, subobtuse, 13–15 mm long, strongly keeled and villous along median and submarginal veins, inner bracts green with broad colourless white margins, keels densely villous. *Flowers* salmon-pink to dull orange with golden-yellow cup extending onto lower third of tepal limbs, outer tepals flushed coppery on reverse; perianth tube funnel-shaped, 5 mm long; tepals oblanceolate, 20–30 × 7–10 mm. *Filaments* 5–6 mm long, pilose in lower half, yellow; anthers 4 mm long, apically connate when young, yellow. *Style* dividing opposite lower ½ of anthers, branches ± 1.5 mm long, forked. *Capsules* oblong-ellipsoid, 7– 9 mm long. *Flowering time*: August.

Distribution and ecology: a highly local endemic from the southern foothills of the Riviersonderend Mtns in Western Cape, South Africa; in stony soils in renosterveld shrublands.

Diagnosis: unmistakable in its falcate, H-shaped leaves 4–6 mm wide with villous, winged margins, villous bracts, and orange flowers with conspicuous yellow cup extending onto the lower third of the tepal limbs. Similar leaves are otherwise known only in yellow-flowered *Romulea hirsuta* (sect. *Stellanthe*) and pink-flowered *R. tetragona* (sect. *Roseae*). The species is highly threatened by agriculture.

53. **Romulea setifolia** *N.E.Br.* in The Gardeners' Chronicle, ser. 3, 92: 467 (1932); De Vos: 171 (1972). Type: South Africa, [Western Cape], Mossel Bay, Gourits River, *Muir 4847* (K, holo.; PRE, iso.).

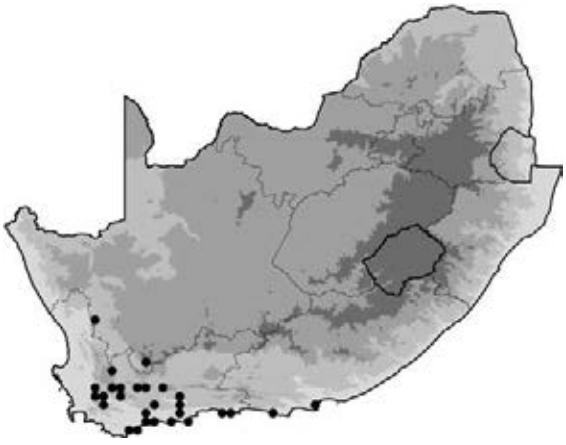
Romulea setifolia var. *aggregata* M.P.de Vos: 175 (1972), new synonym. Type: South Africa, [Western Cape], Worcester, near Breede River bridge NE of Bain's Kloof, *De Vos 1276* (NBG [as STE], holo.).

Romulea setifolia var. *belviderica* M.P.de Vos: 173 (1972), new synonym. Type: South Africa, [Western Cape], Knysna, Belvedere Estate, *Duthie 1246* (NBG, holo.).

Romulea setifolia var. *ceresiana* M.P.de Vos: 175 (1972), new synonym. Type: South Africa, [Western Cape], Ceres, flats west of Theronsberg Pass, *De Vos 1676* (NBG [as STE], holo.).

Plants 50–200 mm high. *Corm* ovoid, 5–10 mm diam., oblique with crescent-shaped basal ridge, tunics woody, usually minutely pitted, with clusters of converging fibrils on basal ridge. *Stem* subterranean or rarely aerial and exserted up to 100 mm. *Leaves* 3 to 6, lower 2 basal or all seemingly so in short-stemmed forms, terete-filiform, narrowly 4-grooved, 0.5–1.5 mm diam. *Peduncles* up to 5, semi-terete, erect or suberect in fruit; outer bracts green with narrow colourless membranous margins, 8–25 mm long, striate (5or 6 veins/mm), inner bracts with wide, usually colourless or rarely brown-flecked membranous margins. *Flowers* yellow or pale apricot-coloured with orange-yellow cup and sometimes arrow-shaped dark markings in throat extending to base of cup as dark lines or reduced to median dark line; perianth tube funnel-shaped, 3–7 mm long; tepals oblanceolate, 8–35 × 3–10 mm. *Filaments* 4–7 mm long, pilose basally, yellow; anthers 2–8 mm long, yellow. *Style* dividing near anther apices. *Capsules* oblong, ± 10 mm long. *Flowering time*: July to September (to November at high altitudes).

Distribution and ecology: ranging from the Bokkeveld Mtns in Northern Cape, with outlying populations from the Klein Roggeveld to Touws Rivier, through the Cold Bokkeveld and Breede River Valley to Heidelberg and Bredasdorp in Western Cape thence along the coast to Port Elizabeth in Eastern Cape, South Africa; mostly on sandy flats.



Distribution of ***Romulea setifolia***.

Diagnosis: a mostly acaulescent, rarely short-stemmed species with filiform leaves, usually colourless (rarely brown-flecked) membranous margins to the inner bracts, and yellow to apricot-coloured flowers with a yellow cup, sometimes with dark blotches in the throat.

Romulea setifolia is highly variable in the dimensions and markings of the flowers and in the relative lengths of anthers and filaments. These differences led De Vos (1972) to recognise four varieties in the species. Populations from the Cold Bokkeveld, summit of the Hex River Pass, and the Bonteberg with a larger or smaller, dark median blotch near the base of each tepal, extending as a median line to the base of the cup (sometimes reduced in extent to these median streaks), were segregated as var. *ceresiana*. They differ from other populations of the species in no other respect, and both marked and unmarked plants were collected in a single population at Aan de Doorns in the Hex River Valley [*Walters 126* (NBG)]. Many species in the genus with marked flowers display a similar variation without taxonomic recognition at varietal level. Populations from the Swartruggens are unusual in having just a solitary basal leaf but otherwise accord with other collections previously segregated as var. *ceresiana* and we provisionally include them in *R. setifolia*.

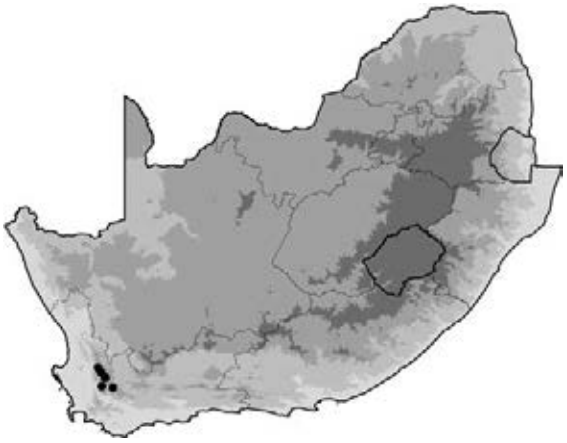
A second variety, var. *aggregata*, was recognised for populations from the northwest of the range, from the Bokkeveld Mtns to Worcester, with unmarked flowers, 25–45 mm long with the anthers as long as the filaments or longer. Populations with mostly smaller flowers, 12–25 mm long with the anthers shorter than the filaments, from near Touws Rivier and then along the southern coast from Caledon to Port Elizabeth, were treated as var. *setifolia*, with the exception of plants from Belvidere near Knysna, which were segregated as a fourth variety, var. *belviderica* on the basis of their seeds that were sticky or glutinous when dry and their inability to produce viable seeds in crosses with the typical variety. The latter characteristic was, however, documented by De Vos (1972) in infraspecific crosses in other species without any taxonomic implications. In view of similar levels of variation in flower size and markings in other species of the genus without accommodating taxonomic recognition we see little to recommend the continued recognition of these varieties.

54. **Romulea albomarginata** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 177 (1972). Type: South Africa, [Western Cape], 37 km N of Gydo Pass, *De Vos 1999* (NBG [as STE], holo.).

Plants 50–100 mm high. *Corm* ovoid, 5–10 mm diam., oblique with crescent-shaped basal ridge, tunics woody, usually minutely pitted, with clusters of converging, soft-textured fibrils on basal ridge separated by apically grooved teeth. *Stem* subterranean or rarely shortly aerial. *Leaves* 3 to 6, lower 2 basal or all seemingly so in short-stemmed forms, terete-filiform, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 4, semi-terete, erect or suberect in fruit; outer bracts green with narrow colourless membranous margins, 12–25 mm long, striate (5 or 6 veins/mm), inner bracts with wide, colourless membranous margins. *Flowers* white or pink to magenta with orange-yellow cup and dark lines in throat, outer tepals maroon or darkly feathered on reverse; perianth tube funnel-shaped, 4–6 mm long; tepals oblanceolate, 15–25 × 5–9 mm. *Filaments* 4–5 mm long, pilose basally, yellow; anthers 4–7 mm long, yellow. *Style* dividing just below or beyond anther apices. *Capsules* oblong, ± 10 mm long. *Flowering time*: August to October.

Distribution and ecology: a local endemic of Western Cape, South Africa, recorded from the Cold Bokkeveld and around Ceres, from 500–1 800 m elevation; on sandy or loamy flats in fynbos.

Diagnosis: distinguished from yellow–orange-flowered *Romulea setifolia* by its white or pink to magenta flowers and distinctive corm tunics, the converging clusters of basal fibrils rather soft in texture and separated by small woody teeth that are grooved apically over the basal ridge. In *R. setifolia*, as in all other members of sect. *Aggregatae*, the converging fibrils are woody and not different in texture from the rest of the tunic. The species was originally known only from one or two pink-flowered populations from the Cold Bokkeveld but we include in it additional populations from Ceres and the northern slopes of the Hex River Mtns with white flowers but the same distinctive corms with soft fibril clusters.



Distribution of ***Romulea albomarginata***.

Sect. 4. **Roseae** *(Bég.) M.P.de Vos* in Journal of South African Botany, Suppl. 9: 202 (1972). *Romulea* 'Stirps' *Roseae* Bég.: 60 (1909). Type: *R. rosea* (L.) Eckl.

Ser. **Roseae** *(Bég.) J.C.Manning & Goldblatt*, name at new rank. *Romulea* 'Stirps' *Roseae* Bég. in Malpighia: 60 (1909). *R.* sect. *Roseae* (Bég.) M.P.de Vos: 202 (1972). Type: *R. rosea* (L.) Eckl.

Romulea subsect. *Cruciatae* M.P.de Vos: 259 (1972), new synonym. *Romulea* sect. *Cruciatae* (M.P.de Vos) J.C.Manning & Goldblatt: 96 (2001). Type: *Romulea cruciata* (Jacq.) Baker

Romulea subsect. *Campestres* M.P.de Vos: 231 (1972), new synonym. Type: *R. obscura* Klatt

[*Romulea* subsect. *Roseae* in M.P.de Vos: 246 (1972), invalid name without author.]

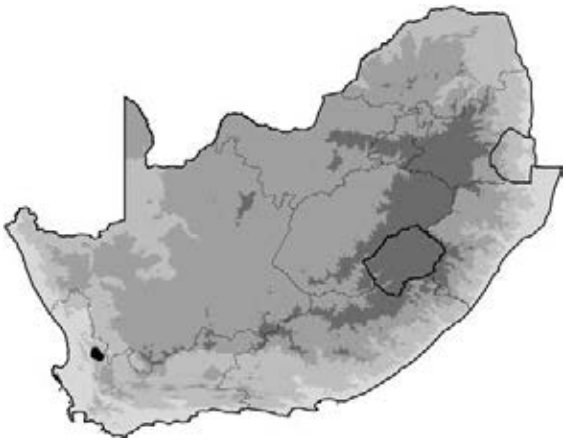
Corms rounded and tunics with curved basal teeth, or corms pointed and tunics with straight basal teeth. *Leaves* ± terete and narrowly 4-grooved. *Flowers* funnel-shaped; outer bracts with narrow membranous margins and tip.

55. **Romulea cedarbergensis** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 245 (1972). Type: South Africa, [Western Cape], Cederberg, Wolfsberg, *Uys sub De Vos 2030* (NBG [as STE], holo.).

Plants 15–30 mm high. *Corm* globose or obovoid, 3–6 mm diam., rounded or crested below, tunics woody, split into curved or bent, grooved teeth below. *Stem* subterranean. *Leaves* (1)2, basal, filiform, narrowly 4-grooved, 0.3–0.5 diam., upper usually smaller. *Peduncle* 1, semi-terete, reddish brown, suberect in fruit; outer bract submembranous and greenish or purplish, with narrow, colourless membranous margins, 6–15 mm long, faintly veined (5 or 6 veins/mm), inner bracts with wide, membranous margins brown-speckled near tip. *Flowers* white or pale pink with golden-yellow cup, outer tepals striped purple on reverse; perianth tube funnel-shaped, 3–5 mm long; tepals oblanceolate to elliptic, 7–16 × 2.5–6.0 mm. *Filaments* 4–6 mm long, pilose basally, golden-yellow; anthers 2.0–3.5 mm long, pale yellow. *Style* dividing near anther apices. *Capsules* oblong, ± 8 mm long. *Flowering time*: August, September.

Distribution and ecology: endemic to the Cederberg in Western Cape, South Africa, at ± 1 500 m elevation; in seasonally damp, sandy hollows in fynbos.

Diagnosis: a diminutive species separated from *Romulea rosea* by its one or two filiform leaves up to 0.5 mm diam., and solitary, white to pale pink flowers with golden-yellow cup and anthers ± half as long as the filaments. An allied, winter-flowering species from the Cold Bokkeveld, *Romulea lilacina*, has a solitary, sticky leaf and larger, lilac flowers without a yellow cup, the tepals 16–20 mm long and filaments 8–9 mm long,



Distribution of ***Romulea cedarbergensis***.

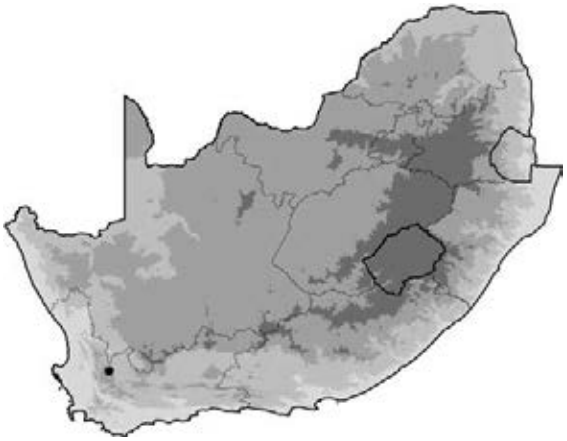
produced in May and June. Anatomically, the leaves lack secondary veins and have highly reduced fibre strands in the rib margins.

56. **Romulea lilacina** *J.C.Manning & Goldblatt* in Adansonia, ser. 3, 23: 98 (2001). Type: South Africa, Western Cape, Cold Bokkeveld, Zeekoegat, west bank of Riet River at foot of Katbakkies Pass, deep sand in open restio veld, 5 June 2000, *Manning 2252* (NBG, holo.; PRE, iso.).

Plants 20–50(–100) mm high. *Corm* globose or obovoid, 5–7 mm diam., rounded or crested below, tunics woody, split into curved or bent, grooved teeth below. *Stem* subterranean. *Leaves* 1(2), basal, filiform, narrowly 4-grooved, sticky with adhering sand grains, purplish, 0.5–1.0 mm diam. *Peduncles* 1 to 3, semi-terete; outer bract submembranous below, purplish, with narrow, colourless membranous margins, 10–15 mm long, faintly veined (5 or 6 veins/mm), sticky with adhering sand grains, inner bracts ± entirely membranous with purple veins, brown-speckled near tip. *Flowers* pale to dark lilac with darker veining, especially in the concolorous cup, outer tepals striped purple on reverse; perianth tube funnel-shaped, 5–6 mm long; tepals oblanceolate to elliptic, 16–20 × 5–7 mm. *Filaments* 8–9 mm long, pilose, lilac; anthers 3.5–4.0 mm long, lilac. *Style* dividing opposite upper half of anthers. *Flowering time*: May to June.

Distribution and ecology: a local endemic of the Cold Bokkeveld in Western Cape, South Africa, known from a single extended population at the foot of Katbakkies Pass; in open washes in deep sand between Restionaceae.

Diagnosis: an early flowering species instantly recognised by its solitary (rarely two), sticky leaf with adhering sand grains, sticky bracts, and lilac flowers without



Distribution of ***Romulea lilacina***.

a yellow cup and with concolorous stamens. A similar, later flowering species from the Cederberg, *Romulea cedarbergensis*, is even smaller, with mostly two leaves without adhering sand grains and smaller, white to pale pink flowers with golden-yellow cup and stamens, the tepals only 7–16 mm long and filaments 4–6 mm long.

57. **Romulea rosea** *(L.) Eckl.* in Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon: 19 (1827); De Vos: 246 (1972). *Ixia rosea* L.: 75 (1767). *Trichonema roseum* (L.) Ker Gawl.: t. 1225 (1809). *Syringodea rosea* (L.) Klatt: 403 (1882). *Bulbocodium roseum* (L.) Kuntze: 700 (1891). Type: South Africa, without precise locality or collector, illustration in Miller: t. 240 (1760).

Plants 30–200 mm high. *Corm* globose or obovoid, 5–15 mm diam., rounded or crested below, tunics woody, split into curved or bent, grooved teeth below. *Stem* subterranean. *Leaves* 2 to 12, all evidently basal, terete-filiform or compressed-cylindric, narrowly 4-grooved, 0.5–2.5 mm diam. *Peduncles* up to 5, semi-terete, recurved but straightening and suberect in fruit; outer bracts greenish or purplish, with narrow, brown-speckled, membranous margins, 12–25 mm long, closely veined (± 8 veins/mm), inner bracts with wide, brown or brown-streaked membranous margins. *Flowers* magenta, lilac-pink or pink to white with pale yellow to golden-yellow cup, often with violet-blue zone in throat, outer tepals feathered or irregularly marked on reverse; perianth tube funnel-shaped, 2–8 mm long; tepals oblanceolate to elliptic, 10–38 × 3–10 mm. *Filaments* 3–8 mm long, pilose basally; anthers 3–10 mm long, yellow. *Style* dividing opposite or above anthers. *Capsules* oblong or shortly cylindric, 10–15 mm long. *Flowering time*: July to October.

Distribution and ecology: widespread in the Cape Floral Region, South Africa, from the Bokkeveld Mtns in Northern Cape through the coastal and near interior Western Cape to Port Elizabeth in Eastern Cape but absent from the drier parts, including the Little Karoo; mostly in seasonally moist sandy soils in fynbos. Naturalised in Australia, New Zealand, California, Channel Islands, Tristan da Cunha and St Helena.

Diagnosis: the most common species in the genus, diagnosed by the rounded corms and magenta to lilac-pink or white flowers with greenish or golden-yellow cup, often with a violet zone in the throat but without distinct blotches, herbaceous outer bracts with narrow membranous margins and apices, and peduncles curving after flowering but straightening and ± erect as the capsules dry out. It is distinguished from *Romulea obscura* by the lack of yellow pigmentation in the tepals (apart from the cup), the flowers thus either white or pink with a bluish cast, fruiting peduncles straightening in fruit, and a somatic chromosome number $2n = 18$.

Romulea rosea is a polymorphic species with a number of variants and forms, often connected by intermediates (De Vos 1972). The typical variety is based on white- or pink-flowered plants with the style overtopping the anthers but the longer styles are not consistent within populations, which invariably also include short-styled variants, treated by De Vos (1972) under the name var. *reflexa* (Eckl.) Bég., actually a synonym of *R. flava* (Lam.) M.P.de Vos, the correct name for the taxon at varietal level being *R. rosea* var. *muirii* N.E.Br. (Manning et al. 2011). Vegetatively similar plants with white flowers with a golden-yellow cup were segregated as var. *elegans*. We include both of these variants in the typical variety as part of the natural variation in the taxon.

Two additional varieties were recognised for plants with broader, ± compressed-cylindric leaves mostly more than 1 mm diam. and up to 2.5 mm diam., with var. *australis* for plants with smaller flowers mostly less than 23 mm long, and var. *communis* for those with larger flowers mostly more than 23 mm long. Flower size in the two variants is genetically fixed but they hybridise readily in cultivation with intermediates known in the wild, and var. *communis* may be essentially a larger-flowered form of var. *australis* (De Vos 1972). Under normal circumstances we would have little hesitation in including them as part of the general variation in the species but the smaller-flowered var. *australis* is a common autogamous ruderal of roadsides and farmyards in the Western Cape coastal districts, and has become naturalised in Australia and New Zealand as a troublesome weed under the name onion grass or Guildford grass, and in California, the Channel Islands, Tristan da Cunha and St. Helena. In view of its obvious economic importance we continue to recognise it at varietal level but include in it the vegetatively similar but larger-flowered var. *communis*.

Key to varieties

1a Widest leaves 1 mm diam., terete; flowers 22–48 mm long. . . . . 57a. var. *rosea*

1b Widest leaves 1.0–2.5 mm diam., compressed-cylindric; flowers 15–25(–35) mm long. . . . . 57b. var. *australis*

57a. var. **rosea**

Ixia chloroleuca Jacq.: 180 (1791). *Trichonema chloroleucum* (Jacq.) Ker Gawl.: 223 (1804) [as *T. ochroleucum*, corrected in Ker Gawl.: t. 1225 (1809)]. *Ixia chloroleuca* (Jacq.) Vahl: 50 (1805) [as *I. ochroleuca*]. *Romulea chloroleuca* (Jacq.) Eckl.: 20 (1827). *Bulbocodium chloroleucum* (Jacq.) Kuntze: 700 (1891). *Romulea rosea* var. *chloroleuca* (Jacq.) Bég.: 158 (1908). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 272 (1794 [1788–1795).

Romulea rosea var. *celsii* Planch.: t. 799 (1853). *Romulea celsii* (Planch.) Klatt: 400 (1882). Type: South Africa, without precise locality or collector, illustration in Planch.: t. 799 (1853).

Romulea elegans Klatt: 400 (1882), new synonym. *Romulea rosea* var. *elegans* (Klatt) Bég.: 63 (1909). Type: South Africa, [Western Cape], Doornhoogte, *Zeyher 1602* (S, holo.; B, G, GRA, K [in part], PRE, SAM, Z, iso.).

Romulea muirii N.E.Br.: 467 (1932), new synonym. *Romulea rosea* var. *muirii* (N.E.Br.) J.C.Manning & Goldblatt: 277 (2011). Type: South Africa, [Western Cape], Riversdale, *Muir 4848* (K, holo.).

[*Romulea rosea* var. *reflexa* sensu Bég. (1908) and De Vos (1972), not of (Eckl.) Bég. (1908) (= *R. flava* (Lam.) M.P.de Vos)].

Distribution and ecology: widespread through the natural range of the species, from the Cederberg to Riversdale.

Diagnosis: characterised by narrow leaves, mostly 0.5–1.0 m wide, and relatively large flowers, 22–48 mm long.

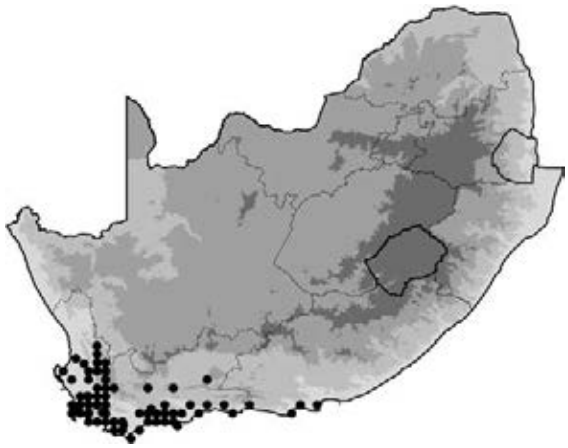
57b. var. **australis** *(Ewart) M.P.de Vos* in Journal of South African Botany, Suppl. 9: 254 (1972). *Romulea cruciata* var. *australis* Ewart: 43, t. XII (1907). Type: Australia, Victoria, near Melbourne, *Tovey s.n.* (MEL, lecto., designated by De Vos: 252 (1972); BOL, MEL, isolecto.).

Trichonema longifolium Salisb.: 316 (1812). *Romulea longifolia* (Salisb.) Baker: 89 (1877). *Bulbocodium longifolium* (Salisb.) Kuntze: 700 (1891). Type: South Africa, without precise locality or collector, illustration in Ker Gawler: t. 575 (1802).

Romulea parviflora Eckl.: 19 (1827). *Trichonema parviflorum* (Eckl.) Steud.: 702 (1841). Type: South Africa, [Western Cape], Cape Peninsula, Green Point, Sept. 19–24, *Ecklon s.n.* (S, holo.).

Romulea rosea var. *communis* M.P.de Vos: 257 (1972), new synonym. Type: South Africa, [Western Cape], Stellenbosch, near Papegaaiberg, *De Vos 1099* (NBG [as STE], holo.).

Distribution and ecology: throughout the range of the species, from the Bokkeveld Mtns to Port Elizabeth, mostly as a weed of roadsides and unkempt lawns and pastures. Naturalised in Australia, New Zealand, California, the Channel Island, Tristan da Cunha and St Helena.



Distribution of ***Romulea rosea***.

Diagnosis: distinguished from the typical variety by the broader, compressed-cylindric leaves 1.0–2.5 mm wide, and often smaller flowers, mostly 15–22 mm long but up to 35 mm long.

58. **Romulea cruciata** *(Jacq.) Bég.* in Botanische Jahrbücher für Systematik 38: 335 (1907). *Ixia cruciata* Jacq.: 8 (1795 [1788–1795]). *Trichonema cruciatum* (Jacq.) Ker Gawl.: sub. t. 575 (1802). *Bulbocodium cruciatum* (Jacq.) Kuntze: 700 (1891). *Romulea bulbocodium* var. *cruciata* (Jacq.) Ewart: 298 (1931). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 290 (1794 [1788–1795]).

Romulea cruciata var. *neglecta* Bég.: 337 (1907). Type: Several collections cited, no type designated.

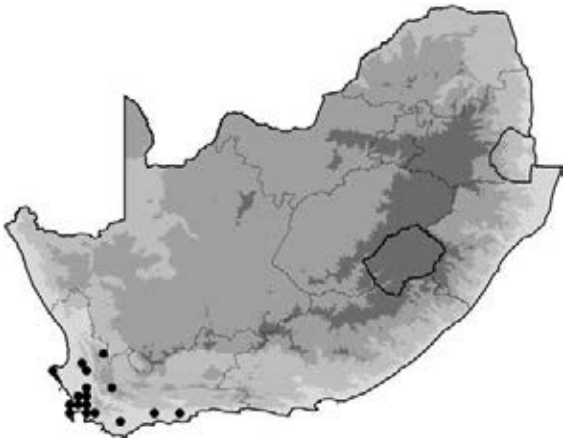
Romulea cruciata var. *parviflora* Bég.: 337 (1907). Type: Several collections cited, no type designated.

Romulea cruciata var. *vulgaris* Bég.: 336 (1907). Type: Several collections cited, no type designated.

Romulea ×*intermedia* Bég.: 339 (1907), new synonym. *Romulea cruciata* var. *intermedia* (Bég.) M.P.de Vos: 263 (1972). Type: South Africa, without precise locality, *Zeyher 4044* (G, holo.; GRA, K, P, S, Z, iso.).

Romulea ambigua Bég.: 338 (1907). Type: South Africa, [Western Cape], 'in collibus prope Brakfontein,' *Schlechter 10784* (B, lecto., designated by De Vos: 66 (1983); G, K, PRE, S, isolecto.).

Plants 30–200 mm high, sometimes clumped. *Corm* obovoid, 8–15 mm diam., pointed, tunics woody, split into straight or slightly recurved teeth converging toward basal point. *Stem* subterranean. *Leaves* 2 to 8(–12), all evidently basal, terete-filiform and narrowly 4-grooved to compressed-cylindric or H-shaped and widely grooved or channelled, sometimes with raised



Distribution of ***Romulea cruciata***.

secondary veins in channels, 0.5–5.0 mm diam. *Peduncles* up to 7, semi-terete, recurved but straightening and suberect in fruit; outer bracts greenish or purplish, with narrow, colourless membranous margins, 10–28 mm long, closely veined (± 8 veins/mm), inner bracts with wide, brown or brown-streaked (rarely colourless) membranous margins. *Flowers* magenta to lilac-pink with golden-yellow or orange-yellow cup, with purple or bluish transverse blotches in throat with median line extending into cup, outer tepals irregularly streaked or feathered on reverse; perianth tube funnel-shaped, 3–5 mm long; tepals oblanceolate to elliptic, 15–30(–35) × 5–10 mm. *Filaments* 3–6 mm long, pilose basally; anthers 4–8 mm long, yellow or with dark lines. *Style* usually dividing opposite upper half of anthers. *Capsules* oblong or ellipsoid, acute and shortly beaked, 6–14 mm long. *Flowering time*: July to September.

Distribution and ecology: distributed in South Africa from the Bokkeveld Mtns in Northern Cape along the West Coast to Elim and Albertinia in Western Cape but most common between Porterville and the Cape Peninsula; on seasonally moist sandy and granite flats in fynbos.

The species is replaced by *Romulea eximia* between Malmesbury and Atlantis.

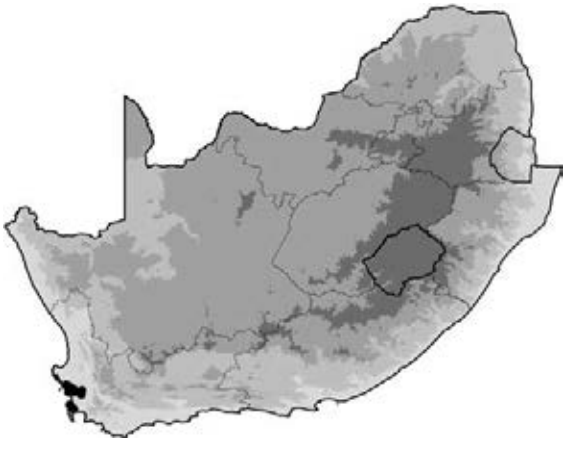
Diagnosis: distinguished by the pointed corm with straight or slightly recurved teeth converging on the basal point, and small to moderate-sized, 22–35 mm long, magenta to lilac-pink flowers with golden- or orange-yellow cup with dark blue or purplish ± transverse blotches in the throat, and unusual, acute and almost beaked capsules. The leaves vary from terete and narrowly 4-grooved to H-shaped with wide grooves or channels. The pointed corms, flowers with prominent dark blotches around the cup, and the acute capsules separate the species from *Romulea rosea*, with which it shares a somatic chromosome number $2n = 18$.

Populations with larger, (35–)40–50 mm long, old-rose-pink (i.e. with some yellow admixture to the pink) flowers with a pale or greenish yellow cup from the small triangle Malmesbury–Yzerfontein–Atlantis are treated as the distinct species *Romulea eximia*, evidently differing from *R. cruciata* also in leaf anatomy in having smaller, lignified epidermal cells (De Vos 1972). A second purported difference between the two, viz. a subdermal layer of sclerenchyma extending across the ribs in *R. eximia*, is also developed in narrow-leaved forms of *R. cruciata* and is thus not consistent. Crosses between the two taxa are usually unsuccessful but occasionally yield fertile seeds.

Plants matching the type illustration in having wider leaves, 1–4 mm wide, cylindric or H-shaped with relatively wide longitudinal grooves or channels, sometimes with raised veins in the channels, and treated by De Vos (1972) as var. *cruciata* were separated from plants with narrower, terete leaves 0.5–1.0 mm diam., treated as var. *intermedia*. Plants with exceptionally wide leaves, 5 mm wide, have been collected around Porterville but elsewhere the distinction between the two leaf forms is less compelling, with intermediates between them in many populations. A similar variation in leaf shape is known in *R. hirsuta* and we do not uphold the formal taxonomic distinction between them.

59. **Romulea eximia** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 267 (1972). Type: South Africa, [Western Cape], near Darling, *De Vos 1687* (NBG [as STE], holo.).

Plants 30–200 mm high. *Corm* obovoid, 8–15 mm diam., pointed, tunics woody, split into straight or slightly recurved teeth converging toward basal point. *Stem* subterranean. *Leaves* 2 to 8, all evidently basal, terete-filiform and narrowly 4-grooved, 0.5–1.5 mm diam. *Peduncles* up to 5, semi-terete, recurved but straightening and suberect in fruit; outer bracts greenish or purplish, with narrow, colourless membranous margins, 20–30 mm long, closely veined (± 8 veins/mm), inner bracts with wide, brown or brown-streaked membranous margins. *Flowers* old-rose-pink to terracotta-coloured with pale or greenish yellow cup, with purple-reddish blotches in throat with median line extending into cup, outer



Distribution of ***Romulea eximia***.

tepals irregularly streaked on reverse; perianth tube funnel-shaped, 5–8 mm long; tepals oblanceolate, (25–)30–40(–50) × 7–14 mm. *Filaments* (6–)9–12 mm long, pilose basally; anthers 7–12 mm long, yellow or with dark lines. *Style* usually dividing opposite upper half of anthers. *Capsules* oblong or ellipsoid, acute and shortly beaked, ± 10 mm long. *Flowering time*: August, September.

Distribution and ecology: a narrow endemic of Western Cape, South Africa, restricted to the triangle Malmesbury–Yzerfontein–Atlantis; on seasonally wet granite or loamy flats in fynbos or renosterveld shrubland.

Diagnosis: sharing a pointed corm and acute, ± beaked capsules with *Romulea cruciata* and distinguished from it by the larger, (35–)40–50 mm long [vs. 22–35 mm long], old-rose to terracotta-coloured flowers (i.e. with a yellow admixture to the pink) with a pale or greenish yellow cup [vs. magenta to rose-pink with golden- or orange-yellow cup]. Anatomically it is also distinguished by the smaller, thickened leaf epidermal cells. The two species share the somatic chromosome number $2n$ = 18 but hybrids between them are only partially fertile (De Vos 1972). True *R. cruciata* is absent from range of *R. eximia* and the two taxa are thus parapatric.

The species is florally very similar to the often sympatric *Romulea hirsuta* with bell-shaped corm and often exserted stem but has a pale or greenish yellow vs. golden- or orange-yellow cup.

60. **Romulea obscura** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 399 (1882); De Vos: 231 (1972). Type: South Africa, [Western Cape], *Drège 4041* (S, lecto., designated by De Vos: 233 (1972); BM, isolecto.).

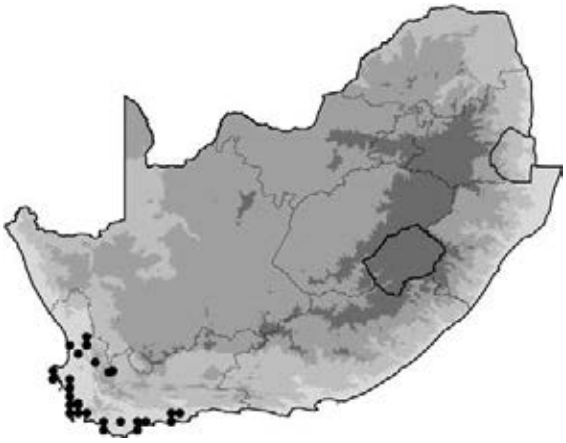
Romulea papyracea Wolley-Dod: 170 (1900), new synonym. Type: South Africa, [Western Cape], Table Mountain, in the plantation on the Lower Plateau, *Wolley-Dod 3075* (BOL, holo.; BM, K, iso.).

Romulea obscura var. *blanda* M.P.de Vos: 239 (1972), new synonym. Type: South Africa, [Western Cape], between Mamre and Ysterfontein, *Bolus 20725* (BOL, holo.; K, iso.).

Romulea obscura var. *campestris* M.P.de Vos: 237 (1972), new synonym. Type: South Africa, [Western Cape], between Clanwilliam and Graafwater, *De Vos 1897* (NBG [as STE], holo.).

Romulea obscura var. *subtestacea* M.P.de Vos: 238 (1972), new synonym. Type: South Africa, [Western Cape], Malmesbury, Soutpan NW of Ysterfontein, *De Vos 2037* (NBG [as STE], holo.).

Plants 30–150 mm high. *Corm* globose or obovoid, 5–15 mm diam., rounded or crested below, tunics woody, split into curved or bent, grooved teeth below. *Stem* subterranean. *Leaves* 2 to 12, all evidently basal, terete-filiform, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* up to 5, semi-terete, recurved and widely spreading in fruit; outer bracts greenish or brownish, with narrow,



Distribution of ***Romulea obscura***.

brown-speckled, membranous margins, 8–22 mm long, closely veined (± 8 veins/mm), inner bracts with wide, colourless or brown-speckled membranous margins. *Flowers* yellow, apricot-, terracotta-coloured, dark old-rose or rosy pink, with or without dark blotches or streaks in throat, with greenish yellow or orange-yellow cup, outer tepals irregularly marked or striped on reverse; perianth tube funnel-shaped, 2–5 mm long; tepals oblanceolate to elliptic, 10–40 × 3–12 mm. *Filaments* 3–8 mm long, pilose basally or glabrescent; anthers 3–9 mm long, yellow. *Style* dividing opposite lower half of anthers. *Capsules* oblong, 10–15 mm long. *Flowering time*: August to October.

Distribution and ecology: a species of the Western Cape lowlands, extending from Clanwilliam and Graafwater along the West Coast to the Cape Peninsula and eastward to Stilbaai; in seasonally moist, sandy soils in fynbos.

Diagnosis: distinguished from *Romulea rosea* by the somatic chromosome number $2n$ = 22 ($2n$ = 18 in *R. rosea*), the presence of some degree of yellow pigmentation in the tepals (distal to the cup), the flowers ranging from yellow through apricot-, terracotta-coloured and salmon-pink to rosy-pink, with a greenish yellow to orange-yellow cup, and the fruiting peduncles remaining widely spreading on drying. Flowering plants without careful colour notes are impossible to assign between the two species with any accuracy. Yellow-flowered forms resemble *R. monticola* from the Bokkeveld and Matsikamma-Gifberg Mtns, but the flowers are duller in hue with proportionally longer outer bracts more than half as long as the flowers, inner bracts with membranous margins distinctly narrower than the central green portion, and peduncles widely spreading in fruit.

Romulea obscura is best known historically from the West Coast between Saldanha and the Cape Peninsula but is now less often encountered as a result of increasing urbanisation. The species is polymorphic for flower size, colour and markings, with four varieties recognised by De Vos (1972), all interfertile to some degree and with intermediates between them. The typical variety

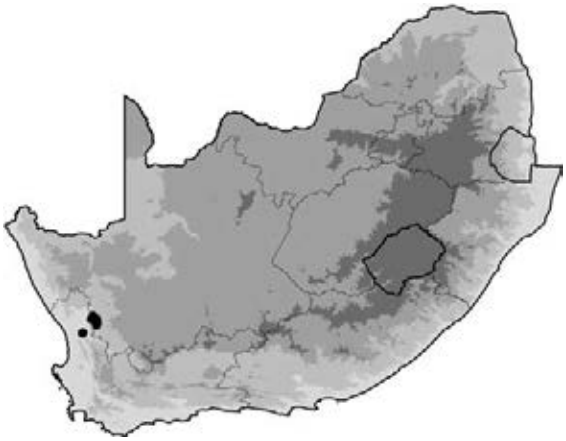
is associated with plants with relatively small, yellow or apricot-coloured flowers 15–25(–35) mm long, recorded along the coast from Hopefield to Stilbaai. Similarly small-flowered plants but with a rose-pink to terracotta-coloured perianth, often with dark blotches in the throat, and recorded between Hopefield and the Cape Peninsula, were treated as var. *subtestacea*, with intermediates between the two varieties recorded near Kraaifontein. Larger flowered plants with flowers 25–50 mm long were similarly segregated by perianth colour into var. *campestris*, with yellow, apricot-coloured or pale rosy pink flowers, usually without blotches in the throat, and var. *blanda*, with rosy pink flowers always with dark blotches in the throat. The former variety is most common in the Olifants River Valley but extends south to Hopefield, with the latter recorded from Vredenburg to the Cape Peninsula. Intermediates between var. *campestris* and var. *obscura* are recorded from Bredasdorp.

Similar variations in flower size, perianth colour or tepal markings are encountered in other species of *Romulea*, including *R. rosea*, evidently part of a complex pattern of small-scale variation within species. In view of the numerous intermediates between them we see little point in retaining formal recognition of the extremes at varietal level.

Romulea papyracea Wolley-Dod (1900) was treated as a synonym of *R. schlechteri* by Manning & Goldblatt (2001) but we have re-examined the type collection and conclude that it is conspecific with *R. obscura*. The rounded corm, with traces of teeth on the remaining inner tunics, subterranean stem with several basal leaves, and 'flesh' flowers (noted on the holotype) with closely veined outer bracts, and inner bracts with broad, colourless membranous margin are all consistent with this identification.

61. **Romulea monticola** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 241 (1972). Type: South Africa, [Northern Cape], top of Vanrhyn's Pass, *De Vos 1924* (NBG [as STE], holo.).

Plants 50–100 mm high. *Corm* globose or obovoid, 5–15 mm diam., rounded or crested below, tunics woody, split into curved or bent, grooved teeth below. *Stem* subterranean. *Leaves* 3 to 12, all evidently basal, terete-filiform, narrowly 4-grooved, 0.5–1.0 mm diam., sometimes minutely ciliolate on rib margins. *Peduncles* up to 5, semi-terete, reddish brown, suberect or recurved in fruit; outer bracts greenish or brownish and submembranous in lower half, with brown-speckled, membranous margins, 10–30 mm long, closely ribbed above (± 8 veins/mm), inner bracts with wide, brown-speckled membranous margins. *Flowers* golden-yellow, often with darker cup, with 1 or more dark veins in throat, outer tepals reddish brown or streaked with brown on reverse; perianth tube funnel-shaped, 3–4 mm long; tepals oblanceolate to elliptic, 18–27 × 5–7 mm. *Filaments* 4–5 mm long, pilose basally, yellow; anthers 3–4 mm long, initially joined at tips, yellow. *Style* dividing opposite anthers. *Capsules* subglobose or oblong, 8–10 mm long. *Flowering time*: (July) August, September.



Distribution of ***Romulea monticola***.

Distribution and ecology: endemic to the Bokkeveld Mtns in Northern Cape and adjacent Matsikamma-Gifberg massif in Western Cape, South Africa; on seasonally moist sandy or loamy flats in renosterveld shrubland and transitional fynbos.

Diagnosis: distinguished from other members of sect. *Roseae* with rounded corms by the golden-yellow flowers, usually with dark veins in the cup, dark reddish brown, subterete peduncles not spreading or coiling in fruit, and subherbaceous outer bracts with relatively narrow, finely brown-speckled margins. Closely resembling yellow-flowered forms of *Romulea obscura* from the Olifants River Valley but distinguished by its brighter yellow flowers with proportionally shorter bracts less than half as long as the perianth, inner bracts with broader membranous margins ± as wide as the central green portion, and the peduncles remaining suberect or curved in fruit. The flowers in *R. obscura* are mostly dull yellow (to salmon-pink) with the bracts more than half as long as the flowers, the membranous margins of the inner bracts distinctly narrower than the central green portion, and peduncles widely spreading in fruit.

Romulea monticola may also be confused with *R. luteoflora*, which typically has more strongly herbaceous bracts with whitish margins and apices marked with larger, dark flecks, and peduncles that ultimately coil up in fruit. Neither *R. obscura* nor *R. luteoflora* have been recorded from the Bokkeveld and Matsikamma-Gifberg. It is also superficially similar to *R. montana* (sect. *Romulea*), which usually has dark markings on the tepals, bracts without visible membranous margins, and corms with a crescent-shaped basal ridge.

Ser. **Atrandrae** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank. *Romulea* subsect. *Atrandrae* M.P.de Vos in Journal of South African Botany, Suppl. 9: 209 (1972). Type: *R. atrandra* G.J.Lewis

Corms rounded and tunics with curved basal teeth. *Leaves* ± terete, 4-grooved. *Flowers* funnel-shaped; *outer*

bracts with well-developed membranous tip. *Peduncles* often coiling in fruit.

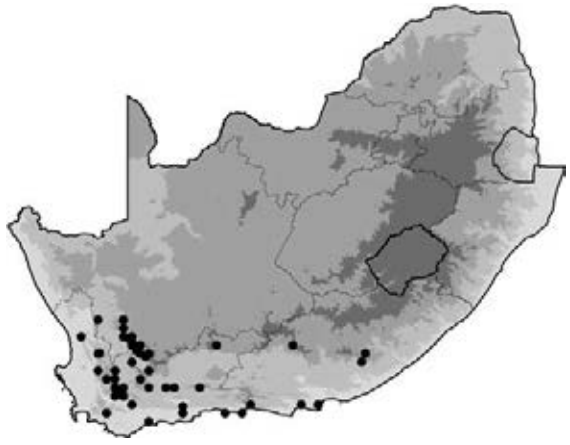
62. **Romulea atrandra** *G.J.Lewis* in Flowering Plants of South Africa 14: t. 544 (1934); De Vos: 212 (1972). Type: South Africa, [Western Cape], Laingsburg, Tweedside, cultivated Hort. Kirstenbosch *Lewis s.n.* (BOL, holo.; PRE, iso.).

Romulea atrandra var. *esterhuyseniae* M.P.de Vos: 215 (1972), new synonym. Type: South Africa, [Western Cape], Ladismith, Swartberge, Towerkop, *Esterhuysen 13924* (BOL, holo.; K, NBG, PRE, SAM, iso.).

Romulea atrandra var. *lewisiae* M.P.de Vos: 217 (1972), new synonym. Type: South Africa, [Eastern Cape], Port Elizabeth, Victoria Park, *Lond 617* (PRE, holo.; GRA, K, iso.).

Plants 50–200 mm high. *Corm* globose or obovoid, 10–25 mm diam., rounded or crested below, tunics woody, split into curved or bent, grooved teeth below. *Stem* subterranean. *Leaves* 3 to 10, all evidently basal, terete or compressed-cylindric, narrowly or more widely 4-grooved, 1–4 mm diam. *Peduncles* up to 5, semi-terete, recurved and coiling in fruit; outer bracts green with narrow, brown-flecked, membranous margins expanding to prominent membranous tip, 10–30 mm long, closely ribbed (± 8 veins/mm), inner bracts with wide, brown-flecked membranous margins. *Flowers* white, pale blue or lilac to magenta with whitish to golden-yellow cup sometimes veined with black, with or without purple blotches around cup, outer tepals blotches or feathered with purple on reverse; perianth tube funnel-shaped, 4–8 mm long; tepals oblanceolate to obovate, 15–35 × 3–15 mm. *Filaments* 4–8 mm long, pilose basally, yellow or blackish; anthers (2.5–)5.0–10.0 mm long, yellow, purple or black; pollen yellow. *Style* dividing opposite anthers. *Capsules* cylindric, 10–14 mm long. *Flowering time*: July to October.

Distribution and ecology: widely distributed through the near-interior, winter-rainfall parts of Northern and Western Cape, from the Gifberg through the Cederberg and Cold Bokkeveld to Worcester and eastward to Port Elizabeth and onto the Hogsback in Eastern Cape, and from Calvinia and Williston along the Roggeveld to the Swartberg in the Little Karoo and onto the mountains around Graaff-Reinet; typically on seasonally damp shale or clay flats in renosterveld shrubland but also other open vegetation.



Distribution of ***Romulea atrandra***.

Diagnosis: the central species in ser. *Atrandrae*, *Romulea atrandra* is highly variable in size, flower colour and markings. It is diagnosed by the rounded corm, firm-textured and closely ribbed outer bracts with conspicuous brown-flecked membranous tips, and white, pale blue or lilac to magenta flowers with white to golden-yellow cup, with or without dark blotches around the cup or dark lines in the cup.

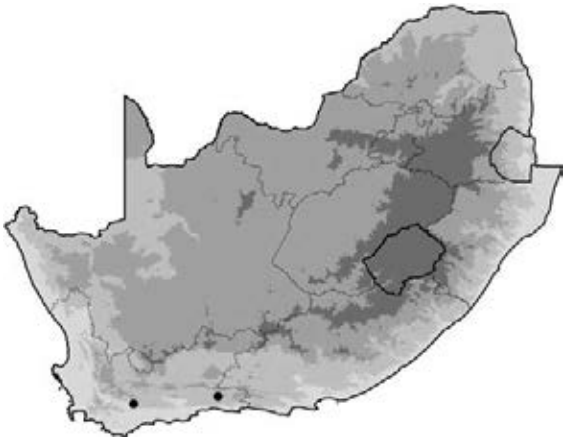
Plants with narrow leaves were distinguished as var. *esterhuyseniae* and those with small flowers 25 mm long or less as var. *lewisiae* (De Vos 1972). These represent two extremes of a much more complex pattern of variation. There is little doubt that they are not natural as currently interpreted and we elect not to recognise them.

The most striking form, occurring over much of the Roggeveld, has large, bright magenta flowers with a pale yellow or whitish cup boldly striped with black on the veins, and banded with black in the throat. Other populations have white or pale blue to pink or magenta flowers with unstriped cups, either pale or golden-yellow and with or without dark markings in the throat. Populations along the south coast have small, unmarked, white to pale blue flowers and may be confused with forms of *R. rosea*, from which they differ in the closely ribbed bracts with conspicuous brown-flecked tips, and anatomically in lacking veins in the rib margins.

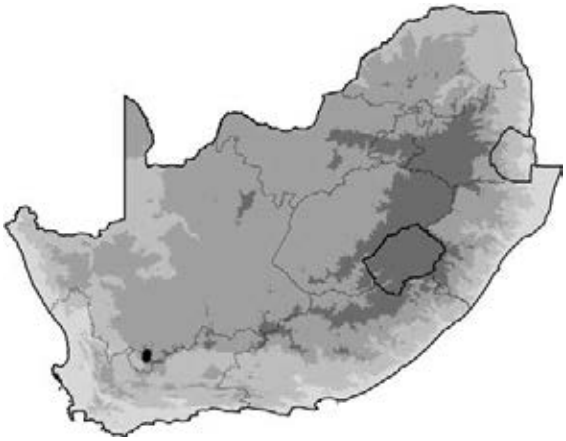
63. **Romulea vlokii** *M.P.de Vos* in Flora of southern Africa 7(2,2): 55 (1983). Type: South Africa, [Western Cape], Kammanassie Mtns, Buffelsberg, near Diepkloof, *Vlok 384* (NBG, holo.).

Plants 50–150 mm high. *Corm* ovoid, 5–12 mm diam., pointed below, tunics woody, split into ± straight teeth converging on basal point. *Stem* subterranean. *Leaves* 2 to 4, all evidently basal, terete, narrowly 4-grooved, ± 1 mm diam., upper leaves much smaller than lower. *Peduncles* up to 4, semi-terete, recurved and coiling in fruit; outer bracts green with narrow, brown-flecked, membranous margins expanding to prominent membranous tip, 15–25 mm long, closely ribbed (± 8 veins/mm), inner bracts with wide, brown-flecked membranous margins. *Flowers* magenta with golden-yellow cup, with or without purple blotches around cup, outer tepals blotches or feathered with purple on reverse; perianth tube funnel-shaped, 5–7 mm long; tepals obovate, 22–25 × 8–12 mm. *Filaments* 4–6 mm long, pilose basally, orange-yellow; anthers ± 7 mm long, yellow. *Style* dividing opposite anthers. *Flowering time*: June–July.

Distribution and ecology: a rarely collected species endemic to the Little Karoo in Western Cape, South Africa,



Distribution of ***Romulea vlokii***.



Distribution of ***Romulea hallii***.

where it has been recorded from the Kammanassie Mtns and east of Montagu; on moist stony slopes in renosterveld shrubland.

Diagnosis: distinguished by the basally pointed corm, conspicuous membranous tips to the outer bracts, and magenta flowers with yellow cup. Similar corms occur in several species in sect. *Roseae* but the immediate relationships of the species appear to lie with *Romulea atrandra* and other species with strongly veined outer bracts with prominent membranous tips, rather than with other pink-flowered species with pointed corms and lightly veined outer bracts lacking prominent membranous tips, such as *R. cruciata*. The species may be confused with *R. atrandra* in the Little Karoo and examination of the corms is necessary to separate *R. vlokii*, with straight basal teeth converging to a basal point, from *R. atrandra*, with a rounded corm with basal teeth curved or bent over a basal ridge.

64. **Romulea hallii** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 217 (1972). Type: South Africa, [Northern Cape], Sutherland, top of Verlatekloof, *Hall 3176* (NBG, holo.).

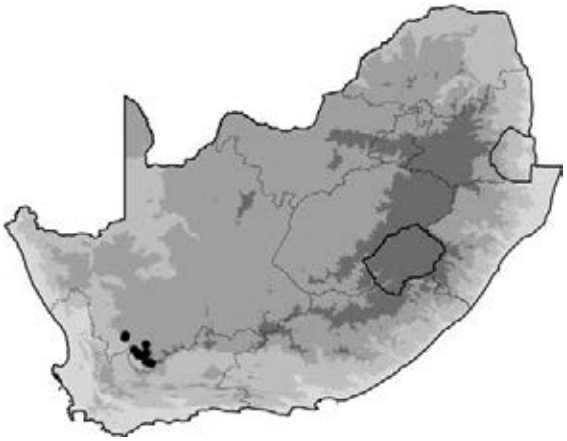
Plants 30–50(–80) mm high. *Corm* globose, 10–25 mm diam., obliquely rounded below, tunics woody, split into bent, grooved teeth below. *Stem* subterranean. *Leaves* 3 to 8, all evidently basal, compressed-terete, 4-grooved, 2–3 mm diam. *Peduncles* up to 4, semi-terete, recurved or flexuous in fruit; outer bracts green and herbaceous in lower half, with wide, brown-flecked, membranous margins and tip, 15–18 mm long, herbaceous portion triangular and closely ribbed (8 veins/mm), inner bracts with wide, brown-flecked membranous margins. *Flowers* pale lilac or wisteria-blue with orange-yellow cup and purple and black blotches extending as a median line into cup, outer tepals feathered with purple on reverse; perianth tube funnel-shaped, 5–6 mm long; tepals obovate, 15–22 × 8–10 mm. *Filaments* 5–6 mm long, pilose basally, orange-yellow; anthers 4–5 mm long, yellow. *Style* dividing just below anther apices. *Capsules* oblong, ± 10 mm long. *Flowering time*: May to July.

Distribution and ecology: a narrow endemic known only from the Roggeveld Escarpment south of Sutherland in Northern Cape, South Africa, where it is known from the top of the Verlatekloof Pass; on clay flats in renosterveld shrubland.

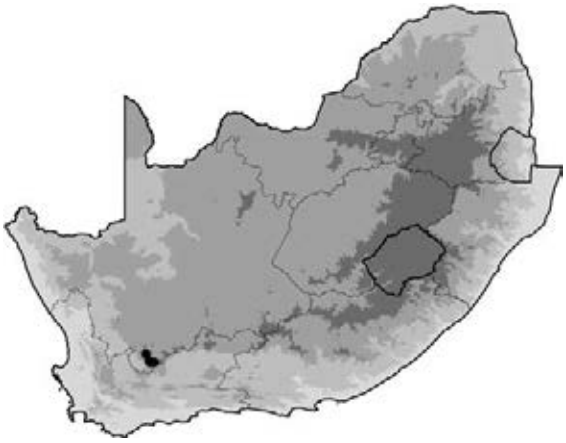
Diagnosis: an early-flowering species allied to *Romulea atrandra* and resembling thick-leaved forms of that species but separated by its winter-flowering and pale lilac or wisteria-blue flowers with orange-yellow cup, and outer bracts with acute, triangular herbaceous basal portion.

65. **Romulea komsbergensis** *M.P.de Vos* in Annale van die Universiteit van Stellenbosch, Reeks A, Wis-Natuurkunde 28(3): 69 (1952a): De Vos: 219 (1972). Type: South Africa, [Northern Cape], Sutherland, north of Komsberg Pass, *De Vos 1582* (NBG [as STE], holo.).

Plants 30–100(–150) mm high. *Corm* globose, 7–15 mm diam., obliquely rounded below, tunics woody, split into bent, grooved or channelled teeth below. *Stem* subterranean. *Leaves* 5 to 12, all evidently basal, filiform, narrowly 4-grooved, 1.0–1.5 mm diam. *Peduncles* up to 5, semi-terete, recurved and coiling in fruit; outer bracts softly herbaceous and submembranous or herbaceous in upper half, striate (± 6 veins/mm), with broad, mostly fawn and brown-speckled membranous margins and tip, 14–24 mm long, inner bracts with wide, brown-flecked membranous margins. *Flowers* magenta, often fading blue at tips, with yellow cup edged with narrow blue band and stained brown at base, outer tepals irregularly marked or feathered with purple on reverse; perianth tube funnel-shaped, 3–4 mm long; tepals obovate, 15–28 × 8–15 mm. *Filaments* ± included, ± 4 mm long, pubescent basally, brownish; anthers 3–5 mm long, circinnate, purple ageing yellow; pollen rust-coloured. *Style* usually dividing between base and middle of anthers, rarely exserted up to 4 mm beyond anthers, branches forked. *Capsules* oblong, 8–10 mm long. *Flowering time*: August, September.



Distribution of ***Romulea komsbergensis***.



Distribution of ***Romulea multifida***.

Distribution and ecology: originally thought to be endemic to the Komsberg in Northern Cape but now known to extend along the higher-lying parts of the Roggeveld Escarpment as far north as Middelpos, South Africa; forming large colonies in seepages or the margins of seasonal streams and pools in renosterveld shrubland.

Diagnosis: distinguished from allied species in ser. *Atrandrae* with magenta flowers by the conspicuous brown stain covering the base of the floral cup and filaments, and cytologically in a having $2n = 20$ rather than 22. The orange-yellow cup is rimmed with a purple or blue transverse band and the tepals often fade bluish at the tips. The species typically has a short style dividing near the base of the anthers but populations around Middelpos in the north of the range have the style well exserted, up to 4 mm beyond the anthers.

66. **Romulea multifida** *M.P.de Vos* in Annale van die Universiteit van Stellenbosch, Reeks A, Wis-Natuurkunde 28(3): 71 (1952a); De Vos: 221 (1972). Type: South Africa, [Northern Cape], plateau west of Sutherland, *Joubert s.n.* (NBG [as STE], holo.).

Plants 20–50 mm high. *Corm* globose, 6–15 mm diam., obliquely rounded below, tunics woody, split into bent, grooved or channelled teeth below. *Stem* subterranean. *Leaves* 2 or 3, all evidently basal, terete-filiform, narrowly 4-grooved, 0.5–1.0 mm diam. *Peduncles* 1 or 2, semi-terete, recurved and coiling in fruit; outer bracts softly herbaceous, striate (± 6 veins/mm), with narrow colourless membranous margins and conspicuous brown-flecked membranous tip, 14–18 mm long, inner bracts with wide, brown-flecked membranous margins. *Flowers* magenta with yellow cup and chestnut-brown blotches edged above by a narrow purple or lilac band, outer tepals feathered with purple on reverse; perianth tube funnel-shaped, 5–7 mm long; tepals obovate, 14–20 × 6–9 mm. *Filaments* ± included, 5–6 mm long, pilose basally, yellow; anthers 2.5–4.0 mm long, circinnate, purple or yellowish. *Style* dividing well below anthers, purple, branches 3–4 mm long, multifid with 12 or more lobes. *Capsules* oblong, ± 8 mm long. *Flowering time*: August.

Distribution and ecology: a narrow endemic of the Komsberg south of Sutherland in Northern Cape; restricted to sandy flats in renosterveld.

Diagnosis: a rare species with 2 or 3 filiform leaves and magenta flowers with yellow cup, and diagnostic style dividing well below the anthers into purple or blackish, antler-like branches that are further once or twice divided, thus with 12 or more stigmas. The species co-occurs with *R. komsbergensis* and may be overlooked but the latter has more numerous leaves and flowers with a characteristic brown stain at the bottom of the cup and once-forked style branches, and is ecologically separated by its preference for seepages and marshy situations.

67. **Romulea luteoflora** *(M.P.de Vos) M.P.de Vos* in Journal of South African Botany, Suppl. 9: 210 (1972). *Romulea atrandra* var. *luteoflora* M.P.de Vos: t. 1135 (1952b). Type: South Africa, [Western Cape], Ceres, top of Theronsberg Pass, *De Vos 1570* (NBG [as STE], holo.).

Plants 50–100(–150) mm high. *Corm* globose, 5–20 mm diam., obliquely rounded below, tunics woody, split into bent, grooved teeth below. *Stem* subterranean. *Leaves* 2 to 6, all evidently basal, terete-filiform, narrowly 4-grooved, 1–2 mm diam. *Peduncles* up to 6, semi-terete, 30–140 mm long, recurved and later coiling in fruit; outer bracts green with narrow, translucent or brown-blotched membranous margins expanding to a well-developed, brown-blotched, membranous tip, 12–25 mm long, closely ribbed (± 8 veins/mm), inner bracts with wide, brown-flecked or rarely colourless membranous margins. *Flowers* pale or buttercup-yellow with darker yellow cup, unmarked or with brown blotches around cup, sometimes reduced to lines, outer tepals feathered or blotched with brown on reverse; perianth tube cup- or funnel-shaped, 4–6 mm long; tepals oblanceolate, (16–)18–35 × (4–)5– 15 mm. *Filaments* 4–7 mm long, pilose basally, yellow; anthers (4–)6–9 mm long, yellow. *Style* dividing between middle

and top of anthers. *Capsules* oblong, ± 10 mm long. *Flowering time*: July to September.

Distribution and ecology: with a rather scattered distribution along the western escarpment, on the Kamiesberg, Hantam and Roggeveld Mtns in Northern Cape, and from the Cold Bokkeveld to Worcester in Western Cape, South Africa; on seasonally moist stony clay flats, mostly in renosterveld shrubland. The species is absent from the Bokkeveld Mtns.

Diagnosis: distinguished from allied species in the series with herbaceous outer bracts with prominent membranous margins by its yellow flowers, sometimes streaked or blotched with brown, and style not exserted above the anthers. Plants from the Roggeveld have thicker, shorter leaves. The fruiting peduncles coil up when ripe.

Romulea luteoflora was originally treated as a variety of pink-flowered *R. atrandra* but differing from it in chromosome number as well as flower colour. Experimental hybrids between the two species are only slightly fertile (De Vos 1972).

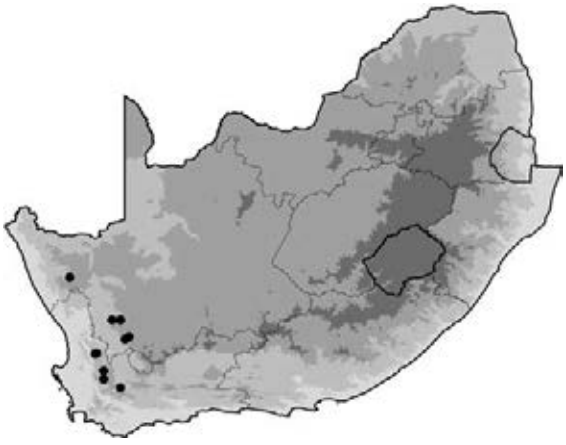
Romulea luteoflora may be confused with *R. diversiformis* but the latter is readily identified by the longer style well exserted beyond the anthers, more numerous (6 to 12) leaves, and preference for marshy soils in seepages and around seasonal pools. It has also been confused with *R. monticola* from the Bokkeveld Mtns and *R. obscura* from the Cold Bokkeveld, both of which have the outer bracts less firmly herbaceous below and the inner bracts with finely brown-speckled membranous margins. The fruiting peduncles in *Romulea monticola* are slender and reddish brown, and remain suberect or are curved in fruit, whereas they are typically thicker in *R. obscura* and spread widely in fruit. Both species differ from *R. luteoflora* anatomically in lacking rib marginal veins in the leaves.

Outlying collections from around Albertinia assigned to the species by De Vos (1972) are anomalous in their smaller flowers, softer outer bracts, and finely reddish-speckled membranous margins to the inner bract. The plants, which have not yet set fruit and thus do not show the diagnostic characters of the fruiting peduncles, are unusually delicate for the species, with relatively unsubstantial membranous tips to the bracts. They closely resemble collections of *R. obscura* from the Agulhas Plain and we include them in that species.

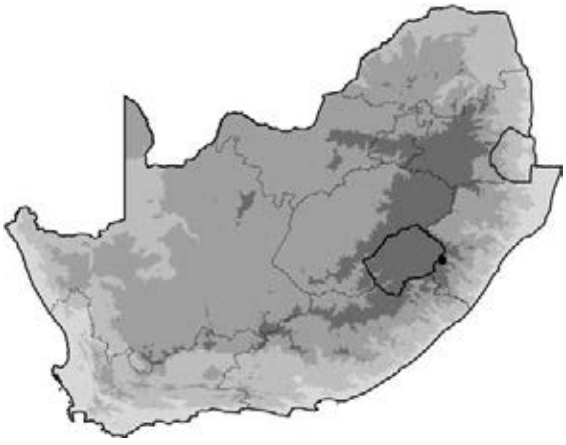
Plants from the summit of the Sani Pass on the Lesotho/KwaZulu-Natal border with softer corm tunics and small flowers with proportionally longer, narrowly funnel-shaped tubes and smaller anthers were treated as *Romulea luteoflora* var. *sanisensis* M.P.de Vos (1983) but the morphological differences between them and typical plants from the Western and Northern Cape, in conjunction with the extraordinary geographical disjunction, suggest that that they represent a distinct species, which we recognise as *R. sanisensis*.

68. **Romulea sanisensis** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank. *Romulea luteoflora* var. *sanisensis* M.P.de Vos in Flora of southern Africa 7(2,2): 56 (1983). Type: Lesotho, Sani Pass, west of Border Post in grassland, *Hilliard & Burtt 7153* (PRE [as 'STE'], holo.; NU, iso.).

Plants 20–50 mm high. *Corm* globose, 6–10 mm diam., obliquely rounded below, tunics firm-papery, split into bent, grooved teeth below. *Stem* subterranean. *Leaves* 4 to 8, all evidently basal, terete, narrowly 4-grooved, ± 1 mm diam. *Peduncles* 1 to 4, semi-terete, 25–45 mm long; outer bracts green with narrow, translucent or brown-blotched membranous margins expanding to a well-developed, brown-blotched, membranous tip, 11–14 mm long, closely ribbed (± 8 veins/mm), inner bracts with wide membranous margins flecked with brown distally. *Flowers* yellow to pale apricot-coloured, unmarked, outer tepals feathered with brown on reverse; perianth tube narrowly funnel-shaped, 6 mm long; tepals elliptic, 10–12 × 3–5 mm. *Filaments* inserted at or above middle of tube, 4–5 mm long, puberulous basally, yellow; anthers 2–3 mm long, yellow. *Style* dividing opposite middle of anthers, branches 1–2 mm long, divided halfway. *Capsules* oblong, ± 7 mm long. *Flowering time*: October to early November.



Distribution of ***Romulea luteoflora***.



Distribution of ***Romulea sanisensis***.

Distribution and ecology: an early-flowering species still known only from the type locality in marshy turf at the top of Sani Pass just inside Lesotho, where it forms colonies in company with other dwarf geophytes.

Diagnosis: distinguished from *Romulea luteoflora* by the smaller flowers with proportionally longer, narrowly funnel-shaped tube, tepals 10–12 mm long and thus not more than twice as long as the tube, filaments inserted at or above the middle of the tube and 4–5 mm long, thus longer than the anthers, 2–3 mm long.

69. **Romulea diversiformis** *M.P.de Vos* in Annale van die Universiteit van Stellenbosch, Reeks A, Wis-Natuurkunde 28(3): 63 (1952a); De Vos: 225 (1972). Type: South Africa, [Northern Cape], Sutherland, Damslaagte, *De Vos 1581* (NBG [as STE], holo.).

Plants 50–100(–150) mm high. *Corm* globose, 8–15 mm diam., obliquely rounded below, tunics woody, split into bent, grooved teeth below. *Stem* subterranean. *Leaves* 6 to 12, all evidently basal, terete-filiform, narrowly 4-grooved, 0.5–1.5 mm diam. *Peduncles* up to 6, semi-terete, recurved and later coiling in fruit; outer bracts green with narrow membranous margins expanding to well-developed, colourless or whitish membranous tip, 12–20 mm long, closely ribbed (± 8 veins/mm), inner bracts with wide, colourless or whitish membranous margins. *Flowers* buttercup- or chrome-yellow, outer tepals brownish or feathered with brown on reverse; perianth tube cup- or funnel-shaped, 4–6 mm long; tepals obovate, ± unequal, 18–28 mm long, outer 7–12 mm wide, inner 10–16 mm wide. *Filaments* 4–6 mm long, pilose basally, yellow; anthers 5–8 mm long, yellow. *Style* exserted and dividing 3–6 mm beyond anthers, branches forked. *Capsules* oblong, 7–10 mm long. *Flowering time*: August, September.

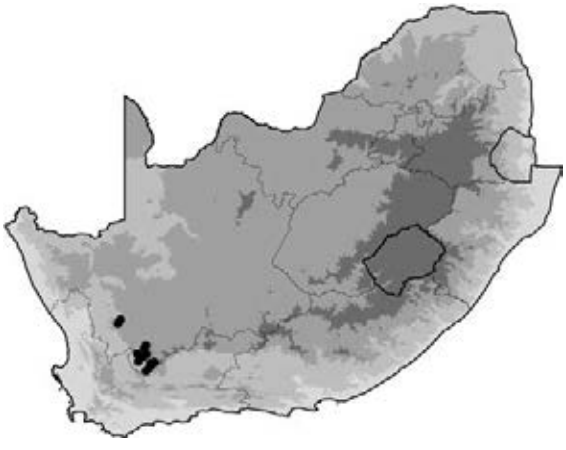
Distribution and ecology: described from the Klein Roggeveld in Northern Cape, South Africa, but now recorded further north along Roggeveld Escarpment west of Sutherland and from the summit of the Hantamsberg near Calvinia; in seepages and around seasonal pools on shale soils.

Diagnosis: readily recognised by its bright yellow, unmarked flowers with relatively broad, obovate tepals, the inner notably broader than the outer, and the long style, exserted 3–6 mm beyond the anthers. The numerous leaves and the whitish or colourless membranous margins to the inner and outer bracts are also distinctive. The species has been confused with *Romulea luteoflora*, but that species has fewer leaves (2 to 6), brown-flecked membranous margins to the inner and outer bracts, and a shorter style not exserted beyond the stamens.

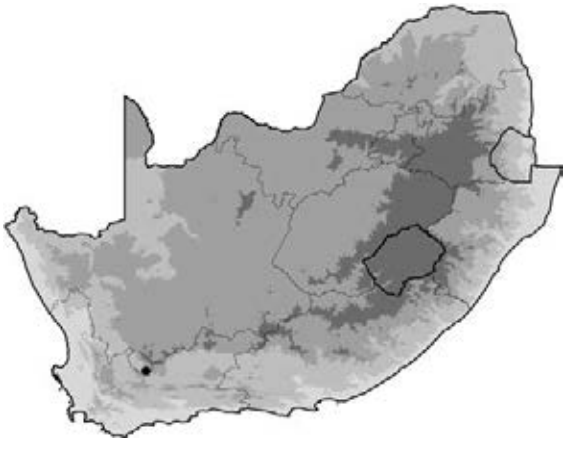
70. **Romulea eburnea** *J.C.Manning & Goldblatt* in Bothalia 34: 19 (2004). Type: South Africa, [Northern Cape], 28 km along Komsberg Pass road from southern end, foot of Smoushoogte, alluvial wash along Meintjiesplaasrivier, 28 August 2003, *J. Manning 2886* (NBG, holo.; MO, iso.).

Plants 50–100 mm high. *Corm* globose, 5–10 mm diam., obliquely rounded below, tunics woody, split into bent, grooved teeth below. *Stem* subterranean. *Leaves* 2 to 4, terete, narrowly 4-grooved, ± 1 mm diam. *Peduncles* 1 or 2, semiterete, recurved and later coiling in fruit; outer bracts submembranous, with broad, brown-flecked membranous margins and tip, 18–22 mm long, inner bracts submembranous with broad, brown-flecked membranous margins. *Flowers* golden-yellow or pale creamy apricot-coloured with lower ⅔ of tepals and cup deep yellow, outer tepals flushed dull olive-coloured on reverse; perianth tube deeply funnel-shaped, 10–13 mm long, tepals oblanceolate, 23–27 × 7–9 mm. *Filaments* pilose below, 6–7 mm long, yellow; anthers ± 8 mm long, yellow. *Style* dividing at or just beyond anthers, branches 3 mm long, deeply divided. *Capsules* oblong, 10–11 mm long. *Flowering time*: August, September.

Distribution and ecology: evidently endemic to the Klein Roggeveld in Northern Cape, where it has been recorded twice on the Komsberg; on sandy flats on Beaufort sandstone in renosterveld shrubland.



Distribution of ***Romulea diversiformis***.



Distribution of ***Romulea eburnea***.

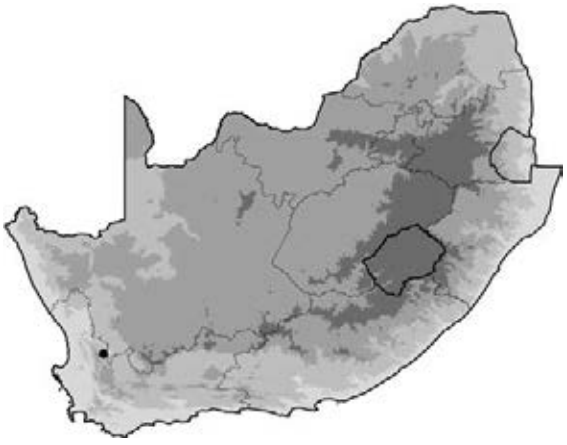
Diagnosis: distinguished by the relatively few (2 to 4), filiform leaves, submembranous bracts, and yellow or pale apricot-coloured flowers with narrowly funnel-shaped tube 10–13 mm long. Possibly most closely allied to *Romulea malaniae*, another species with few leaves and pedicels coiling in fruit but with smaller flowers with shorter perianth tube. Anatomically, the leaves are unusual in lacking secondary veins on either side of the main veins and in having a subdermal sclerenchyma layer joining the main and marginal bundles.

71. **Romulea monophylla** *J.C.Manning & Goldblatt* in South African Journal of Botany 95: 133 (2014). Type: South Africa, Western Cape, Cederberg, 4 km before Farm Sederberg, fynbos on sand, 12 Aug. 1986, *C.M. van Wyk 2539* (PRE, holo.).

Plants 100–150 mm high. *Corm* globose, ± 10 mm diam., rounded or crested below, tunics woody, split into bent, grooved teeth below. *Stem* subterranean. *Leaf* solitary, basal, terete, narrowly 4-grooved, ± 1 mm diam. *Peduncle* 1, semi-terete, reddish brown; outer bracts green or flushed brown, with scarcely visible, colourless membranous margins, 15–22 mm long, ribbed above (± 6 veins/mm), inner bract ± entirely membranous or distal half with narrow herbaceous central portion, with purple or green veins in centre and wide, colourless margins. *Flowers* orange, ?with dark lines in throat, outer tepals finely feathered and marbled with brown on reverse; perianth tube funnel-shaped, 6–7 mm long; tepals oblanceolate to elliptic, 20–22 × 6–8 mm. *Filaments* ± 8 mm long, pilose in lower half, yellow; anthers ± 8 mm long, yellow. *Style* dividing opposite middle of anthers, branches 2 mm long, divided halfway. *Flowering time*: August.

Distribution and ecology: a rare species known from the type collection from the Farm Sederberg in the Cederberg, Western Cape; in sandy soil in fynbos.

Diagnosis and relationships: distinctive in the solitary leaf and orange flowers with herbaceous outer bracts with narrow, scarcely visible membranous margins but ± entirely membranous inner bracts with unmarked margins. *Romulea monophylla* is distinguished from other yellow-flowered species with membranous inner bracts by the strictly solitary leaf, herbaceous outer bract with narrow membranous margins, and the unspotted inner bracts.



Distribution of ***Romulea monophylla***.

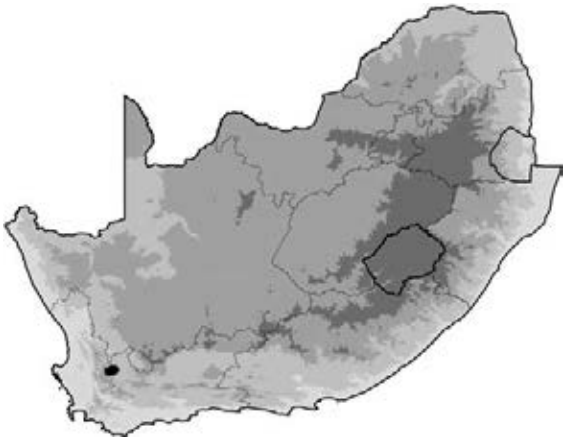
72. **Romulea fuscomontana** *J.C.Manning & Goldblatt*, sp. nov. Type: South Africa, Western Cape, Swartruggens, Knolfontein, arid mountain fynbos in sand, 28 May 2019, *I. Jardine* (NBG, holo.).

Plants 30–50 mm high at flowering. *Corm* globose, ± 10–15 mm diam., rounded or crested below, tunics woody, split into bent, grooved teeth below. *Stem* subterranean. *Leaf* solitary, basal, emergent at flowering, terete, stiffly erect, narrowly 4-grooved, mostly condupliacte with just the apex unifacial, ultimately 50–60 mm long, ± 1 mm diam. *Peduncle* 1, short and stout, scarcely exserted abve ground level, semi-terete, pale flushed reddish brown; outer bracts ± entirely membranous or submembranous, with broad colourless membranous margins and membranous tip flushed pale brown, 12–15 mm long, mauve-ribbed above (± 6 veins/mm), inner bract ± entirely membranous with mauve flushed veins in centre and wide, colourless margins flushed golden brownish apically. *Flowers* golden yellow with dark lines in throat, outer tepals finely feathered with brown on reverse; perianth tube funnel-shaped, 4–5 mm long; tepals oblanceolate to elliptic, 20–22 × 5–7 mm. *Filaments* ± 7 mm long, pilose basally, yellow; anthers ± 7 mm long, yellow. *Style* dividing opposite upper third of anthers, branches 2 mm long, divided halfway. *Flowering time*: May.

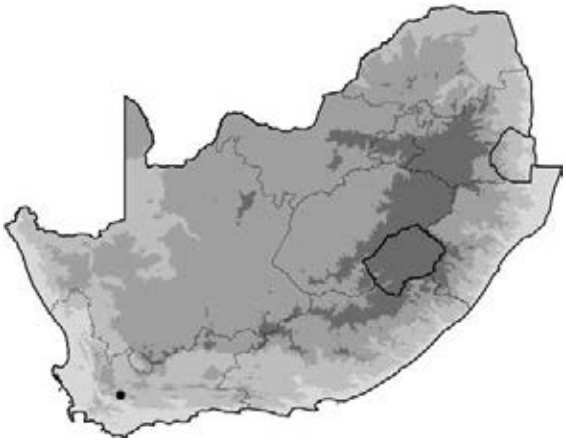
Distribution and ecology: a rare species known from the type collection from the farm Knolfontein in the Swartruggens, Western Cape; on sandy loamy flats in arid fynbos, along wash lines among pebbles.

Diagnosis and relationships: an early winter-flowering species, *Romulea fuscomontana* is distinctive in the genus in the solitary, short, stiff leaf that is emergent or only partly developed at flowering, and solitary, golden yellow flower borne at ground level, with ± entirely membranous or submembranous outer bracts with broad, colourless margins and tip flushed pale brown, and entirely membranous inner bracts with unmarked margins. Anatomically, the leaves are unusual in lacking rib marginal veins as well as secondary veins on either side of the main veins, and in having a subdermal sclerenchyma layer joining the main veins to the marginal fibre strands. This subdermal sclerenchyma layer, which gives the leaves their characteristic rigidity, is also found in *R. eburnea* from the Klein Roggeveld, but that species has a marginal vein associated with the marginal strands. *Romulea eburnea*, also with submembranous outer and inner bracts as in *R. fuscomontana*, has two or more leaves, and flowers with a much deeper perianth tube, 10–13 mm long.

Romulea fuscomontana may be confused with spring-flowering *Romulea malaniae*, which resembles it in



Distribution of ***Romulea fuscomontana***.



Distribution of ***Romulea malaniae***.

having the flowers borne at ground level on a very short peduncle with a characteristic knee-bend just below the flower, and in the submembranous outer bracts but that species has much smaller flowers, with tepals 8–20 mm long and anthers only 3–4 mm long, and the margins of the inner bracts and the tip of the outer bracts are distinctly flecked with brown. It also differs anatomically from *R. fuscomontana* in having secondary and marginal vascular bundles in the leaves, without a joining subdermal sclerenchyma layer. *Romulea monophylla* from the Cederberg, with a solitary leaf and large orange flowers resembling those of *R. fuscomontana*, is a spring-flowering species with the leaf fully developed at flowering, and the flowers are borne well above ground level on long peduncles, with herbaceous outer bracts.

73. **Romulea malaniae** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 223 (1972). Type: South Africa, [Western Cape], Sandvlei, 23 km S of Matroosberg Station, *Malan s.n.* (NBG [as STE], holo.).

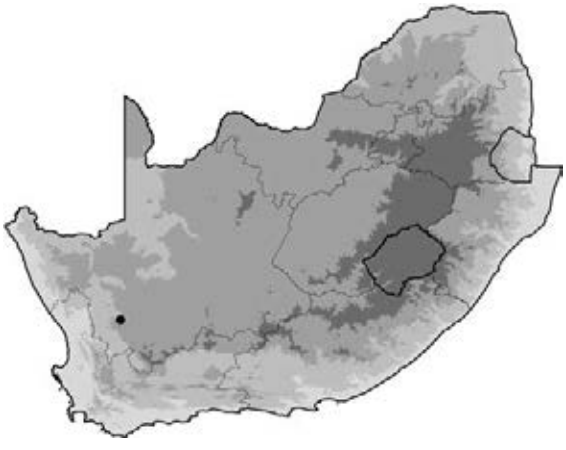
Plants 30–50 mm high. *Corm* globose, 5–10 mm diam., obliquely rounded below, tunics woody, split into bent, grooved teeth below. *Stem* subterranean. *Leaves* 1 to 3, all evidently basal, terete, narrowly 4-grooved, ± 1 mm diam. *Peduncles* up to 3, semi-terete, short and stout, recurving and later coiling in fruit; outer bracts pale and membranous or subherbaceous in upper half, with broad membranous margins and apex brown-speckled at tips only, 12–18 mm long, inner bracts pale and membranous, with broad, brown-flecked membranous margins. *Flowers* pale canary-yellow with outer tepals brownish on reverse; perianth tube funnel-shaped, 5–9 mm long; tepals oblanceolate, 8–20 × 4–5 mm. *Filaments* 4–5 mm long, pilose basally, yellow; anthers 3–4 mm long, yellow. *Style* dividing below anther apices, branches divided. *Capsules* subglobose to oblong, 5–8 mm long. *Flowering time*: August.

Distribution and ecology: known only from the type locality near the summit of Rooihoogte Pass on the Waboomsberg in Western Cape; in sandy patches on a sandstone ridge in open fynbos.

Diagnosis: a small and inconspicuous member of ser. *Atrandrae* distinguished by the 1 to 3 leaves, ± membranous inner and outer bracts, and unmarked, pale yellow flowers with tepals 8–20 mm long and short anthers 3–4 mm long. The short, stout peduncles have a characteristic knee-bend just below the flower.

74. **Romulea collina** *J.C.Manning & Goldblatt* in Bothalia 34: 17 (2004). Type: South Africa, Northern Cape, summit of Hantamsberg at base of radio mast, August 2002, flowered in cult. July 2003, *IBSA 5* (NBG, holo.).

Plants 50–100 mm high, growing in clumps. *Corm* globose, 10–15 mm diam., obliquely rounded below, tunics woody, split into bent, grooved teeth below, with fibrous neck 20–40 mm long. *Stem* subterranean. *Leaves* 7 to 9, all evidently basal, terete, narrowly 4-grooved, 1.0–1.5 mm diam. *Peduncles* up to 4, semi-terete, short and stout, suberect in fruit; outer bracts pale and membranous or subherbaceous in centre, with broad, brown-flecked membranous margins and apex, 10–12 mm long, inner bracts pale and membranous, with broad, brown-flecked membranous margins. *Flowers* pale canary-yellow with



Distribution of ***Romulea collina***.

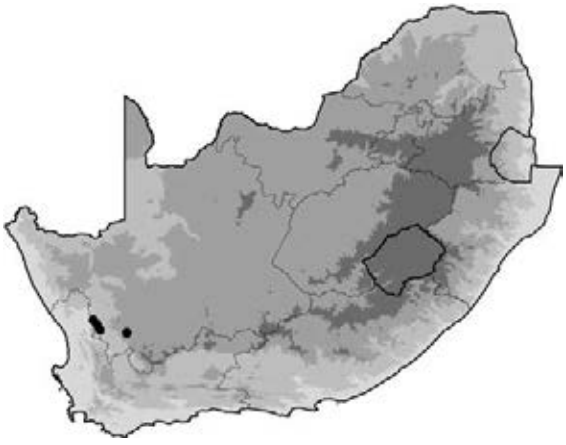
golden-yellow cup, outer tepals with dark median blotch or transverse zone in throat and feathered with maroon on reverse, inner tepals with narrow brownish maroon median line and diffuse transverse zone in throat; perianth tube funnel-shaped, ± 4 mm long; tepals oblanceolate, ± 20 × 7 mm. *Filaments* ± 6 mm long, pilose basally, yellow; anthers 2.5–3.0 mm long, yellow. *Style* dividing below anther apices, branches 1.5–2.0 mm long, deeply divided. *Capsules* subglobose, ± 8 mm long. *Flowering time*: late June to July.

Distribution and ecology: known from a single collection from the summit of the Hantamsberg near Calvinia in Northern Cape, South Africa; on seasonally moist clay flats in renosterveld shrubland.

Diagnosis: one of a small group of species in sect. *Roseae* with ± membranous or papery outer and inner bracts, and yellow flowers, among which it is distinguished by the rounded corm, numerous (7 to 9) leaves, and flowers with a golden-yellow cup marked with dark blotches and streaks around the throat.

75. **Romulea membranacea** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 227 (1972). Type: South Africa, [Northern Cape], Elandsfontein, 29 km NW of Middelpos, *Salter 3488* (BOL, holo.; BM, K, iso.).

Plants 30–100 mm high. *Corm* ovoid, 5–12 mm diam., pointed below, tunics woody, split into ± straight teeth converging on basal point. *Stem* subterranean. *Leaves* 6 to 10, all evidently basal, filiform, narrowly 4-grooved, ± 0.5 mm diam. *Peduncles* up to 4, semi-terete, recurving in fruit; outer bracts pale and membranous or subherbaceous in upper half, with broad, brown-flecked membranous margins and apex, 10–14 mm long, inner bracts pale and membranous, with broad, brown-flecked membranous margins. *Flowers* golden-yellow with 1 to 3 dark veins in throat, outer tepals blotched or striped brownish on reverse; perianth tube funnel-shaped, 3–5 mm long; tepals oblanceolate, 15–22 × 4–7 mm. *Filaments* 5–6 mm long, pilose basally, yellow; anthers 3–4 mm long, yellow. *Style* dividing below or at anther apices, branches divided. *Capsules* subglobose, ± 5 mm long. *Flowering time*: July, August.



Distribution of ***Romulea membranacea***.

Distribution and ecology: described from the Roggeveld west of Middelpos in Northern Cape, South Africa, but now also recorded from the southern Bokkeveld Escarpment; in washes on sandy or calcareous soils in renosterveld or succulent karoo shrublands.

Diagnosis: one of a handful of species with basally pointed corms, distinguished by the soft inner bract, subherbaceous only in the upper half, and with wide membranous margins and tips, and the golden-yellow flowers with darker veins in the throat.

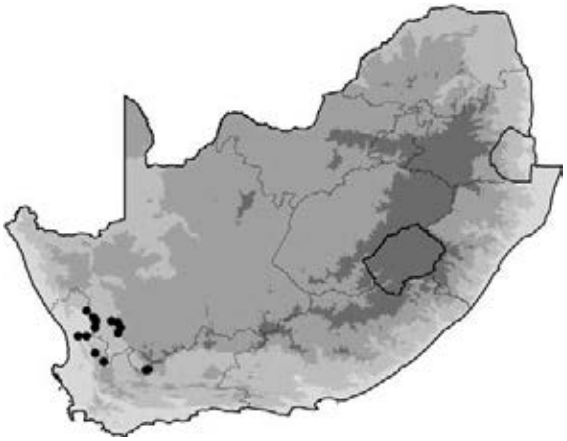
Ser. **Hirtae** *(Bég.) J.C.Manning & Goldblatt*, name at new rank. *Romulea* 'Stirps' *Hirtae* Bég. in Annuaire du Conservatoire du Jardin Botaniques de Genève: 159 (1908). *Romulea* sect. *Hirtae* (Bég.) M.P.de Vos: 269 (1972). Type: *R. hirta* Schltr.

Corms rounded and tunics with curved basal teeth. *Leaves* 4-winged with lateral ribs reduced and median ribs winged, glabrous or ciliate on wing margins; peduncles glabrous or pilose along angles. *Flowers* funnel-shaped; *outer* bracts with membranous margins and often prominent membranous tip.

76. **Romulea hirta** *Schltr.* in Botanische Jahrbücher für Systematik 27: 91 (1899); De Vos: 269 (1972). Type: South Africa, [Western Cape], Koudeberg, Wuppertal, *Schlechter 8766* (B, holo.; BM, K, P, S, Z, iso.).

Plants 50–150 mm high. *Corm* globose or obovoid, 8–15 mm diam., rounded or crested below, tunics woody, split into bent teeth below. *Stem* subterranean. *Leaves* 3 to 9, all evidently basal, 4-winged, lateral ribs reduced, median ribs marginally winged and glabrous or ciliate and sometimes also sparsely villous on margins, sometimes crisped, 2–5 mm wide. *Peduncles* up to 5, angled, glabrous or pilose on angles, recurved or suberect in fruit; outer bracts green or submembranous below, with narrow, usually brown-flecked, membranous margins, 10–18 mm long, closely ribbed (± 8 veins/mm), inner bracts with wide, brown-flecked membranous margins. *Flowers* pale yellow (rarely white), sometimes with golden-yellow cup, often with diffuse brownish or greenish transverse band in throat, rarely with brown blotches in throat, outer tepals greenish yellow on reverse; perianth tube funnel-shaped, 4–5 mm long; tepals oblanceolate or elliptic, 12–25 × 4–8 mm. *Filaments* 5–6 mm long, pilose basally or subglabrous, yellow; anthers 3–5, yellow. *Style* dividing opposite anthers. *Capsules* subglobose to oblong, up to 10 mm long. *Flowering time*: July to September.

Distribution and ecology: with a scattered distribution on the Bokkeveld Mountains around Nieuwoudtville, the Hantam Plateau around Calvinia (where white-flowered plants have been recorded as well as the usual yellow) and the Klein Roggeveld in Northern Cape, and the northern Cederberg in Western Cape, South Africa; in seasonally moist loam in renosterveld shrubland.



Distribution of ***Romulea hirta***.

Diagnosis: one of three species in the genus with similar, 4-winged leaves, often hairy on the wing margins, but the only one with this leaf type in sect. *Roseae* and also the only one with pale yellow flowers. The flowers often have an indistinct dark band in the throat but are only rarely (a single collection from the Nieuwoudtville Wildflower Reserve) marked with distinct black blotches.

The exact relationships of the species are not clear. There is a tendency for the bracts to develop prominent membranous apices as in ser. *Atrandrae*, and specimens with dark markings have been confused with *Romulea luteoflora* but the somatic chromosome number, $2n = 26$, is anomalous there and consistent with ser. *Bicarinatae*.

Ser. **Bicarinatae** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 274 (1972). Type: *R. sabulosa* Bég.

Spatalanthus Sweet: t. 300 (1829). *Romulea* subg. *Spatalanthus* [as *Spathalanthus*] (Sweet) Baker: 37 (1896). Type: *S. speciosus* Sweet = *Romulea monadelpha* (Sweet) Baker

[*Romulea* sect. *Spatalanthus* in Manning & Goldblatt: 98 (2001), invalid name without author.]

[*Romulea* ser. *Spatalanthus* in Manning & Goldblatt: 104 (2001), invalid name without author.]

Corms rounded, tunics with bent or curved basal teeth. *Leaves* terete or compressed-cylindric, 4-grooved, sometimes subfistulose. *Flowers* cup-shaped; *outer* bracts keeled in upper half, inner bracts strongly 2-keeled.

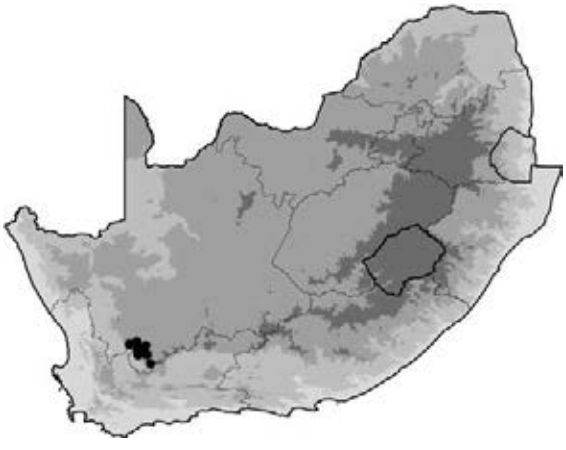
77. **Romulea subfistulosa** *M.P.de Vos* in Annale van die Universiteit van Stellenbosch, Reeks A, Wis-Natuurkunde 28(3): 66 (1952a); De Vos: 275 (1972). Type: South Africa, [Northern Cape], near Sutherland, *Joubert & De Vos 1585* (NBG [as STE], holo.).

Romulea vanzyliae M.P.de Vos: 284 (1972) [as ×*vanzyliae*]. Type: South African, Northern Cape, without precise locality, cultivated in Cape Town, *Van Zyl s.n.* (BOL, holo.; PRE, iso.).

Plants 50–150 mm high. *Corm* globose, rounded, 10–20 mm diam., oblique, tunics woody, splitting into curved teeth below. *Stem* subterranean. *Leaves* 4 to 9, basal, compressed-terete, arcuate or suberect, X-shaped and broadly 4-grooved to H-shaped with median ribs winged, 2–5 mm diam. *Peduncles* up to 3, angled, recurving but suberect in fruit; outer bracts green with narrow, colourless or brown-speckled membranous margins, 160–25 mm long, closely and heavily ribbed (8 to 10 veins/mm), usually with stouter midvein in upper half, inner bracts 2-keeled with stouter veins on keels, with colourless or brown-flecked membranous margins. *Flowers* cup-shaped, shiny carmine-pink with yellow cup and reddish black blotches in throat, extended as median line into cup, outer tepals with yellow longitudinal stripes and dark feathering on reverse; perianth tube cup-shaped, 3.0–5.5 mm long; tepals obovate, 25–50 × 10–17 mm long. *Filaments* inserted at base of tube, 4–6 mm long, pilose at base, yellow or purple to black; anthers 8–11 mm long, apically joined at first, yellow. *Style* dividing opposite middle of anthers, branches forked. *Capsules* oblong to subglobose, 8–10 mm long. *Flowering time*: (August) September (October).

Distribution and ecology: largely restricted to the Roggeveld in Northern Cape, South Africa, between Middelpos and Sutherland but also recorded from the Hantam Plateau east of Calvinia; on seasonally damp stony dolerite flats in open shrubland.

Diagnosis: the only member of ser. *Bicarinatae* with pink flowers with a yellow cup, *Romulea subfistulosa* is also readily distinguished by the several, subfistulose leaves 2–5 mm wide, either X-shaped and widely 4-grooved or more usually ± H-shaped with the median ribs winged. Plants from Calvinia were originally regarded as a hybrid with *R. sabulosa* (although *R. subfistulosa* was still then known only from the Roggeveld) but do not differ in any significant way from typical



Distribution of ***Romulea subfistulosa***.

R. subfistulosa and were assigned to this species by Manning & Goldblatt (2001).

78. **Romulea unifolia** *M.P.de Vos* in South African Journal of Botany 53: 247 (1987). Type: South Africa, [Northern Cape], Roggeveld Escarpment, Farm Fransplaas, *Oliver 8933* (NBG [as STE], holo.; K, MO, NBG, PRE, iso.).

Plants (50–)80–150 mm high. *Corm* globose, rounded, 10–20 mm diam., oblique, tunics woody, splitting into curved teeth below. *Stem* subterranean. *Leafs* 1, rarely up to 3 but then additional leaves much reduced, basal, compressed-terete, arcuate or spreading, subfistulose, broadly 4-grooved, 2–5 mm diam. *Peduncles* up to 3, angled; outer bracts green with narrow, colourless or brown-speckled membranous margins, 20–30 mm long, closely and heavily ribbed (8 to 10 veins/mm), usually with stouter midvein in upper half, inner bracts 2-keeled with stouter veins on keels, with colourless or brown-flecked membranous margins. *Flowers* cup-shaped, shiny orange to reddish orange with black blotch above yellow in throat, outer tepals with dark feathering on reverse; perianth tube cup-shaped, 3–5 mm long; tepals obovate-cuneate, (28–)30–45(–50) × 10–20 mm long. *Filaments* inserted at base of tube, 5–6 mm long, minutely pilose, blackish; anthers 9–12 mm long, apically joined at first, yellow. *Style* dividing opposite middle of anthers, branches forked. *Flowering time*: August, September.

Distribution and ecology: a local endemic of the Northern Cape, South Africa, originally and still best known from the Roggeveld to the west and south of Middelpos but also recorded on the Bokkeveld Plateau between Calvinia and Nieuwoudtville; restricted to dolerite flats in open shrubland.

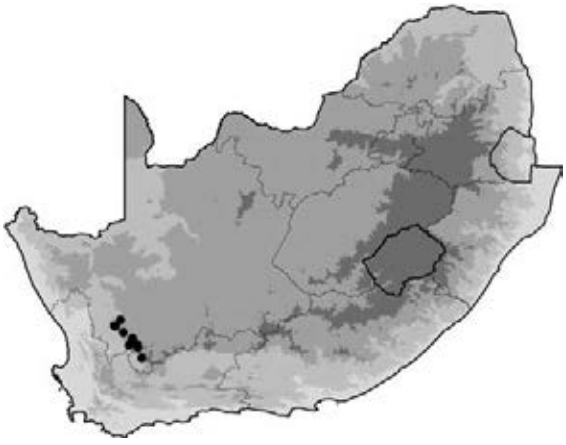
Diagnosis: distinctive in the genus in its mostly solitary leaf (rarely with an additional one or two much reduced leaves) and large, orange to reddish orange flowers with black and yellow markings in the cup. The basal leaf is thick and subfistulose, 2–4 mm wide and broadly 4-grooved.

79. **Romulea sabulosa** *Schltr. ex Bég.* in Botanische Jahrbücher für Systematik 38: 334 (1907); De Vos: 279 (1972). Type: South Africa, [Northern Cape], Bokkeveld Mtns, Oorlogskloof, *Schlechter 10964* (G, lecto., designated by De Vos: 281 (1972); B, BM, BOL, GRA, K, PRE, S, Z, isolecto.).

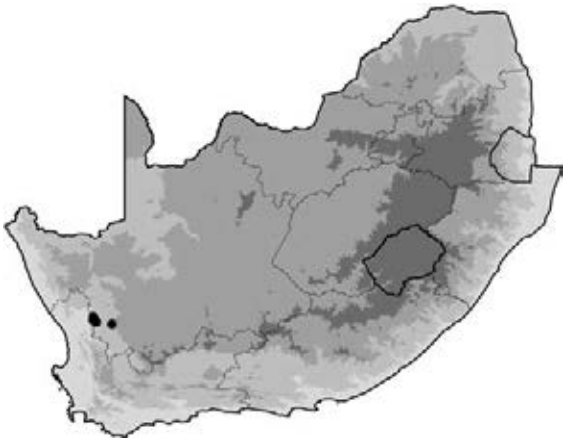
Plants 80–150(–200) mm high. *Corm* globose, rounded, 8–15 mm diam., oblique, tunics woody, splitting into curved teeth below. *Stem* subterranean. *Leaves* 3 to 5, all basal, terete, narrowly 4-grooved, ± 1 mm diam. *Peduncles* up to 4, terete, suberect in fruit; outer bracts green with narrow, usually black-blotched or ± entirely black membranous margins, 20–35 mm long, closely and heavily ribbed (8–10 veins/mm) with stouter midvein, inner bracts 2-keeled with stouter veins on keels, with colourless or brown-flecked membranous margins. *Flowers* cup-shaped, shiny scarlet or currant-red with elongated black markings in throat on greyish green or lilac background above a yellow V-shaped blotch, outer tepals with yellow lines and black feathering on reverse; perianth tube cup-shaped, 2–4 mm long; tepals obovate-cuneate, 25–40(–55) × 12–20(–25) mm long. *Filaments* inserted at base of tube, 3–5 mm long, triangular, glabrous or sparsely pilose, whitish to dark; anthers 8–12 mm long, apically joined at first, yellow or purplish with yellow pollen. *Style* dividing opposite middle of anthers, branches forked, whitish. *Capsules* oblong, ± 15 mm long. *Flowering time*: (July) August (September).

Distribution and ecology: a narrow endemic of the Bokkeveld Mtns around Nieuwoudtville in Northern Cape, South Africa; on seasonally moist loamy tillite flats in renosterveld shrubland.

Diagnosis: one of three species in ser. *Bicarinatae* with large, glossy red to orange, cup-shaped flowers, *Romulea sabulosa* is distinguished from *R. unifolia* by the several, narrow leaves ± 1 mm diam. and scarlet to currant-red flowers, and from *R. monadelpha* by the free



Distribution of ***Romulea unifolia***.



Distribution of ***Romulea sabulosa***.

stamens, widened toward the base and tapering above. It is ecologically separated from these two species, both restricted to heavy clay soils derived from dolerite, by its preference for loamy tillite.

80. **Romulea monadelpha** *(Sweet ex Steud.) Baker*, Handbook of the Irideae: 104 (1892); De Vos: 283 (1972) [not *R. speciosa* (Andrews) Baker (1877)]. *Spatalanthus speciosus* Sweet: t. 300 (1829). *Trichonema monadelphum* Sweet ex Steud.: 702 (1841) [as a new name for *Spatalanthus speciosus* Sweet, not *Trichonema speciosum* Ker Gawl (1804)]. Type: South Africa, without precise locality or collector, illustration in Sweet: t. 300 (1829).

Plants (50–)80–150 mm high. *Corm* globose, rounded, 10–20 mm diam., oblique, tunics woody, splitting into curved teeth below. *Stem* subterranean. *Leaves* 3 to 8, basal, terete, narrowly 4-grooved, 1–2 mm diam. *Peduncles* up to 4, angled, curved in fruit; outer bracts green with narrow, colourless or ± entirely black membranous margins, 20–30 mm long, closely and heavily ribbed (8 to 10 veins/mm), usually with stouter midvein in upper half, inner bracts 2-keeled with stouter veins on keels, with colourless or brown-flecked membranous margins. *Flowers* cup-shaped, shiny strawberry or claret-red with black blotch on pale greyish or purple background above yellow mark (sometimes with black median line) in throat, outer tepals with dark feathering on reverse; perianth tube bowl-shaped, 2–3 mm long; tepals obovate-cuneate, 25–40(–45) × 12–25 mm long. *Filaments* inserted at base of tube, 3–6 mm long, either oblong and longitudinally appressed or connate in stout cylindric collar, glabrous or pilose basally, blackish; anthers 10–15 mm long, apically joined at first, yellow or purplish with yellow pollen. *Style* dividing opposite base to middle of anthers, branches forked. *Capsules* oblong, 10–15 mm long. *Flowering time*: August, September.

Distribution and ecology: endemic to Northern Cape, South Africa, on the Bokkeveld Plateau from Nieuwoudtville to Calvinia and southward along the Roggeveld to Middelpos; restricted to seasonally moist dolerite flats in open shrubland.

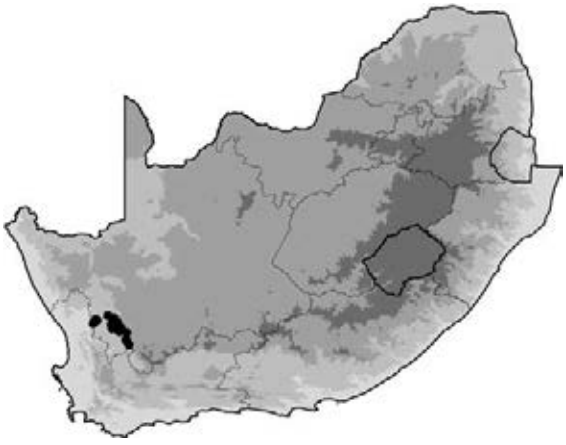
Diagnosis: the type and all subsequent collections from the Bokkeveld Plateau are diagnosed by the filaments fused into a stout, smooth, cylindric column, but collections from the Roggeveld have oblong, closely appressed but free filaments bearded basally. These populations may be confused with *R. sabulosa*, but that species has the filaments triangular in section and distinctly tapered above, and ± terete peduncles.

81. **Romulea viridibracteata** *M.P.de Vos* in Journal of South African Botany, Suppl. 9: 277 (1972). Type: South Africa, [Western Cape], Pakhuis Pass, *Salter 3652* (BOL, holo.; BM, K, iso.).

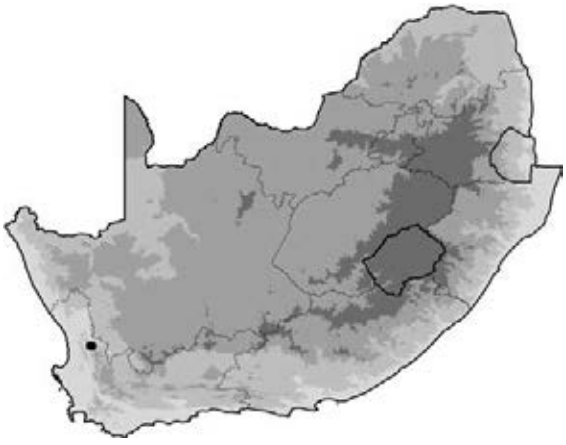
Plants 80–100 mm high. *Corm* globose, rounded, 7–15 mm diam., oblique, tunics woody, splitting into curved teeth below. *Stem* subterranean. *Leaves* 3 to 5, all basal, terete, narrowly 4-grooved, 0.8–2.0 mm diam. *Peduncles* up to 4, terete, suberect in fruit; outer bracts green with narrow, black-blotched membranous margins and brown-flecked membranous apices, 17–30 mm long, closely and heavily ribbed (8 to 10 veins/mm), often with stouter mid-vein in upper half, inner bracts 2-keeled with stouter veins on keels, with colourless or brown-flecked membranous margins. *Flowers* cup-shaped, bright yellow with black, 3-toothed markings in throat and black flecks at base, outer tepals blackish on reverse; perianth tube cup-shaped, 2–4 mm long; tepals obovate, 20–35 × 6–10 mm long. *Filaments* inserted at base of tube, 4–5 mm long, pilose; anthers 6–9 mm long, apically joined at first. *Style* dividing opposite upper half of anthers, branches forked. *Capsules* oblong, 15 mm long. *Flowering time*: August, September.

Distribution and ecology: a local endemic of Western Cape, South Africa, known only from the top of Pakhuis Pass; in renosterveld shrubland.

Diagnosis: the only member of ser. *Bicarinatae* with yellow flowers, distinguished from other species in



Distribution of ***Romulea monadelpha***.



Distribution of ***Romulea viridibracteata***.

the genus with yellow flowers blotched with brown in the throat by the large size of the flowers and by the strongly ribbed inner and outer bracts, the inner bracts 2-keeled with the keel veins stouter than the others. The black-chequered bract margins are characteristic.

Ser. **Lomurea** *(M.P.de Vos) J.C.Manning & Goldblatt*, name at new rank. *Romulea* subg. *Lomurea* M.P.de Vos in Journal of South African Botany, Suppl. 9: 285 (1972). Type: *Romulea syringodeoflora* M.P.de Vos

[*Romulea* sect. *Lomurea* in M.P.de Vos: 287 (1972), invalid name without author.]

Corms rounded and tunics with curved basal teeth. *Flowers* salver-shaped, tube 15–30 mm long. *Chromosome number* 2*n* = 20.

82. **Romulea syringodeoflora** *M.P.de Vos* in Annale van die Universiteit van Stellenbosch, Reeks A, Wis-Natuurkunde 28(3): 74 (1952a); De Vos: 287 (1972). Type: South Africa, [Northern Cape], near Sutherland, *De Vos 1587* (NBG [as STE], holo.).

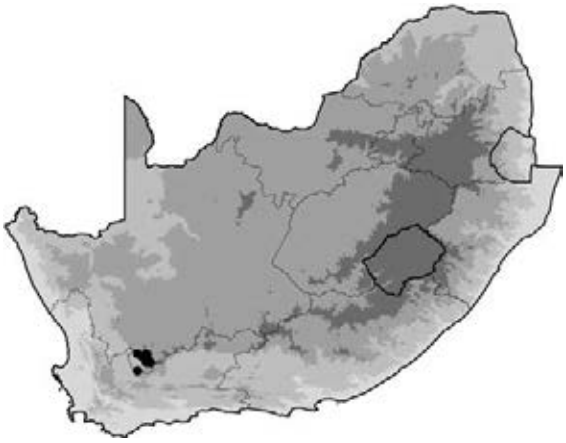
Plants 20–50 mm high. *Corm* globose, rounded, 10–15 mm diam., oblique, tunics woody, splitting into curved teeth below, with fibrous neck 20–50 mm long. *Stem* subterranean. *Leaves* 5 to 7, all basal, arcuate or spreading, terete, narrowly 4-grooved, 1.5–2.5 mm diam., median ribs glabrous or ciliate on margins with hairs up to 0.5 mm long. *Peduncles* up to 5, usually shortly exserted, terete; outer bracts green with narrow, colourless membranous margins, 15–20 mm long, closely ribbed (8 to 10 veins/mm), inner bracts with broad colourless membranous margins. *Flowers* salver-shaped, magenta to dark pink with yellowish throat outlined with red or purple, tepals feathered purple on reverse, tube longitudinally banded with purple and yellow; perianth tube cylindric, 15–22 mm long; tepals narrowly elliptic, spreading, 10–17 × 3–5 mm long. *Filaments* inserted at mouth of tube, 4–5 mm long, glabrous, white; anthers 4–6 mm long, dark purple; pollen reddish brown. *Style* dividing near anther apices, branches ± 2 mm long, divided ± halfway. *Flowering time*: September, October.

Distribution and ecology: endemic to the Roggeveld Escarpment in Northern Cape, South Africa, from west of Sutherland to the Komsberg; on seasonally wet clay flats in renosterveld shrubland.

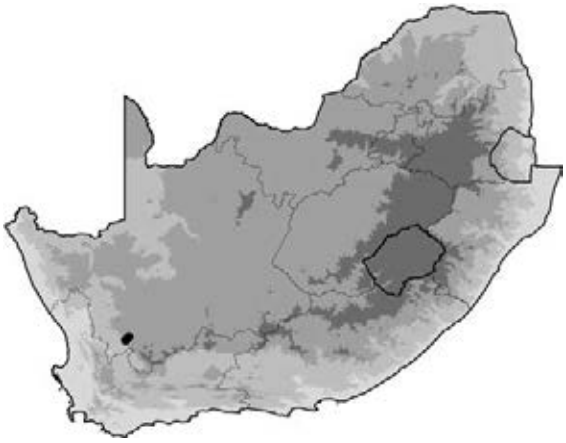
Diagnosis: recognised by the rounded corm, arched or abruptly spreading, smooth or shortly ciliate leaves and pink to magenta, salver-shaped flowers with perianth tube 15–22 mm long.

83. **Romulea albiflora** *J.C.Manning & Goldblatt* in Adansonia, ser. 3, 23: 106 (2001). Type: South Africa, [Northern Cape], Roggeveld Escarpment, Farm Blomfontein, west of Middelpos, *Goldblatt & Manning 10367* (NBG, holo.; K, MO, PRE, S, WAG, iso.).

Plants 50–80(–120) mm high, often clump-forming. *Corm* globose, rounded, 8–10 mm diam., oblique, tunics woody, splitting into curved teeth below, with fibrous neck 20–50 mm long. *Stem* subterranean. *Leaves* ± 5, all basal, suberect and ± straight, up to twice as long as flowering stems, terete or compressed, narrowly 4-grooved, 1.5–2.0 mm diam., median ribs softly villous on margins with hairs up to 1 mm long. *Peduncles* up to 5, well exserted, terete; outer bracts green with narrow, colourless membranous margins, 18–25 mm long, closely ribbed (8 to 10 veins/mm), inner bracts with broad colourless membranous margins. *Flowers* salver-shaped, white with yellowish throat outlined with purple, tepals flushed mauve and feathered purple on reverse, tube longitudinally banded with purple and yellow; perianth tube cylindric, 20–33 mm long; tepals narrowly elliptic, spreading, 12–20 × 2.5–4.0 mm long. *Filaments* inserted at mouth of tube, ± 4 mm long, glabrous, white; anthers 6–7 mm long, dark purple; pollen reddish brown. *Style* dividing near anther apices, branches ± 2 mm long, divided ± halfway. *Flowering time*: September, October.



Distribution of ***Romulea syringodeoflora***.



Distribution of ***Romulea albiflora***.

Distribution and ecology: a narrow endemic of the Roggeveld Escarpment west of Middelpos in Northern Cape, South Africa; on seasonally moist clay flats in renosterveld shrubland.

Diagnosis: occurring north of *Romulea syringodeoflora* and distinguished from it by the longer, suberect and softly villous leaves with hairs up to 1 mm long and white, salver-shaped flowers with perianth tube 30–33 mm long.

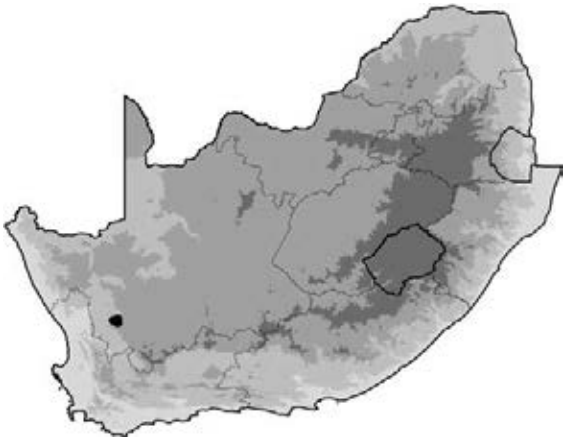
Ser. **Tubiformes** *J.C.Manning & Goldblatt*, new series. Type: *Romulea hantamensis* (Diels) Goldblatt

[*Romulea* ser. *Tubiformes* in Manning & Goldblatt: 97 (2001), invalid name without author.]

Corms pointed downward, tunics with straight basal teeth. *Flowers* salver-shaped, tube 35–70 mm long. *Chromosome number* 2*n* = 30.

84. **Romulea hantamensis** *(Diels) Goldblatt* in Flowering Plants of Africa 41: t. 1613 (1970); De Vos: 289 (1972). *Lapeirousia hantamensis* Diels: 116 (1909). Type: South Africa, [Northern Cape], Calvinia, Hantamsberg, *Diels 732* (B, holo.).

Plants 70–150 mm high. *Corm* ovoid and pointed at base, 8–15 mm diam., oblique, tunics woody with straight or slightly curved teeth converging to basal point. *Stem* subterranean. *Leaves* ± 6 to 10, arcuate or spreading, all basal, terete, narrowly 4-grooved, 1.0–1.5 mm diam. *Peduncles* up to 5, not or very shortly exserted from leaf bases, remaining erect in fruit; outer bracts green flushed purple at base with narrow colourless membranous margins, 28–35 mm long, sheathing lower part of perianth tube, closely ribbed (8 to 10 veins/mm), inner bracts with wider, colourless or brown-speckled membranous margins. *Flowers* salver-shaped, dull pink or magenta to purple (rarely white) with dark blotch in distal third and dark veins and white throat, outer tepals greenish with purple veins on reverse; perianth tube cylindric, 35–70 mm long; tepals elliptic, spreading, 10–14 × 3–5 mm. *Filaments* inserted near top of tube, exserted, 3 mm long, glabrous, white; anthers 3–5 mm long, purple-striped with whitish pollen. *Style* dividing just below to just beyond anther apices. *Capsules* oblong, 12–15 mm long, borne above ground. *Flowering time*: August, September.



Distribution of ***Romulea hantamensis***.

Distribution and ecology: a narrow endemic restricted to the summit plateau of the Hantamsberg near Calvinia in Northern Cape, South Africa; on seasonally wet dolerite flats and rock sheets in renosterveld. The distinctive flowers are adapted to pollination by the long-proboscid fly *Prosoeca* sp. (Nemestrinidae).

Diagnosis: one of the most distinctive species in the genus, *Romulea hantamensis* has salver-shaped, pink to purple flowers with the tepals strikingly marked and veined with purple with white streaks, and a cylindric perianth tube 30–70 mm long, partially concealed by long bracts 28–35 mm long. The diploid chromosome number 2*n* = 30 is unique in sect. *Roseae* although recorded for several species in sections *Romulea* and *Aggregatae*.

UNCERTAIN SPECIES

Ixia bulbocodioides D.Delaroche, Descriptiones plantarum aliquot novarum: 19 (1766). *Romulea bulbocodioides* (D.Delaroche) Eckl.: 18 (1827). Type: Unknown and identity uncertain but applied by Ecklon: 18 (1827) and Baker: 88 (1877) and later authors to *R. flava*.

Ixia fugax Hornem., Hortus regius botanicus Hafniensis 1: 50 (1813), illegitimate homonym, not *I. fugax* Salisb. (1796). Type: South Africa, without precise locality, *Masson s.n.* (possibly cultivated), (C, holo.). Identity uncertain.

Romulea barbata Baker in Journal of Botany, British and foreign 14: 236 (1876). Type: coloured drawing in Lindley Library of the Royal Horticultural Society, London, named '*Trichonema barbatum* W. Herb. (ined).' It shows a plant with elongated stem and lilac flowers with narrow tepals and style overtopping the stamens. Possibly a horticultural form.

Romulea dielsii Bég. in Malpighia 23: 96 (1909). Type: *Diels 146* (B), not found and probably destroyed. Identity unknown.

Romulea tubata Klatt in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 401 (1882). Type: *Drège 2636* (Lübeck), not seen and probably destroyed. The species is described as having an elongated stem and yellow flowers with a perianth tube twice as long as the tepals. Identity unknown.

[*Romulea zeyheri* Eckl.: 19 (1827), invalid name without description. *Trichonema zeyheri* Eckl. ex Steud.: 702 (1841), invalid name without description. Evidently based on a *Geissorhiza* species, its identity is uncertain.]



Plate 67. A, ***Romulea atrandra***, Sutherland, NC; B, ***R. austinii***, Matjiesfontein, WC; C, ***R. citrina***, Kamieskroon, NC; D, ***R. dichotoma***, Caledon, WC; E, ***R. dichotoma***, Napier, WC; F, ***R. diversiformis***, Sutherland, NC; G, ***R. eburnea***, Sutherland, NC; H, ***R. eximia***, Darling, WC; I, ***R. flava***, Cape Town, WC.

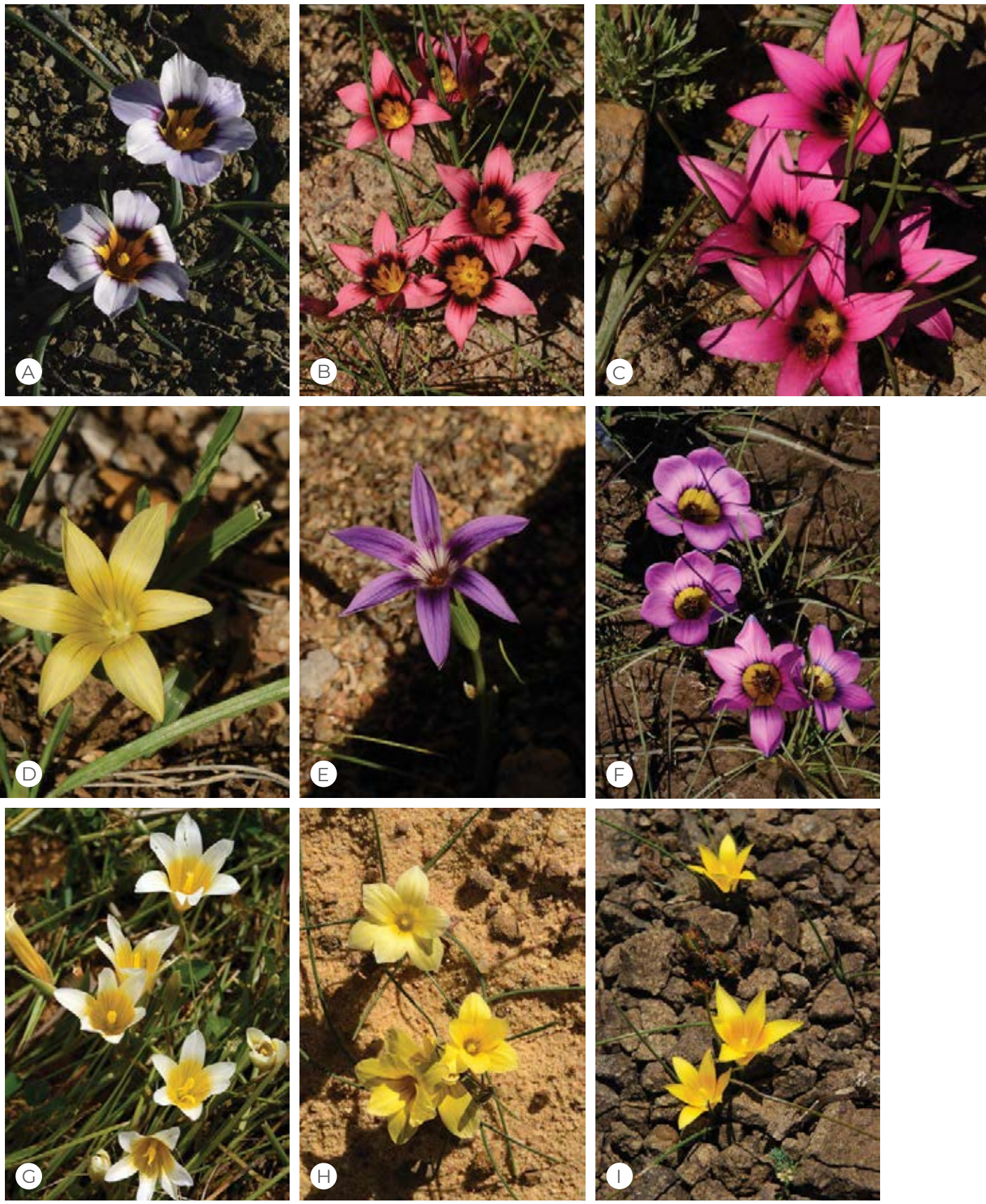


Plate 68. A, ***Romulea hallii***, Sutherland, NC; B, ***R. hirsuta***, Darling, WC; C, ***R. hirsuta***, Hermon, WC; D, ***R. hirta***, Calvinia, NC; E, ***R. kamisensis***, Kamiesberg, NC; F, ***R. komsbergensis***, Sutherland, NC; G, ***R. leipoldtii***, Porterville, WC; H, ***R. luteoflora***, Nieuwoudtville, NC; I, ***R. macowanii***, Rhodes, EC;



Plate 69. A, ***Romulea monadelpha***, Calvinia, NC; B, ***R. montana***, Nieuwoudtville, NC; C, ***R. multifida***, Sutherland NC; D, ***R. namaquensis***, Kamieskroon, NC; E, ***R. obscura***, Cape Town, WC; F, ***R. obscura***, Struisbaai, WC; G & H, ***R. quartzicola***, Vredendal, WC.



Plate 70. A, ***Romulea pudica***, Nieuwoudtville, NC; B, ***R. rosea*** subsp. ***rosea***, Napier, WC; C, ***R. sabulosa***, Nieuwoudtville, NC; D, ***R. sanisensis***, Sani Pass, KZN; E, ***R. schlechteri***, Grotto Bay, WC; F, ***R. schlechteri***, Mamre, WC; G, ***R. setifolia***, Worcester, WC; H, ***R. speciosa***, Kamiesberg, NC; I, ***R. stellata***, Gifberg, WC.



Plate 71. A, ***Romulea subfistulosa***, Sutherland, NC; B, ***R. syringodeoflora***, Sutherland, NC; C, ***R. tabularis***, Darling, WC; D, ***R. tetragona***, Sutheraland, WC; E, ***R. triflora***, Cape Town, WC; F, ***R. tortuosa***, Nieuwoudtville, NC; G, ***R. tortuosa***, Sutherland, NC; H, ***R. unifolia***, Middelpos, NC.

REFERENCES

ADANSON, M. 1763. *Familles des plantes*, vol. 2. Paris.

ANDREWS, H. 1797. *Ixia reflexa*. Reflex flowered ixia. *The Botanist's Repository* 1: t. 14.

ANDREWS, H. 1801a. *Ixia speciosa*. Deep crimson ixia. *The Botanist's Repository* 3: t. 186.

ANDREWS, H. 1801b. *Ixia bulbocodium* var. *flore speciosissimo. The Botanist's Repository* 3: t. 170.

BAKER, J.G. 1876. New species of Ixieae. *Journal of Botany, British and foreign* 14: 236–239.

BAKER, J.G. 1877. Systema Iridacearum. *Journal of the Linnean Society, Botany* 16: 61–104, 141–180.

BAKER, J.G. 1892. *Handbook of the Irideae*. London.

BAKER, J.G. 1896. Iridaceae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–71. Reeve, Ashford.

BAKER, J.G. 1897. Diagnoses Africanae X. *Bulletin of Miscellaneous Information, Kew* 1897: 243–300.

BAKER, J.G. 1904. Iridaceae. *Bulletin de l' Herbier Boissier*, sér. 2, 4: 1003–1007.

BAKER, J.G. 1906. *Romulea torta & R. rubrolutea*. *Bulletin of Miscellaneous Information, Kew* 1906: 24, 25.

BÉGUINOT, A. 1907. Diagnoses Romulearum novarum vel minus cognitarum. *Botanische Jahrbücher für Systematik* 38: 322–339.

BÉGUINOT, A. 1908. Revisione delle "Romulea" dell' erbario Delessert (Ginevra). *Annuaire du Conservatoire du Jardin Botaniques de Genève* 11–12: 144–163.

BÉGUINOT, A. 1909. Revisione monographica del genre *Romulea* Maratti. *Malpighia* 23: 55–117, 185–239, 275–296.

BOLUS, L. 1928. Plants—new and noteworthy. *South African Gardening and Country Life* 18: 341, 342.

BOLUS, L. 1931. Novitates Africanae. *Journal of Botany, British and foreign* 69: 10–15.

BROWN, N.E. 1929. The Iridaceae of Burman's Florae capensis Prodromus. *Bulletin of Miscellaneous Information, Kew* 1929: 129–139.

BROWN, N.E. 1932. *Romulea setifolia* & *R. muirii*. *The Gardeners' Chronicle*, ser. 3, 92: 467.

BURMAN, N.L. 1768. *Flora indica*: *cui accedit series zoophytorum indicorum, nec non Prodromus florae capensis*. Cornelius Haak, Leiden.

BURTT, B.L. 1967. *Romulea longituba* var. *alticola*. *Curtis's Botanical Magazine* 176: t. 515.

CUFODONTIS, G. 1972. Enumeratio plantarum Aethiopiae: Spermatophyta. *Bulletin du Jardin Botanique Nationale de Belgique* 42, Suppl.

DELAROCHE, D. 1766. *Descriptiones plantarum aliquot novarum*. Leiden.

DE VOS, M.P. 1952a. Nuwe en minder bekende *Romulea*-spesies van die Roggeveld. Annale van die Universiteit van Stellenbosch, Reeks A, Wis-Natuurkunde: 59–80.

DE VOS, M.P. 1952b. *Romulea atrandra* var. *luteoflora*. *Flowering Plants of Africa* 29: t. 1135.

DE VOS, M.P. 1952c. *Romulea tetragona*. *Flowering Plants of Africa* 29: t. 1136.

DE VOS, M.P. 1955. Enkele nuwe Romulea-spesies. *Journal of South African Botany* 21: 101–108.

DE VOS, M.P. 1970. Bydrae tot die morfologie en anatomie van *Romulea*. 2. Blare. *Journal of South African Botany* 36: 271–286.

DE VOS, M.P. 1972. The genus *Romulea* in South Africa. *Journal of South African Botany*, Suppl. 9: 1–307.

DE VOS, M.P. 1983. *Romulea*. In O.A. Leistner (ed), *Flora of southern Africa* 7(2, 2): 10–76. Botanical Research Institute, Pretoria.

DE VOS, M.P. 1987. A new species of *Romulea* (Iridaceae) from the Great Roggeveld Plateau, Cape Province. *South African Journal of Botany* 53: 247, 248.

DIELS, L. 1909 ['1910']. *Lapeirousia hantamensis*. *Botanische Jahrbücher für Systematik* 44: 116.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.

EWART, A.J. 1907. Contribution to the flora of Australia. *Proceedings of the Royal Society of Victoria* 19: 33–44.

EWART, A.J. 1931. *Flora of Victoria*. Melbourne University Press.

GOLDBLATT, P. 1970. *Romulea hantamensis*. *Flowering Plants of Africa* 41: t. 1613.

GOLDBLATT, P. 1993. Iridaceae. In G.V. Pope (ed), *Flora zambesiaca* 12 (4): 1–106.

GOLDBLATT, P. 1996. Iridaceae. In R.M. Polhill (ed), *Flora of tropical East Africa* Iridaceae: 1–89.

GOLDBLATT, P. & BARNARD, T.T. 1970. The Iridaceae of Daniel de la Roche. *Journal of South African Botany* 36: 291–317.

GOLDBLATT, P., BERNHARDT, P. & MANNING, J.C. 2002. Floral biology of *Romulea* (Iridaceae: Crocoideae): a progression from a generalist to a specialist pollination system. *Adansonia* 24: 243–262.

GRONOVIUS, J.F. 1755. *Flora orientalis*. Wilhelm de Groot, Leiden.

HARMS, H. 1894. *Romulea campanuloides*. *Botanische Jahrbücher für Systematik* 19, Beibl. 47: 28.

HORNEMANN, J.W. 1813. *Hortus regius botanicus Hafniensis*, vol. 1. Copenhagen.

HOUTTUYN, M. 1782. Handleiding tot de plant- en kruitkunde, vol. 12: 42. t. 78, f. 4. Lodewijk van Es, Amsterdam.

JACQUIN, N.J. 1788–1795 ['1786–1793']. *Icones plantarum rariorum*, vol. 2. C.F. Wappler, Vienna.

JACQUIN, N.J. 1791 ['1790']. *Collectanea*, vol. 4. C.F. Wappler, Vienna.

JORDAN, C.T.A. & FOURREAU, J.P. 1868. *Breviarum plantarum novarum*. Savy, Paris.

KER GAWLER, J.B. 1802. *Trichonema cruciatum*. *Curtis's Botanical Magazine* 16: t. 575.

KER GAWLER, J.B. 1804 ['1805']. Ensatarum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.

KER GAWLER, J.B. 1809. *Trichonema roseum*. Rose trichonema. *Curtis's Botanical Magazine* 30: t. 1225.

KER GAWLER, J.B. 1810. *Trichonema pudicum*. Blush trichonema. *Curtis's Botanical Magazine* 31: t. 1244.

KER GAWLER, J.B. 1811. *Trichonema caulescens*. Caulescent trichonema. *Curtis's Botanical Magazine* 31: t. 1392.

KER GAWLER, J.B. 1812. *Trichonema speciosa*. Crimson trichonema. *Curtis's Botanical Magazine* 36: t. 1476.

KER GAWLER, J.B. 1827. *Iridearum genera*. Brussels.

KLATT, F.W. 1866. Revisio Iridearum. *Linnaea* 34: 537–689.

KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.

KUNTZE, O. 1891. *Revisio generum plantarum*, vol. 2. Leipzig.

LAMARCK, J.B.A.M. de. 1789. *Encyclopedie Methodique Botanique*, vol. 3. Paris.

LAMARCK, J.B.A.M. de. 1791. *Illustration des genres*, vol. 1. Paris.

LAMARCK, J.B.A.M. de. 1813. *Encyclopedie Methodique Botanique*, Suppl. 3. Paris.

LEWIS, G.J. 1934. *Romulea atrandra*. *Flowering Plants of South Africa* 14: t. 544.

LEWIS, G.J. 1938. Eight new Iridaceae from the Cape Province. *Journal of South African Botany* 4: 1–11.
LEWIS, G.J. 1941. New genera and species and miscellaneous notes. *Journal of South African Botany* 7: 19–59.
LINNAEUS, C. 1737. *Genera plantarum*. Leipzig.
LINNAEUS, C. 1753. *Species plantarum*. Stockholm.
LINNAEUS, C. 1767. *Systema naturae*: *Mantissa plantarum* [1]: 75. Salvius, Stockholm.
MARATTI, D.J.F. 1772. *Plantarum Romuleae et Saturniae*. Rome.
MANNING, J.C. & GOLDBLATT, P. 2001. A synoptic review of *Romulea* (Iridaceae: Crocoideae) in sub-Saharan Africa, the Arabian Peninsula and Socotra including new species, biological notes, and a new infrageneric classification. *Adansonia* ser. 3, 23: 59–108.
MANNING, J.C. & GOLDBLATT, P. 2004. Two new species of *Romulea* (Iridaceae: Crocoideae) from the western Karoo, Northern Cape and notes on infrageneric classification and range extensions. *Bothalia* 34: 17–22.
MANNING, J.C. & GOLBLATT, P. 2006. New species of Iridaceae from the Hantam-Roggeveld Centre of Endemism, and the Bokkeveld, Northern Cape, South Africa. *Bothalia* 36: 139–146. MANNING, J.C. & GOLDBLATT, P. 2008. *Romulea lutea* and *R. tubulosa* (Iridaceae: Crocoideae), two new species from Namaqualand, South Africa. *Bothalia* 38: 78–82.
MANNING, J.C. & GOLDBLATT, P. 2014. *Romulea alticola* and *R. monophylla* (Iridaceae: Crocoideae), two new species from Western Cape, South Africa. *South African Journal of Botany* 95:131–134.
MANNING, J.C., GOLDBLATT, J.C. & HARROWER, A.D. 2011. *Romulea pilosa* and *R. quartzicola* (Iridaceae: Crocoideae), two new species from the southern African winter rainfall region, with nomenclatural corrections including new names for *R. amoena*, *R, neglecta* and *R. rosea* var. *reflexa*. *Bothalia* 41: 269–276.
MARAIS, W. 1964. *Romulea leipoldtii*. *Curtis's Botanical Magazine* 175: t. 460.
MILLER, P. 1760. *Figures of plants described in the Gardener's Dictionary*. London.
PHILLIPS, E.P. 1923. *Romulea austinii*. *Flowering Plants of South Africa* 3: t. 90.
PLANCHON, J.E. 1853. *Flores des serres et des jardines de l'Europe*, vol. 8.
REDOUTÉ, P.J. 1809. *Les Liliacées*, vol. 5. Paris.
RENDLE, A.B. 1895. A contribution to the flora of eastern tropical Africa. *Journal of the Linnean Society, Botany* 30: 376–401.
ROEMER, J.J. & SCHULTES. J.A. 1817. *Systema vegetabilium*, vol. 1. J.G. Cotta, Stuttgart.
SALISBURY, R. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.
SCHINZ, H. 1895. Beiträge zur Kenntnis der Afrikanischen Flora. Iridaceae: *Romulea schlechteriana*. *Bulletin de l'Herbier Boissier*, sér. 1, 3: 395.
SCHLECHTER, R. 1898. Decades plantarum novarum austro-Africanum. *Journal of Botany, British and foreign* 36: 314–318, 373–378.
SCHLECHTER, R. 1899 ['1900']. Plantae Schlechterianae novae vel minus cognitae describuntur 2. *Botanische Jahrbücher für Systematik* 27: 90, 91.
SCHULTES, J.A. 1822. *Mantissa systematis vegetabilium*, vol. 1, Cotta, Stuttgart.
SPRENGEL, K. 1824 ['1825']. *Systema vegetabilium*, edn. 16, vol. 1. Göttingen.
STEUDEL, E.G. 1841. *Nomenclator botanicus*, edn. 2, vol. 2. J.G. Cotta, Stuttgart & Tübingen.
SWEET, R. 1829. *Spatalanthus speciosus*. *The British Flower Garden* 3: t. 300. London.
TENORE, M. 1842. *Index seminum*. Naples.
TENORE, M. 1845. *Catalogo Orto botanico di Napoli*. Naples.
THUNBERG, C.P. 1783. *Dissertatio de Ixia*. Uppsala.
THUNBERG, C.P. 1784. *Dissertatio de Gladiolo*. Uppsala.
THUNBERG, C.P. 1811. *Flora capensis*, vol. 1. Edman, Uppsala.
VAHL, M. 1805. *Enumeratio plantarum*, vol. 2. Copenhagen.
WOLLEY-DOD, A.H. 1900. New Cape plants. *Journal of Botany, British and foreign* 38: 170, 171.

31. Afrocrocus

Afrocrocus *J.C.Manning & Goldblatt* in Goldblatt & Manning, The Iris Family: 160 (2008). Type: *A. unifolius* (Goldblatt) Goldblatt & J.C.Manning

Syringodea subg. *Rhipidopsis* M.P.de Vos: 249 (1974). Type: *S. unifolia* Goldblatt = *Afrocrocus unifolius* (Goldblatt) Goldblatt & J.C.Manning

Named for its resemblance to the Northern Hemisphere genus *Crocus* and its occurrence in Africa.

Acaulescent, deciduous geophytes. *Corm* asymmetric, laterally compressed and lens-shaped with wide, fan-shaped basal ridge, axial in origin; tunics woody, splitting into fine parallel fibrils on basal ridge and into a fibrous neck at apex. *Cataphylls* 2, membranous. *Stem* short and subterranean, hidden by leaf bases. *Leaves* one or rarely two, largely bifacial, falcate with dorsal groove but shortly unifacial distally and subterete at apex, smooth or margins ciliolate. *Inflorescence* of solitary, sessile flowers terminal on axes; bracts largely membranous, outer subhyaline and minutely brown-flecked but greenish distally in midline, tubular below, acute, inner similar but two-veined and apically notched, greenish distally along veins. *Flowers* actinomorphic, long-lived, salver-shaped, blue to mauve or white, with greenish yellow or orange markings at base of tepals, unscented, opening in warm weather, nectar from septal nectaries; perianth tube elongate, narrowly trumpet-shaped; tepals subequal, spreading, obovate, concave, subacute. *Stamens* suberect, inserted near top of tube, exserted; anthers diverging, yellow. *Ovary* subterranean, ellipsoid; style filiform, 3-branched distally, branches oblanceolate, longitudinally folded, apex lacerate or shortly multifid. *Capsules* borne at ground level, ellipsoid, cartilaginous. *Seeds* subglobose, testa rugulose, glossy dark brown. *Pollen grains* globose, trizonasulculate, exine punctuate-scabrate. *Basic chromosome number x* = 11.

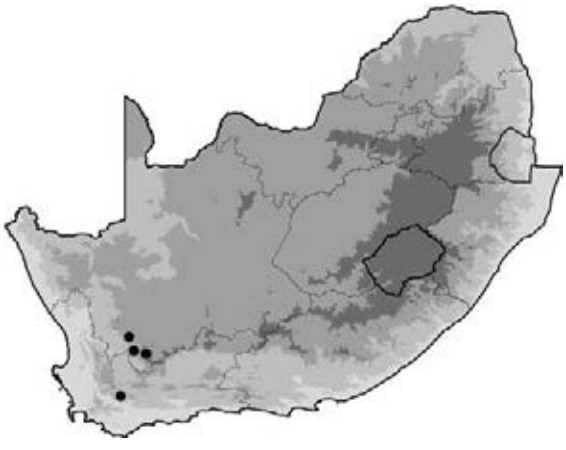
Species 1, only *Afrocrocus unifolius*; South Africa, semi-arid, winter-rainfall western Karoo in Northern Cape and interior Western Cape.

Afrocrocus is closely allied to the genus *Syringodea* and placed as sister to it in molecular analyses. It was initially included in *Syringodea* as the monotypic subg. *Rhipidopsis* but numerous morphological and anatomical differences between *S. unifolia* and the remaining *Syringodea* species prompted Goldblatt & Manning (2008) to treat it as the separate genus *Afrocrocus*. It is distinguished from *Syringodea* by several derived character states, notably the laterally compressed corm with subdermal sclerenchyma layers differentiated into an outermost layer of anticlinally oriented, plate-like platysclereids and a multiseriate inner layer of periclinally oriented, fusiform sclereids; the presence of a dorsal strand of subdermal collenchyma in the leaf, forming a longitudinal window in the adaxial groove; and by its trizonasulculate pollen. The loculicidal capsule, in contrast, represents the ancestral condition compared with the hygroscopic, septicidal capsules in *Syringodea*.

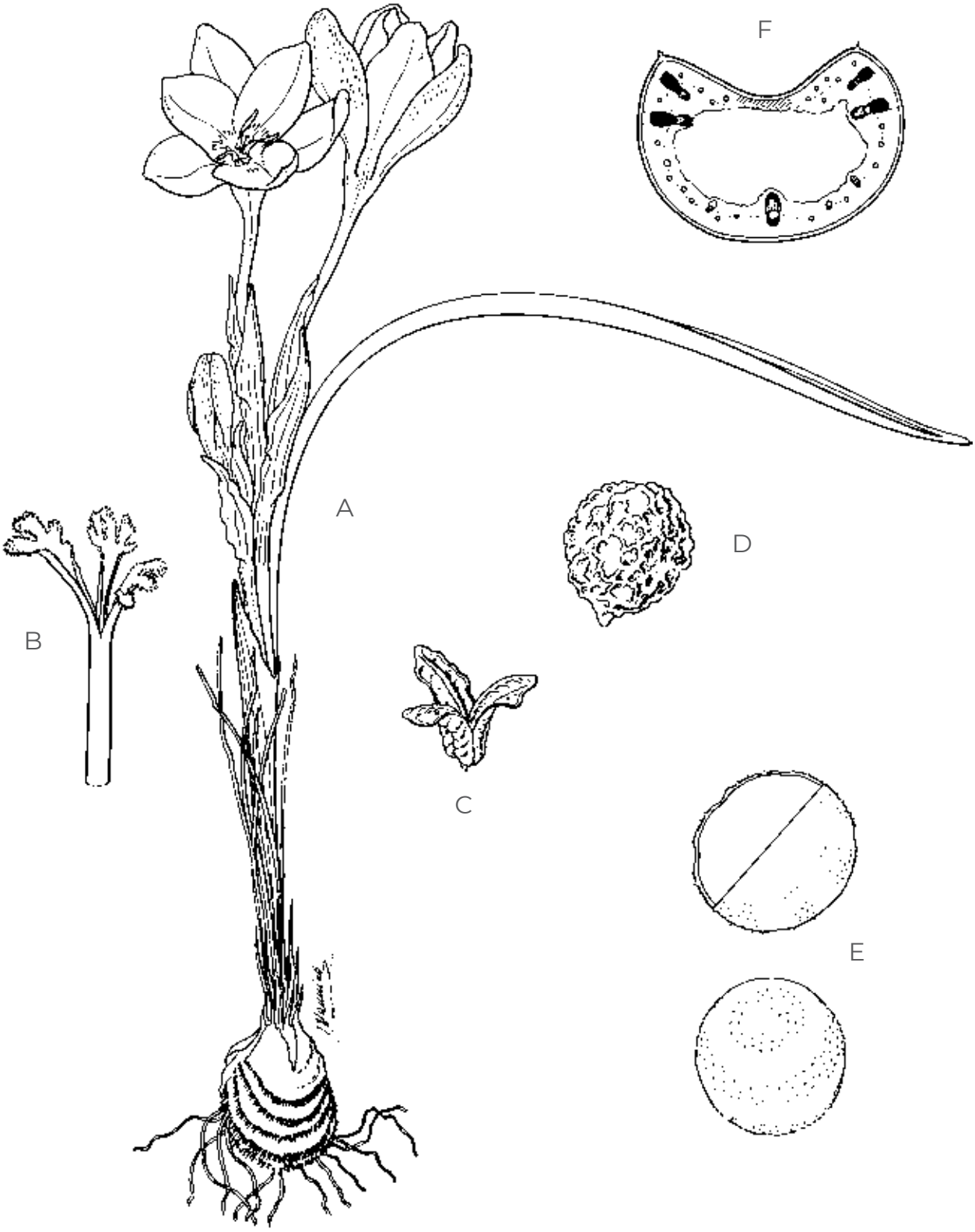
1. **Afrocrocus unifolius** *(Goldblatt) Goldblatt & J.C.Manning* in Goldblatt & Manning, The Iris Family: 160 (2008) [basionym cited as 1972 in error]. *Syringodea unifolia* Goldblatt: t. 1638 (1971). Type: South Africa, [Western Cape], Matroosberg, 3 miles [4.5 km] north of Matroosberg hut, *Stayner s.n.* (NBG 87602, holo.; BOL, iso.).

Plants 50–120 mm high. *Corm* laterally compressed and lens-shaped, 10–25 mm wide with wide, fan-shaped basal ridge. *Leaves* 1(2), falcate, mostly channelled with pale adaxial groove but terete distally, 50–150 mm long and 1.5–3.0 mm diam., smooth or ciliolate on margins. *Flowers* salver-shaped, pale to deep violet or white, sometimes darker at base of tepals, with greenish yellow or orange oval-shaped marking at base of tepals; perianth tube narrowly trumpet-shaped, widening in distal 5 mm, 30–40 mm long; tepals obovate, 15–30 × 7–14 mm, obtuse. *Stamens* suberect; filaments 6–9 mm long, white, ciliate or shortly bearded basally; anthers 5–10 mm long, slightly diverging, yellow or orange. *Style* 45–65 mm long, erect or curved outward distally, dividing near tips of anthers, branches ± 5 mm long, lacerate-multifid. *Capsules* ellipsoid, up to 20 mm long. *Seeds* subglobose, ± 2 mm diam., dark brown, testa rugulose. *Chromosome number* 2*n* = 22. *Flowering time*: April to June.

Distribution and ecology: restricted to the western edge of the central plateau in Northern Cape, South Africa, occurring on the Hantamsberg, Roggeveld, and on the Matroosberg and the summit of the Hex River Pass in Western Cape; on stony clay flats in open renosterveld shrubland.



Distribution of ***Afrocrocus unifolius***.



Afrocrocus unifolius: A, flowering plant; B, detail of style branches; C, dehisced capsule; D, seed; E, pollen grains; F, tissue plan of leaf transection.

REFERENCES

DE VOS, M.P. 1974. Die Suid-Afrikaanse genus *Syringodea*. *Journal of South African Botany* 40: 201–254.
GOLDBLATT, P. 1971. *Syringodea unifolia*. *Flowering Plants of Africa* 41: t. 1638.
GOLDBLATT, P. & MANNING, J.C. 2008. *The Iris Family*: *natural history and classification*. Timber Press, Oregon.



Plate 72. ***Afrocrocus unifolius***, Sutherland, NC.

32. **Syringodea**

Syringodea *J.D.Hook* Curtis's Botanical Magazine 99: t. 6072 (1873), conserved name. Type: *S. pulchella* J.D.Hook.

Revisionary account: De Vos: 201–254 (1974).

From the Greek *syrinx*, a pipe, alluding to the long perianth tube.

Small, acaulescent, deciduous geophytes. *Corm* asymmetric, turbinate or obovoid with a short, oblique, crescent-shaped basal ridge, axial in origin; tunics papery or woody, splitting into fine parallel fibrils on the basal ridge and into a fibrous neck at the top. *Cataphylls* usually 2, membranous. *Stem* short and subterranean, hidden by the leaf bases. *Leaves* one to several, basal, suberect to prostrate, largely bifacial and linear to lanceolate and conduplicate or filiform with a dorsal groove, shortly unifacial distally and then subterete, glabrous or margins ciliolate. *Inflorescence* of solitary, sessile flowers terminal on axes; bracts largely membranous or papery, subhyaline and minutely brown-flecked but greenish distally in midline, tubular below, acute, inner similar but apically notched and greenish distally along two veins. *Flowers* actinomorphic, salver-shaped, blue to mauve or pink or white, sometimes with yellow throat, unscented, thermonastic, nectar from septal nectaries; perianth tube elongate, narrowly trumpet-shaped or cylindric; tepals subequal, spreading, obovate to elliptic, concave, acute to emarginate. *Stamens* erect, inserted near top of tube, exserted; anthers suberect or apically incurved. *Ovary* subterranean, ellipsoid; *style* filiform, 3-branched distally, branches linear or oblanceolate, conduplicate, rarely lacerate apically. *Capsules* geocarpic, clavate or turbinate with sterile pseudopedicellate base, loculicidal and septicidal, hydrochastic and splitting into six, recurved valves above when wet, shrinking longitudinally and finely transversely wrinkled when dry. *Seeds* subglobose or weakly angled, testa reticulate to foveate or colliculate, brown or black. *Pollen grains* globose, inaperturate, exine perforate-scabrate. *Basic chromosome number x* = 6.

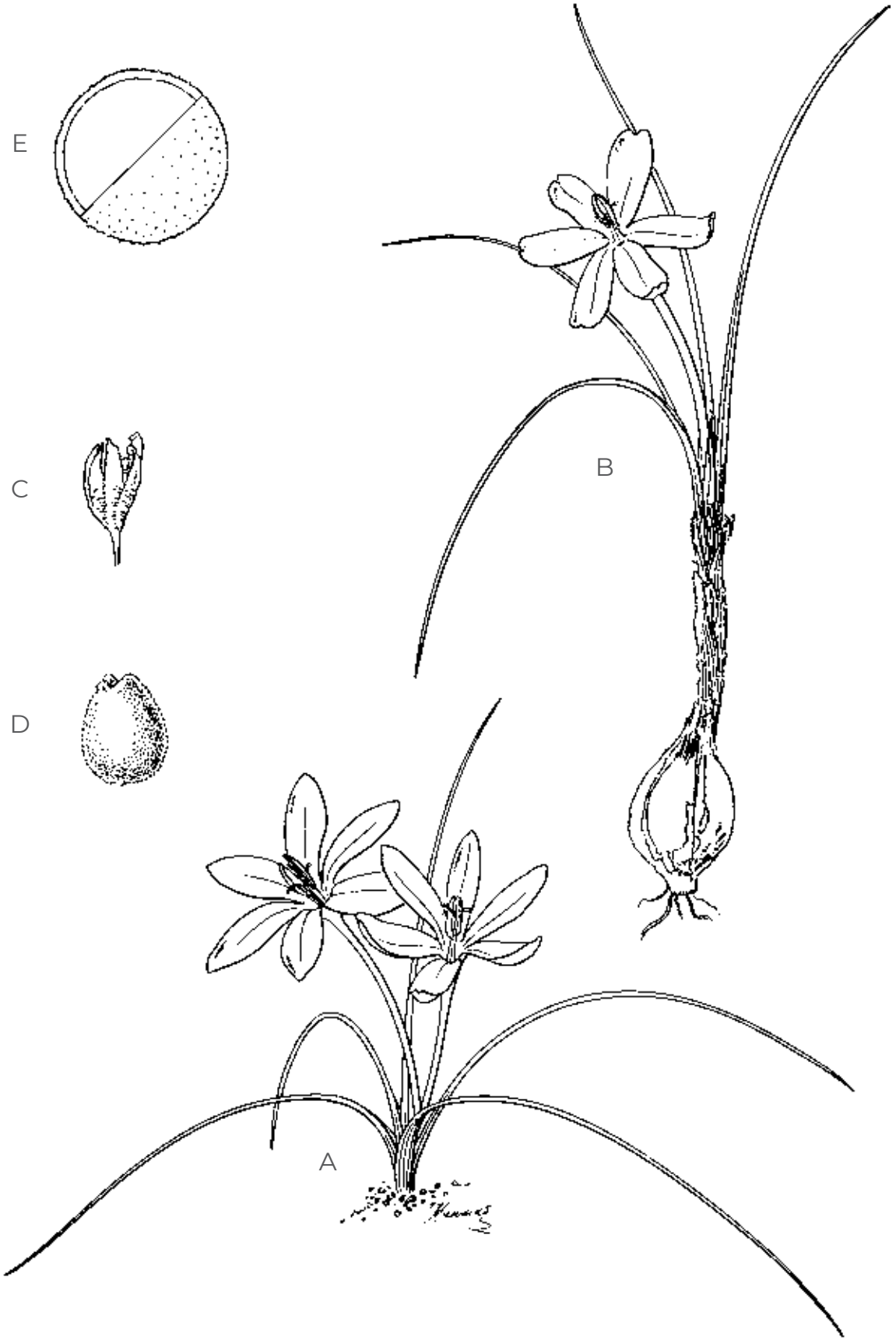
Species 7; South Africa, mainly semi-arid areas, mostly in the winter-rainfall region including the Little and Upper Karoo and interior margins of the winter-rainfall region but extending north to southern Gauteng and east to Dordrecht in Eastern Cape.

A small genus distinguished by its acaulescent habit, woody corm tunics and largely bifacial foliage, blue to mauve, long-tubed salver-shaped flowers with a subterranean ovary, and uniquely hygrochastic capsules that open when wet rather than when dry as in other Iridaceae. The inaperturate pollen is also diagnostic. Molecular analyses confirm a close relationship with *Afrocrocus* and *Romulea*, and these three genera together with the Eurasian genus *Crocus* comprise subtribe *Crocinae.*

The genus is subdivided into the two sections *Syringodea* and *Saxatiles* based on corm shape and leaf number.

Key to species

1a Corms turbinate with very small ridge on pointed base; leaves several; foliage overtopping flowers; plants from Northern Cape near Carnarvon through Eastern Cape and Free State (sect. *Syringodea*)
  2a Perianth tube cylindric throughout, tepals bifid, pink or lilac . . . . . 4. *S. pulchella*
  2b Perianth tube slightly expended apically, tepals ± acute, blue to purple:
    3a Throat of perianth tube white . . . . . 1. *S. concolor*
    3b Throat of perianth tube yellow or orange:
      4a Diameter of open flower < 20 mm diam., tepals 5–8 × ± 2 mm . . . . . 3. *S. flanaganii*
      4b Diameter of open flower 25–55 mm diam., tepals > 10 × 4 mm . . . . . 2. *S. bifucata*
1a Corms obovoid with basal ridge 4–7 mm wide; leaves 1 to several; flowers usually overtopping foliage; plants from Western and western parts of Northern Cape (Namaqualand and Roggeveld) (sect. *Saxatiles*)
  5a Foliage leaf solitary, falcate, unifacial and terete distally or apically . . . . . 7. *S. saxatilis*
  5b Foliage leaves several, mostly or entirely bifacial:
    6a Leaves mostly 6 to 8, linear-filiform, 0.5–1.5(–2.0) mm wide, often flexuous or twisted; perianth tube 20–33 mm long and tepals 10–15 mm long . . . . . 5. *S. longituba*
    6b Leaves 3 to 5, oblong-lanceolate, 3–6 mm wide, spreading; perianth tube 25–35 mm long and tepals 15–20 mm long . . . . . 6. *S. derustensis*



SYRINGODEA. S. concolor: A, flowering plant. ***S. pulchella***: B, flowering plant. ***S. longituba***: C, dehiscing capsule; D, seed; E. pollen grain.

Sect. 1. **Syringodea**

Corm turbinate with very small ridge on pointed base; tunics smooth, subdermal sclerenchyma layers uniform, all sclereids periclinal, idioblasts scattered throughout layers. *Leaves* several, linear, longer than flowers.

1. **Syringodea concolor** *(Baker) M.P.de Vos* in Journal of South African Botany 40: 233 (1974). *S. bicolor* var. *concolor* Baker: 96 (1892). Type: South Africa, [Eastern Cape], Murraysburg, Farm Coetzierskraal, *Tyson 346* (K, holo.; BOL, SAM, iso.).

Plants (30–)100–250 mm high. *Corm* turbinate with small ridge on pointed base, 10–18 mm diam. *Leaves* 4 to 8, linear-canaliculate with pale adaxial groove, (30–)100–250 × 0.5–1.5 mm, smooth or ciliolate on margins. *Flowers* hypocrateriform, pale to deep violet, sometimes darker at base of tepals, with white throat; perianth tube narrowly trumpet-shaped, widening in distal 5 mm, (30–)50–80 mm long; tepals oblanceolate or elliptic, 12–20 × 5–9 mm, ± acute. *Stamens* erect; filaments 5–8 mm long, white; anthers 5–8 mm long, yellow. *Style* 50–85 mm long, dividing between middle and beyond anthers, branches 4–5 mm long, spathulate-lacerate. *Capsules* clavate, 12–20 mm long. *Seeds* angled, ± 1.5 mm diam., black, testa reticulate-foveate. *Chromosome number* 2*n* = 12. *Flowering time*: March, April (May).

Distribution and ecology: widely distributed through the eastern half of the Upper Karoo from Prieska, Carnarvon, Victoria West and Colesberg in Northern Cape to Grahamstown in Eastern Cape, South Africa; in washes or seasonal drainage lines on clay flats in karroid scrub and open grassland.

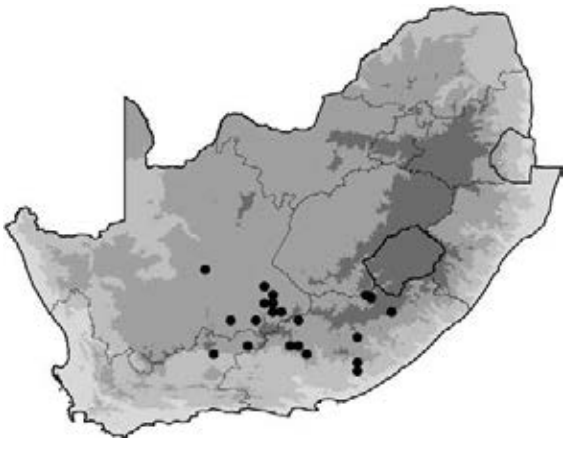
Diagnosis: recognised among the other summer-rainfall species in sect. *Syringodea* with a narrowly funnel-shaped perianth tube by its relatively large, pale to deep violet flowers with a white throat.

Treated by Baker (1892) as merely a variety of *Syringodea bifucata* with a pale rather than yellow throat, *S. concolor* was recognised by De Vos (1974) as a distinct species on the basis of the flower colour difference combined with darker, more finely sculptured seeds.

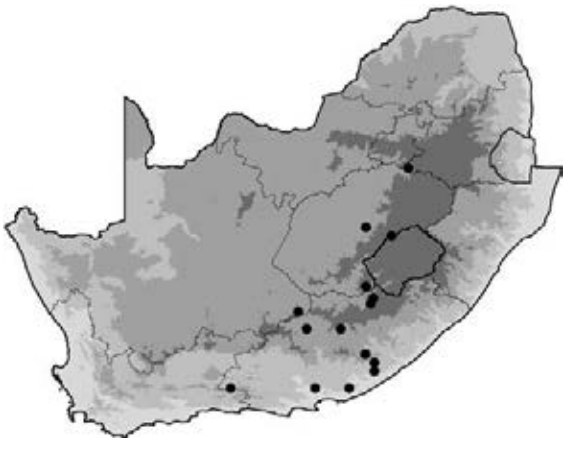
2. **Syringodea bifucata** *M.P.de Vos* in Flora of southern Africa 7(2, 2): 4 (1983), as a replacement name for *S. bicolor* Baker: 67 (1876), illegitimate superfluous name for *Trichonema longitubum* Klatt (1866). Type: South Africa, [Free State], Fat River [Vet Rivier], *Burke 447* [K, lecto., designated by De Vos: 235 (1974)].

Plants 60–250 mm high. *Corm* turbinate with small ridge on pointed base, (7–)10–15 mm diam. *Leaves* 4 to 8, linear-canaliculate with pale adaxial groove, 60–250 × 0.5–1.5 mm, smooth or ciliolate on margins. *Flowers* hypocrateriform, pale to deep violet or sometimes white, paler at base ± and strongly marked with yellow or orange in throat; perianth tube narrowly trumpet-shaped, widening in distal 5 mm, 45–70 mm long; tepals oblanceolate or elliptic, (12–)18–28 × 7–10 mm, ± acute or obtuse. *Stamens* erect; filaments 5–8 mm long, white or yellow; anthers 5–8 mm long, yellow. *Style* 50–75 mm long, dividing between middle and beyond anthers, branches 4–5 mm long, spathulate-lacerate. *Capsules* clavate, 15–20 mm long. *Seeds* angled, ± 1.5 mm diam., brown, testa coarsely reticulate-foveate. *Chromosome number* 2*n* = 12. *Flowering time*: (February) March, April (May).

Distribution and ecology: scattered through the eastern Great and Upper Karoo, South Africa, from Willowmore in Eastern Cape and Colesberg in Western Cape through the central parts of Eastern Cape and the central Free State to Heidelberg in Gauteng; in washes or seasonal drainage lines on clay flats in karroid scrub and open grassland.



Distribution of ***Syringodea concolor***.



Distribution of ***Syringodea bifucata***.

Diagnosis: parapatric with *Syringodea concolor* and distinguished from it (De Vos 1974) by the yellow or orange throat and brown seeds with coarsely sculptured testa with 5 or 6 interstitial cavities per mm. The larger flowers, mostly more than 16 mm diam., distinguish it from *S. flanaganii*.

3. **Syringodea flanaganii** *Baker* in Bulletin of Miscellaneous Information, Kew 1893: 158 (1893). Type: South Africa, [Eastern Cape], top of Gonubie Hill, near Draaibos and Komgha, *Flanagan 720* (K, holo.; B, BOL, PRE, SAM, iso.).

Plants 30–120 mm high. *Corm* turbinate with small ridge on pointed base, 4–10 mm diam. *Leaves* 5 to 9, linear-canaliculate with pale adaxial groove, 30–100 × 0.5–1.0 mm, smooth or ciliolate on margins. *Flowers* hypocrateriform, pale to deep violet, paler at base ± and marked with yellow or orange in throat; perianth tube narrowly trumpet-shaped, widening in distal 3–5 mm, 25–50 mm long; tepals narrowly elliptic, 5–10 × ± 2 mm, ± acute or obtuse. *Stamens* erect; filaments 2–5 mm long, white or yellow; anthers 3–5 mm long, yellow. *Style* 30–55 mm long, dividing ± at middle of anthers, branches 1–2 mm long, spathulate. *Capsules* clavate, 7–8 mm long. *Seeds* unknown. *Flowering time*: March, April.

Distribution and ecology: restricted to Eastern Cape, South Africa, from Port Elizabeth to Dordrecht; on rock sheets and stony flats in open grassland.

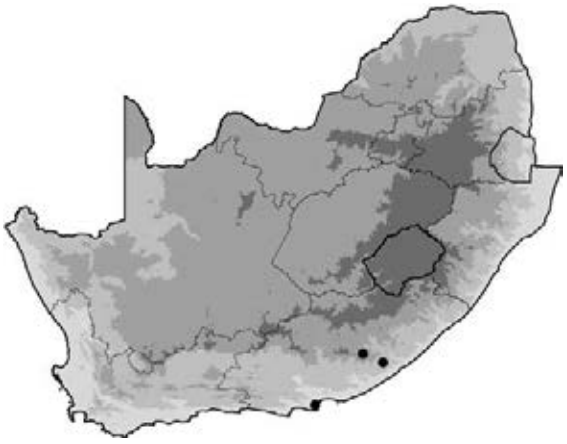
Diagnosis: retained as distinct from *Syringodea bifucata*, with which it shares a perianth tube marked with yellow or orange in the throat, on the basis of its much smaller flowers less than 16 mm diam., with tepals 5–10 × ± 2 mm and style branches 1–2 mm long.

4. **Syringodea pulchella** *Hook.f.* in Curtis's Botanical Magazine 99: t. 6072 (1873). Type: South Africa, [Eastern Cape], Sneeuberg Mtns, *H. Bolus 1852* (K, holo.; BOL, iso.).

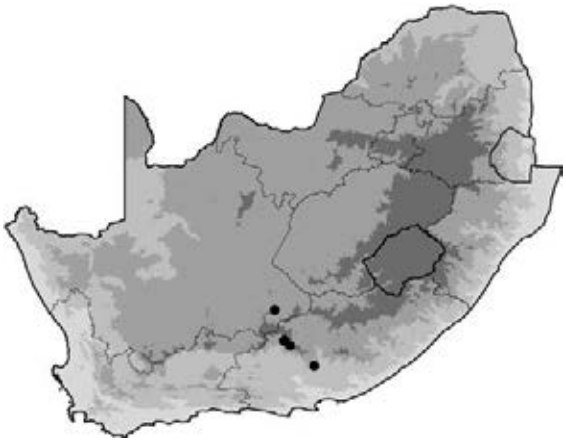
Plants 120–200 mm high. *Corm* turbinate with small ridge on pointed base, 8–15 mm diam. *Leaves* 3 to 7, linear-canaliculate with pale adaxial groove, 100–250 × 0.5–1.5 mm, smooth or ciliolate on margins. *Flowers* hypocrateriform, pale pink to lilac, sometimes flushed darker at base of tepals; perianth tube cylindric throughout, 60–100 mm long; tepals oblanceolate or oblong, 12–22 × 5–7 mm, bifid or bilobed with apices slightly incurved. *Stamens* erect; filaments 3–4 mm long, white; anthers 5–9 mm long, yellow. *Style* 65–120 mm long, dividing between middle and beyond anthers, branches 4–5 mm long, spathulate. *Capsules* clavate, 20–30 mm long. *Seeds* angled, ± 1.5 mm diam., black, testa reticulate-foveate. *Chromosome number* $2n = 12$. *Flowering time*: March, April.

Distribution and ecology: endemic to the Sneeuberg and adjacent Boschberg in Eastern Cape, South Africa; on stony clay flats in karroid scrub.

Diagnosis: a distinctive species, with pale lilac flowers with notched or bifid tepals and a uniquely cylindric perianth tube 60–100 mm long and not widening at the throat.



Distribution of ***Syringodea flanaganii***.



Distribution of ***Syringodea pulchella***.

Sect. 2. **Saxatiles** *M.P.de Vos* in Journal of South African Botany 40: 238 (1974). Type species: *Syringodea saxatilis* M.P.de Vos

Corm obovoid with basal ridge 4–7 mm wide; tunics smooth or rough, subdermal sclerenchyma layers differentiated, with outermost layer of sclereids anticlinal and inner layers periclinal, idioblasts concentrated in outermost layer immediately beneath epidermis. *Leaves* 1–several, terete or linear to oblong-lanceolate, usually shorter than flowers.

5. **Syringodea longituba** *(Klatt) Kuntze* in Revisio generum plantarum 3(2): 309 (1898). *Trichonema longitubum* Klatt: 665 (1866). Type: South Africa, without precise locality, *Mund & Maire 1101* (B, holo.).

Plants mostly 40–100 mm high, solitary or clumped. *Corm* obovoid, 5–20 mm diam. with basal ridge 4–6 mm wide. *Leaves* (4)6 to 8, subterete or with median adaxial groove, sometimes only partially emergent at flowering, 15–60 × 0.5–1.5(–2.0) mm, mostly loosely coiled or helically twisted, ciliolate or ciliate on margins. *Flowers* hypocrateriform, pale to deep violet, and white or orange in throat; perianth tube trumpet-shaped, widening in distal 5 mm, (15–)20–25 mm long; tepals obovate, (8–)10–15 × (3–)4–8 mm, subacute. *Stamens* erect; filaments 3–5(–8) mm long, white, yellow or lilac; anthers suberect, 3–6 mm long, yellow. *Style* (20–)25–40 mm long, dividing near middle of anthers or beyond, branches 2–4(–5) mm long, linear-spathulate. *Capsules* clavate or turbinate, 8–25 mm long. *Seeds* angled, ± 1 mm diam., brown, testa colliculate or partly foveolate. *Chromosome number* 2*n* = 12. *Flowering time*: April to June.

Distribution and ecology: widespread through southwestern South Africa, from northern Namaqualand, the Kamiesberg and Bokkeveld Plateau in Northern Cape to Riversdale in Western Cape; on stony flats and rock sheets in karroid or other open scrub.

Diagnosis: distinctive in sect. *Saxatiles* in its several to numerous, often loosely coiled or helically twisted leaves mostly less than 2 mm diam., and relatively small flowers with perianth tube 15–25 mm long and tepals 8–15 × 3–8 mm.

Key to subspecies

1a Throat of perianth and filaments bright yellow or orange ..... 5a. subsp. *longituba*
1b Throat of perianth and filaments white or lilac .. .. .5b. subsp. *violacea*

5a. subsp. **longituba**

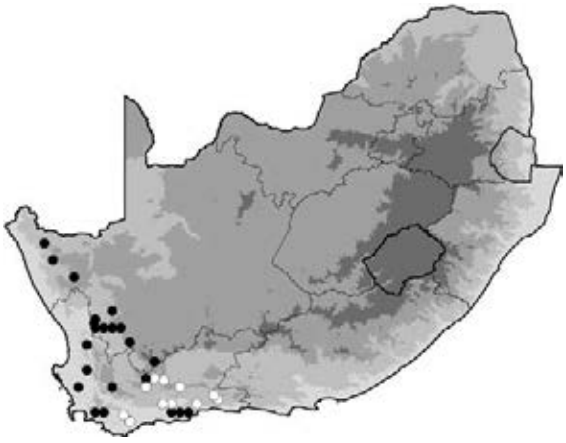
Syringodea filifolia Baker: 67 (1876). Type: South Africa, without precise locality, *Bowie s.n.* (BM, holo.).

Syringodea montana Klatt: 403 (1882). Type: South Africa, [Northern Cape], Hantam Mtns, *Meyer s.n.* (B, holo.).

Syringodea leipoldtii L.Bolus: 12 (1931). Type: South Africa, [Western Cape], near Malmesbury, *Leipoldt s.n.* (BOL 191924, holo.; K, iso.).

Perianth with deep yellow or orange throat. *Filaments* yellow.

Distribution and ecology: mainly in the north and west of the range of the species, from the highlands of northern and central Namaqualand and the Bokkeveld and Roggeveld Escarpments in Northern Cape to Caledon in Western Cape, with isolated populations near Riversdale.



Distribution of ***Syringodea longituba*** subsp. ***longituba***, ●; subsp. ***violacea***, ○.

5b. subsp. **violacea** *(M.P.de Vos) Goldblatt & J.C.Manning* in Manning & Goldblatt in Strelitzia 29: 807 (2012). *Syringodea longituba* var. *violacea* M.P.de Vos: 243 (1974). Type: South Africa, [Western Cape], 12 miles [19 km] north of Muiskraal to Van Wyksdorp, *M.P. de Vos 2270* (NBG, holo.).

Perianth with white or lilac throat. *Filaments* white or lilac.

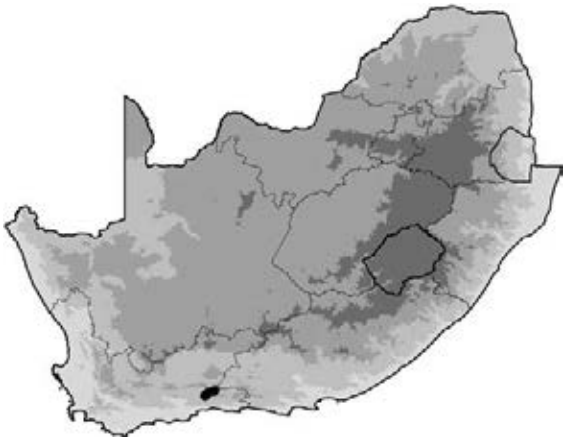
Distribution and ecology: in the south and east of the range of the species in Western Cape, from Matjiesfontein and Laingsburg through the Little Karoo to Bredasdorp and Riversdale.

6. **Syringodea derustensis** *M.P.de Vos* in Journal of South African Botany 40: 245 (1974). Type: South Africa, [Western Cape], Drinkrivier near De Rust, stony hill, *M.P. de Vos 2269* (NBG, holo.).

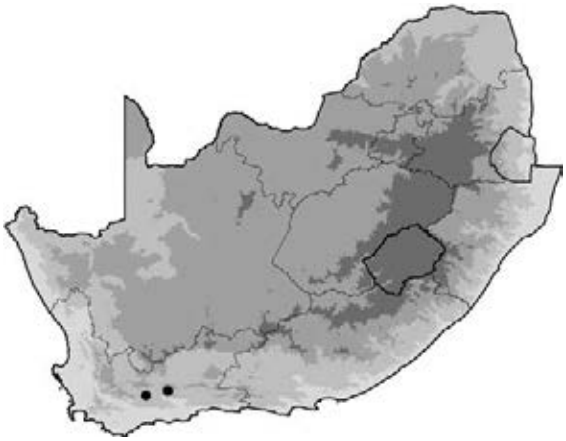
Plants 50–80 mm high. *Corm* ellipsoid, 10–15 × 7–12 mm with basal ridge 4–6 mm wide. *Leaves* 3 to 5, spreading, linear to lanceolate, plane or weakly conduplicate, 30–60 × 3–6 mm, ciliolate on margins, apices slightly thickened and boat-shaped. *Flowers* hypocrateriform, pale to deep violet or rarely white; perianth tube trumpet-shaped, widening in distal 5 mm, 25–35 mm long; tepals obovate, 15–20 × 8–10 mm, subacute. *Stamens* erect; filaments 5–6 mm long, white; anthers suberect, 5–7 mm long, yellow. *Style* 33–38 mm long, dividing near middle of anthers, branches 4–5 mm long, spathulate or lacerate. *Capsules* clavate or turbinate, 5–10 mm long. *Seeds* angled, ± 1.5 mm diam., brown, testa colliculate or partly foveolate. *Chromosome number* 2*n* = 12. *Flowering time*: May to June.



Plate 73. A, ***Syringodea concolor***, Hanover, NC; B, ***S. derustensis***, De Rust, WC; C, ***S. longituba*** subsp. ***violacea***, Calitzdorp, WC; D, ***S. longituba*** subsp. ***longituba***, Porterville, WC; E, ***S. pulchella***, Graaff-Reinett, EC; F, ***S. saxatilis***, Ladismith, WC.



Distribution of ***Syringodea derustensis***.



Distribution of ***Syringodea saxatilis***.

Distribution and ecology: endemic to the eastern Little Karoo, Western Cape, South Africa, between Oudtshoorn and De Rust; in stony washes on quartzite slopes.

Diagnosis: distinctive in its 3 to 5, linear to lanceolate leaves 3–6 mm wide and showy flowers with perianth tube 25–35 mm long and obovate tepals 15–20 × 8–10 mm.

7. **Syringodea saxatilis** *M.P.de Vos* in Journal of South African Botany 40: 246 (1974). Type: South Africa, [Western Cape], Ladismith, 300 m from wine cellars, among succulents, *M.P. de Vos 2264* (NBG, holo.).

Plants 40–80 mm high. *Corm* ellipsoid, 7–12 mm diam. with basal ridge 5–7 mm wide. *Leaf* solitary, falcate, unifacial and subcylindric distally or apically, bifacial and conduplicate basally with ciliolate margins, 50–120 × 1.5–2.5 mm. *Flowers* hypocrateriform, pale to deep violet; perianth tube trumpet-shaped, widening in distal 5 mm, 15–20 mm long; tepals obovate, 10–20 × 5–8 mm, subacute. *Stamens* erect; filaments 5–7 mm long, white; anthers suberect, 3–5 mm long, yellow. *Style* 20–25 mm long, dividing near middle of anthers, branches 4–5 mm long, spathulate. *Capsules* clavate or turbinate, 6–10 mm long. *Seeds* subglobose or angled, ± 1 mm diam., brown, testa colliculate or partly foveolate. *Chromosome number* 2*n* = 12. *Flowering time*: May to June.

Distribution and ecology: endemic to the western Little Karoo, Western Cape, South Africa, around Ladismith and along the southern foothills of the Anysberg; in stony washes on low quartzite or sandstone outcrops.

Diagnosis: unique in the genus in its solitary, falcate leaf with short, unifacial and subcylindric blade. The leaf in juvenile plants is entirely unifacial and terete. The close association of daughter corms with the parent may result in adult plants appearing to produce more than one leaf per corm.

EXCLUDED SPECIES

Syringodea minuta (L.f.) Klatt: 403 (1882). This is a synonym of *Pauridia minuta* (L.f.) Th.Durand & H.Schinz (Hypoxidaceae).

REFERENCES

BAKER, J.G. 1876. On the genus *Syringodea* Hook.f. *Journal of Botany, British and foreign* 14: 66, 67.

BAKER, J.G. 1892. *Handbook of the Irideae*. London.

BAKER, J.G. 1893. Decades kewenses. V. *Bulletin of Miscellaneous Information, Kew* 1893: 155–158.

BOLUS, L. 1931. Novitates Africanae. *Journal of Botany, British and foreign* 69: 10–15.

DE VOS, M.P. 1974. Die Suid-Afrikaanse genus *Syringodea*. *Journal of South African Botany* 40: 201–254.

DE VOS, M.P. 1983. *Syringodea*. In O.A. Leistner (ed), *Flora of southern Africa* 7(2, 2): 1–9. Botanical Research Institute, Pretoria.

HOOKER, J.D. 1873. *Syringodea pulchella*. *Curtis's Botanical Magazine* 99: t. 6072.

KLATT, F.W. 1866. Revisio Iridearum. *Linnaea* 34: 537–689.

KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.

KUNTZE, O. 1898. *Revisio generum plantarum*, vol. 3(2). Leipzig.

MANNING, J.C. & GOLDBLATT, P. 2012. *Plants of the Greater Cape Floristic Region 1: The Core Cape Flora*. *Strelitzia* 29. South African National Biodiversity Institute, Pretoria.

4. Subfamily **IRIDOIDEAE**

IRIDOIDEAE *Eaton*, A botanical dictionary, edn. 4: 28 (1836). Type: *Iris* L.

Deciduous or evergreen perennials, rarely annuals, with rhizomes, bulbs or apically rooting corms. *Leaves* unifacial or bifacial, rarely terete. *Inflorescence* units rhipidia tightly enclosed in a pair of opposed leafy bracts (rhipidial spathes) with flowers exserted serially. *Flowers* fugaceous or long lasting, actinomorphic, often with perigonal nectaries at base of tepals, often only outer whorl, or on surface of all tepals; tepals free or united below, variously coloured. *Stamens* free or filaments partly to entirely united, alternating with style branches or opposite and appressed to style branch; anthers loculicidal and extrorse or rarely porose; endothecial thickenings U-shaped, annular or helical. *Ovary* inferior; style slender or more often short, divided into 3 variously developed branches, either thread-like and stigmatic apically, or flattened and sometimes petaloid and with a pair of subapical crests above transverse stigma. *Capsules* submembranous to woody. *Seeds* angled to globose or discoid, sometimes arillate. *Pollen grains* usually monosulcate, rarely disulcate or zonosulcate, exine reticulate, retipilate, rugulate or verrucate. *Basic chromosome number x* = ?10 (many other numbers).

Genera ± 30, 4 in southern Africa; species ± 920; in 5 tribes, only Irideae in southern Africa.

Tribe **Irideae**

Irideae *M.B.Kittel* in A.Richard, Nouveaux élémens de botanique, edn. 3: 736 (German translation) (1840). Type: *Iris* L.

Subtribe *Ferrariineae* Goldblatt: 438 (1971). Type: *Ferraria* Burm. ex Miller

Subtribe *Homeriineae* Goldblatt: 438 (1971). Type: *Homeria* Vent. = *Moraea* Miller

Deciduous or evergreen perennials with rhizomes or apically rooting corms; stem well developed or subterranean. *Leaves* unifacial or bifacial, rarely terete. *Flowers* fugaceous or long lasting, tepals free or united below. *Filaments* free or united below or entirely, alternate with style branches and/or appressed or joined to opposed style branch; anthers loculicidal, extrorse or latrorse. *Style* slender, short, divided into 3 variously developed branches, either thread-like and stigmatic apically, or flattened and sometimes petaloid with paired crests above transverse stigma; seeds globose to angular or discoid. *Basic chromosome number x* = 10 (9, 8, 6, 5).

Key to genera

1a Rootstock a creeping or erect rhizome or indistinct; plants evergreen or deciduous; leaves unifacial (oriented edgewise to stem) or centric (oval or round in section):
  2a Style (to the naked eye) usually dividing into 3 slender branches, or branches flattened distally, extending between or above the anthers; tepals not clawed and usually subequal, occ. those of the outer or inner whorl smaller . . . . . 34. *Bobartia*
  2b Style usually dividing into 3 thickened or radially or tangentially compressed more-or-less petaloid branches remaining opposite appressed to the stamens; tepals subequal or those of the inner whorl smaller . . . . . 33. *Dietes*
1b Rootstock a corm; plants nearly always deciduous; leaves bifacial and channelled or unifacial or centric (oval or round in section)
  3a Foliage leaves unifacial, oriented edgewise to stem; old corms persisting for some years, with tunics membranous and soon decaying; tepals with crisped edges; style branches bearing a fringe of fine hair-like processes, collectively forming a feathery tuft . . . . . 35. *Ferraria*
  3b Foliage leaves bifacial and channelled to flat, oriented with the adaxial surface facing the stem, or terete; old corm usually resorbed annually, with persistent fibrous to woody tunics; tepals with plane or wavy edges; style branches rarely with marginal processes but other characters not as above . . . . . 36. *Moraea*

33. **Dietes**

Dietes *Salisb. ex Klatt* in Linnaea 34: 583 (1866), name conserved. Type: *D. compressa* (Thunb.) Klatt = *D. iridioides* (L.) Sweet ex Klatt

Naron Medik. 6: 419 (1790). Type: *N. orientale* Medik. = *Dietes iridioides* (L.) Sweet ex Klatt

Revisionary account: Goldblatt: 132–153 (1981).

From the Greek, *di-*, two or dual, *etes*, affinities, for the mixed features of *Iris* and *Moraea* exhibited by the genus.

Plants perennial, evergreen herbs. *Rootstock* a thick, fibrotic creeping rhizome, persisting for several years. *Stem* usually erect, sometimes inclined to trailing, with foliage leaves at lower nodes and entirely sheathing bract-like leaves at upper nodes; branching irregularly in the upper half or dichotomously several-branched. *Foliage leaves* several, in 2-ranks, terminal on rhizome, tough, leathery, unifacial, linear to sword-shaped or lanceolate; margins with submarginal sclerenchyma without marginal vein. *Inflorescences* several-flowered rhipidia, flowers borne on rigid pedicels, pubescent near apices, enclosed in paired, opposed, sheathing, bract-like spathes, inner larger than outer, margins free to base. *Flowers* radially symmetric, large, pale coloured with nectar guides at bases of limbs of outer tepals, claws of outer tepals velvety to papillate in midline; tepals free, outer whorl larger, both whorls of tepals with an ascending claw and spreading limb. *Stamens* usually free; filaments with slightly expanded base or broad based and contiguous or united in lower half; anthers linear, appressed to style branches. *Ovary* green, ± cylindric, included or exserted from spathes; styles short, dividing to form 3 broad, flattened, petal-like branches terminating in paired crests, bearing transverse stigma lobes on abaxial face at base of crests. *Fruit* a many-seeded capsule, either indehiscent, or splitting partly to entirely along locule sutures. *Seeds* large, ± angular. *Pollen grains* monosulcate or zonosulcate, exine reticulate. *Basic chromosome number x* = 10.

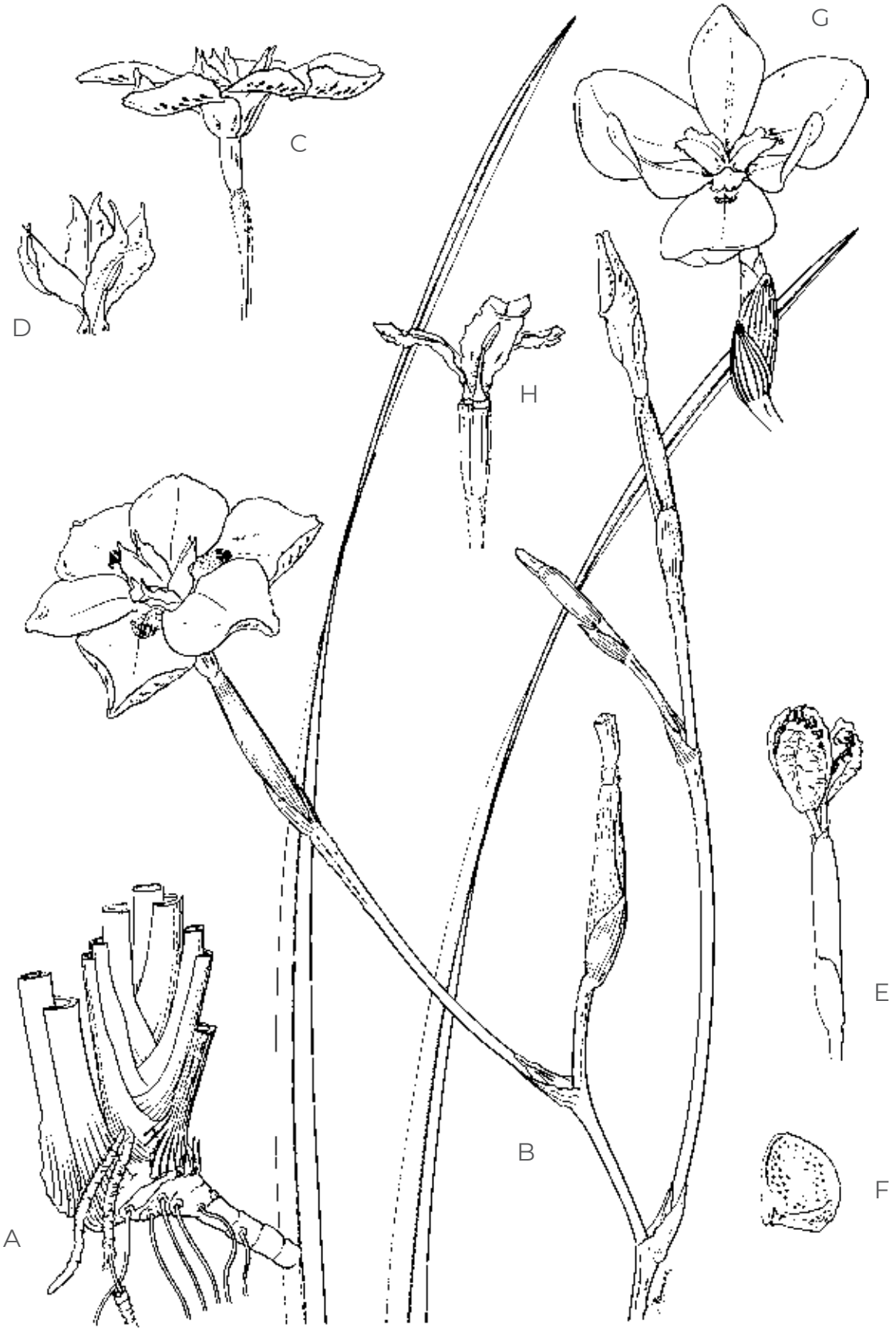
Species 6; southern Africa to East Africa, 1 on Lord Howe Island.

All evergreen, the species of *Dietes* closely resemble in appearance and flowers various species of the northern hemisphere genus *Iris*. The broad, petaloid style branches bearing paired crests and with an anther appressed to each branch, are exactly like those of an *Iris*, as are the larger outer tepals that bear markings. *Dietes* species also have a rhizomatous rootstock as do most species of *Iris*. The differences are subtle, but include tepals free to the base whereas almost all species of *Iris* have the tepals united basally in a tube or cup. The filaments are free to the base and broadened in the lower half or in some populations of *D. iridioides* partly united and in *Iris* are joined to the tubular part of the perianth and are slender throughout. Five of the six species of *Dietes* are African, but only the white-flowered *D. iridioides* is widespread, extending from southern Western Cape into tropical Africa as far north as Kenya. The remainder are relatively narrow endemics. Only *D. robinsoniana* occurs outside Africa, and is restricted to Lord Howe Island between Australia and New Zealand, an extraordinary geographic disjunction not only for Iridaceae but for plants in general. Molecular phylogenetic studies have shown beyond doubt that *D. robinsoniana* is correctly placed to genus and is most closely related to the Eastern Cape *D. bicolor*.

Pollination of *Dietes* has not been studied but the flowers, attractive though they are, do not produce nectar and the reward to pollinating agents is uncertain. Several species are used in horticulture, especially in urban landscapes, as they are easy to propagate and drought resistant, tolerating light frost, full sun or partial shade.

Key to species

1a Leaves 30–50 mm or more at widest point; stem irregularly branched. . . . . 3. *D. butcheriana*
1b Leaves < 25 mm at widest point; stem irregularly or dichotomously branched:
2a Tepal limbs ± round and inner overlapping outer for some distance; branching dichotomous; cauline sheathing leafy bracts 9–20 mm long, subtending branches, obviously paired . . . . . 1. *D. bicolor*
2b Tepal limbs ± obovate to lanceolate and inner not or hardly overlapping outer; branching irregular; cauline sheathing leafy bracts 25–50 mm long, some not subtending branches, not obviously paired and inner much smaller, or evidently lacking:
3a Outer tepals 45–60 mm long; style branches excluding crests 12–20 mm long; inner tepals with brown markings on claws; flowers lasting 3 days. . . . . 5. *D. grandiflora*
3b Outer tepals 24–40 mm long; style branches excluding crests 7–9 mm long; inner tepals not marked; flowers lasting a single day, rarely 2 days:
4a Flowers pale yellow with orange-brown nectar guides and yellow (occasionally blue-flushed) style branches; capsules nodding to pendent, smooth and without beak; filaments always free. . . . . 4. *D. flavida*
4b Flowers white with yellow nectar guides and blue-mauve to blue-flushed or white style branches; capsules erect, rough-walled, usually furrowed and with short beak; filaments sometimes united in lower half . . . 2. *D. iridioides*



DIETES. D. bicolor subsp. ***bicolor***: A, rhizome; B, leaves and flowering stem; C, flower side view; D, detail of stamens and style; E, dehiscing capsule; F, seed. ***D. robinsoniana***: G, flower, detail of stamens and style.

1. **Dietes bicolor** *(Steud.) Sweet ex Klatt* in Linnaea 34: 584 (1866) [*D. bicolor* Sweet (1830), invalid name]; Goldblatt: 143 (1981). *Iris bicolor* Lindl.: t. 1404 (1831), illegitimate homonym, not *I. bicolor* Miller (1758). *Moraea bicolor* Steud.: 159 (1841). Type: South Africa, without precise locality or collector, illustration in Lindl.: t. 1404 (1831).

[*Dietes bicolor* Spae: t. 70 (1846), invalid name.]

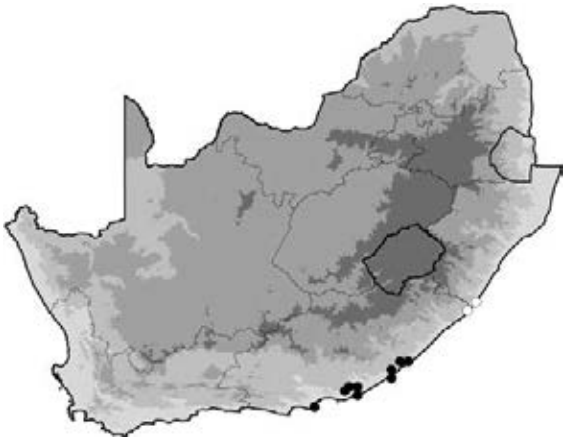
Plants 800–1 200 mm high. *Stem* erect, ± dichotomously branched. *Foliage leaves* mostly 500–800 mm long, linear, with distinct, usually double main vein, 6–12 mm wide, mostly basal, cauline leaves at lower nodes shorter; upper nodes bearing short, paired, opposite, entirely sheathing bract-like leaves, these green or becoming dry and brown, 9–20 mm long, acute, margins free to base. *Rhipidial spathes* obtuse to emarginate; inner 30–45 mm long, outer ± half as long. *Flowers* yellow to ± white, outer tepal limbs usually with solid, dark brown or orange nectar guides at bases or guides speckled, outer tepal claws densely hairy, often speckled orange to brown; outer tepals 32–35 × 20–23 mm, claws ± 12 mm long, limbs round to oblanceolate, spreading; inner tepals 25–35 × ± 18 mm, limbs spreading. *Stamens* free; filaments ± 6 mm long, broad and contiguous in lower half, filiform above; anthers 4–8 mm long. *Ovary* 9–10 mm long; style ± 2 mm long, branches 8–15 × 7–9 mm, crests 5–9 mm long. *Capsules* 18–25 × 15–20 mm, globose-truncate, dehiscing in upper half. *Seeds* angular, dark brown. *Chromosome number* 2*n* = 40. *Flowering time*: mainly spring and summer, August to February; lasting a single day.

Distribution and ecology: restricted to coastal and near interior Eastern Cape and southern KwaZulu-Natal, South Africa, extending from Port Edward to Grahamstown; along streams, riverbanks and marshy places. A record from Town Bush Valley, Pietermaritzburg, probably does not represent a native population.

Dietes bicolor is a valuable ornamental, now widely cultivated and often used as a street planting. Plants may be very free flowering, and although each flower lasts only one day, plants usually produce one or more flowers almost daily for several months.

Diagnosis: taxonomically isolated, *Dietes bicolor* is distinguished by the dichotomously branched flowering stem and pale yellow to white flowers, the outer tepal limbs usually bearing dark brown nectar guides at the bases. The tepal limbs are rounded, with the inner tepals overlapping the outer. *Dietes bicolor* is the only polyploid species of the genus and is more closely related to the Lord Howe Island species, *D. robinsoniana*, than to any of the other African species. Both share a similar dichotomous branching pattern.

Northern populations from southern KwaZulu-Natal and adjacent Eastern Cape with white to creamy white flowers and orange nectar guides are recognised as subsp. *armeniaca*, and those to the south, from Kei Mouth to Grahamstown, with yellow flowers and brown nectar guides represent subsp. *bicolor*.



Distribution of ***Dietes bicolor*** subsp. ***bicolor***, ●; subsp. ***armeniaca***, ○.

Key to subspecies

1a Inner rhipidial spathe 34–45 mm long; flowers pale yellow with solid (rarely speckled) brown nectar guides at bases of outer tepal limbs; outer tepal claws 10–12 mm long; anthers 6–9 mm long; style crests ± 5 mm long . . . . . 1a. subsp. *bicolor*

1b Inner rhipidial spathe 33–40 mm long; flowers white to creamy white, with orange nectar guides at bases of outer tepal limbs, sometimes with minute pale or dark spot in centre of guides; outer tepal claws 9–10 mm long; anthers 4.5–6.0 mm long; style crests 5–9 mm long . . . 1b. subsp. *armeniaca*

1a. subsp. **bicolor**

Inner rhipidial spathe 34–45 mm long. *Flowers* pale yellow with solid (rarely speckled) brown nectar guides at bases of outer tepal limbs; outer tepals 30–35 × 20–31 mm, claws 10–12 mm long; inner tepals 25–35 × ± 18 mm. *Anthers* 6–9 mm long. *Ovary* ± 10 mm long; style branches 8–10 × 9–12 mm, crests ± 5 mm long. *Capsules* 18–25 mm long.

Distribution and ecology: restricted to Eastern Cape, extending from near the mouth of the Kei River south to Grahamstown; at the edges of bush, usually along streams.

Diagnosis: flowers of subsp. *bicolor* are pale yellow, the outer tepal limbs with solid, dark brown nectar guides (rarely brown-speckled) and brown-spotted claws.

1b. subsp. **armeniaca** *Goldblatt & J.C.Manning* in Bothalia 45: 41 (2015). Type: South Africa, KwaZulu-Natal, Leopard Beach, riverbed, Nov. 2011, *Abbott 9381* (NBG, holo.; MO, iso.).

Inner rhipidial spathe 33–40 mm long. *Flowers* white to creamy white, with orange nectar guides at bases of outer tepal limbs, sometimes with minute pale or dark spot in centre of guides; outer tepals 23–33 × 21–29, claws

9–10 mm long; inner tepals 23–33 × 17–22. *Anthers* 4.5–6.0 mm long. *Ovary* 9–10 mm long; style branches 8–15 × 9–12 mm, crests 5–9 mm long. *Capsules* 18–20 mm long.

Distribution and ecology: extending from southern KwaZulu-Natal to the Mkhambathi Gorge in northern coastal Eastern Cape; rocky places in and along streams.

Diagnosis: distinguished by the white to palest yellow flowers with orange nectar guides and orange-spotted outer tepal claws, somewhat smaller rhipidial spathes 33–40 mm long (34–45 mm in subsp. *bicolor*), and generally slightly smaller outer tepals, 23–33 × 21–29 mm vs. 30–35 × 20–31 mm, and anthers, 4.5–6.0 mm vs. 6–9 mm long. The ovary and capsules in subsp. *armeniaca* are also slightly shorter than in subsp. *bicolor.*

2. **Dietes iridioides** *(L.) Sweet ex Klatt* in Th. Durand & H. Schinz, Conspectus florae africae 5: 186 (1894) [*D. iridioides* (L.) Sweet: 497 (1830) invalid name]; Goldblatt: 145 (1981). *Moraea iridioides* L.: 28 (1767). [*M. irioides* Gaertn.: 40 (1788), orth. var.]. *Naron orientale* Medik.: 419 (1790), superfluous name for *M. iridioides* L. *Naron iridioides* (L.) Moench: 627 (1794). *Ferraria blanda* Salisb.: 42 (1796), superfluous name for *M. iridioides* L. *Iris moraeoides* Ker Gawl.: sub t. 1407 (1811), superfluous name for *M. iridioides* L. Type: South Africa, without precise locality or collector, illustration in Miller; t. 238, f. 1 (1758).

Iris compressa L.f.: 98 (1782). *Dietes compressa* (L.f.) Klatt: 584 (1866). Type: South Africa, [Western Cape], near Seekoe River, *Thunberg. s.n.* [UPS–THUNB 1117, lecto., designated by Goldblatt: 145 (1981)].

Moraea catenulata Lindl.: t. 1074 (1827). *Dietes catenulata* (Lindl.) Sweet ex Klatt: 585 (1866). *Iris catenulata* (Lindl.) Baker: 147 (1877). *M. iridioides* var. *catenulata* (Lindl.) Baker: 60 (1892). Type: Mauritius, *R. Barclay*, illustration in Lindl.: t. 1074 (1827).

Moraea iridioides var. *prolongata* Baker: 26 (1896). [*M. prolongata* Baker: 60 (1892), invalid name only in synonymy.] *Dietes prolongata* (Baker) N.E.Br.: 37 (1928). Type: South Africa, without precise locality, ex hort. Leichtlin (K, likely holo.).

Dietes prolongata var. *galpinii* N.E.Br.: 37 (1928). Type: South Africa, Transvaal [Mpumalanga], near Barberton, *Galpin 1206* [K, lecto., designated by Goldblatt: 150 (1981)].

[*Dietes iridifolia* Salisb.: 307 (1812), invalid name.]

[*Iris crassifolia* G.Lodd.: t. 1861 (1832), invalid name without description (but accepted by some authorities). *Dietes crassifolia* G.Lodd. ex G.Don in Sweet: 661 (1839), invalid name without dsecription.]

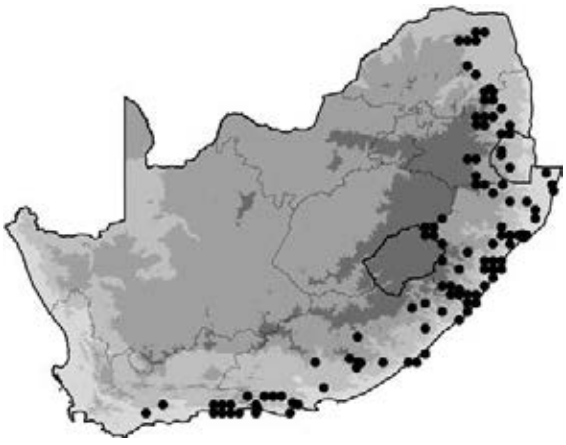
[*Dietes macleayi* Baker: 60 (1892), invalid name only in synonymy.]

subsp. **iridioides**

Plants (150–)300–600 mm high. *Stem* suberect or inclined, irregularly branched, bearing entirely sheathing bract-like leaves from cauline nodes 25–30 mm long, grey-green, often becoming dry and brownish distally; old stem often arching toward ground and producing terminal clusters of leaves, these later taking root. *Foliage leaves* shorter or longer than stems, 250–400(–600) mm long, linear to sword-shaped, (6–)10–15(–25) mm wide. *Rhipidial spathes* obtuse to emarginate; inner 35–50(–55) mm long, outer ± half to nearly $^{2}/_{3}$ as long. *Flowers* white with speckled yellow nectar guides at bases of outer tepal limbs, claws of outer and sometimes inner tepals dotted orange or brown either side of midline with raised central ridge of velvety hairs; style branches blue-violet or white, then often flushed with blue; outer tepals 24–35 × 12–20 mm, claws ± 16 mm long, velvety in midline, limbs spreading to recurved distally; inner tepals (16–)24–30 × 9–13 mm, limbs ± spreading. *Filaments* 5–9 mm long, united below or broader and contiguous in lower ± 3 mm or free and not contiguous; anthers 3–6 mm long; pollen creamy white or pale mauve. *Ovary* 8–15 mm long, lightly ridged; style 2–3 mm long, branches 7–9 × 4–6 mm, crests ± 5 mm long. *Capsules* ± ellipsoid to ± cylindric, usually beaked, 20–30 × 14 mm. *Seeds* angular, dark brown. *Chromosome number* 2*n* = 20. *Flowering time*: sporadic during spring and summer, blooming earliest in areas of winter rainfall; lasting a single day, rarely two days.

Distribution and ecology: the most widespread and common species of the genus, extending from southern Western Cape, South Africa, near Riviersonderend, through eastern southern Africa to Kenya, also local in Angola where subsp. *angolensis* occurs; usually in shade in evergreen forest, often near streams, occasionally in thorn thicket.

Diagnosis: distinguished by its relatively small white flowers usually with pale blue-mauve to violet style branches, usually uniformly white inner tepals, and elongate capsule with a short beak. The capsules are roughly fissured longitudinally and usually tardily dehiscent, sometimes appearing indehiscent. Plants often produce



Distribution of ***Dietes iridioides*** subsp. ***iridioides***.

new clusters of leaves at the tips of old flowering stems, these arching to the ground where they take root.

Plants in the southern part of its range, in southern Western Cape between the Riviersonderend Mtns and Humansdorp have filaments united in the lower half and form a bulbous column towards the base. Further north in Eastern Cape, plants have filaments with similar broad bases but these are free although contiguous. Elsewhere filaments are narrower, with only slightly expanded bases and usually not contiguous.

3. **Dietes butcheriana** *Gerstner* in Journal of South African Botany 9: 149 (1943); Goldblatt: 150 (1981). Type: South Africa, [KwaZulu-Natal], Nkandla Forest, *Gerstner 601* [NH, lecto., designated by Goldblatt: 150 (1981)].

Plants mostly 500–900 mm high. *Stem* inclined, often somewhat flexuose, bearing sheathing leaves at upper nodes 30–60 mm long; irregularly few-branched, branches relatively short. *Foliage leaves* usually exceeding stem, up to 1 000 mm long, sword-shaped, 30–48 mm wide. *Rhipidia* ± obtuse or emarginate, dark green; inner 45–60 mm long, outer ± half as long. *Flowers* white with speckled yellow nectar guides at bases of outer tepals, claws of both whorls speckled orange, style branches white; outer tepals 30–35 × 13–20 mm, claws ± 12 mm long, densely hairy, limbs ± spreading; inner tepals 25–35 × ± 12 mm, limbs spreading. *Stamens* free; filaments ± 6 mm long, ± filiform throughout; anthers ± 4.5 mm long. *Ovary* ± 10 mm long; style ± 3 mm long, branches 7–9 × 6–8 mm, crests 5–10 mm long. *Capsules* subglobose, 25–35 × 20 mm, smooth, nodding, indehiscent, decaying to release seeds. *Seeds* angular, dark brown. *Chromosome number* 2*n* = 20. *Flowering time*: sporadic, mainly spring and summer; lasting a single afternoon.

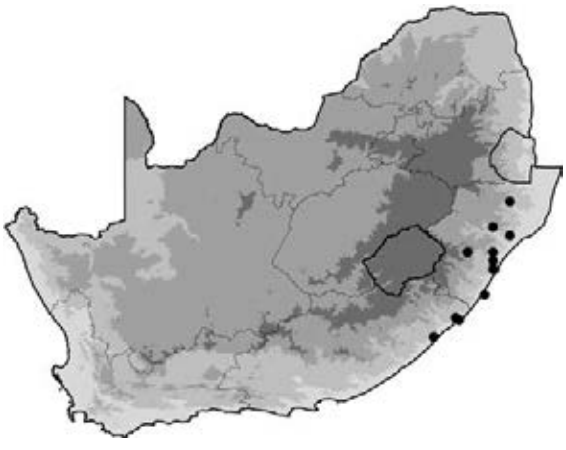
Distribution and ecology: South Africa, occurring in coastal KwaZulu-Natal and northern Eastern Cape as far south as Port St Johns; in shade in coastal and mistbelt forest.

Diagnosis: recognised by its very broad leaves, mostly 30–50 mm wide, *Dietes butcheriana* has white flowers closely resembling those of *D. iridioides* but with white rather than blue-purple flushed style branches. The large capsules, up to 35 × 20 mm, are pendent and have a smooth surface and rounded apex quite different from the beaked and wrinkled capsules of *D. iridioides* and are indehiscent, the walls slowly decaying to release the seeds.

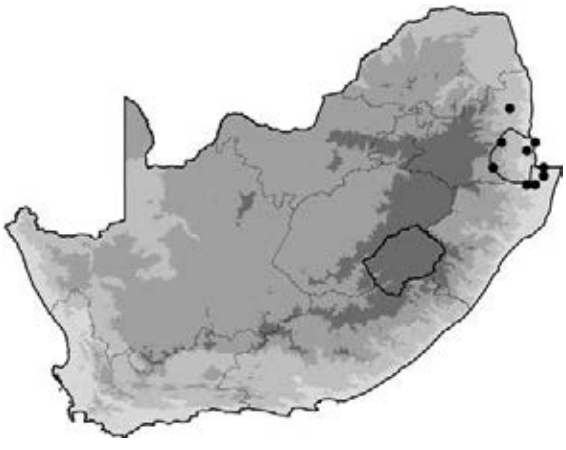
4. **Dietes flavida** *Oberm.* in Flowering Plants of Africa 38: t. 1488 (1967); Goldblatt: 148 (1981). Type: South Africa, [KwaZulu-Natal], Jozini Dam, *Admiraal 5293* (PRE, holo.).

Plants 500–700 mm high. *Stem* ± erect, inclined or trailing, bearing entirely sheathing, bract-like leaves 30–50 mm long at upper nodes, branching irregularly. *Foliage leaves* 300–500 mm long, narrowly sword-shaped, 15–22 mm wide; bract-like leaves at upper nodes entirely sheathing. *Rhipidial spathes* obtuse to emarginate; inner 40–50 mm long, outer ± half as long. *Flowers* pale yellow to creamy white, with speckled, orange-brown nectar guides at bases of outer tepal limbs and spotted on claws, inner tepal claws sometimes spotted brown in 2 lines; outer tepals 30–40 × 15–17 mm long, claws ± 15 mm long, limbs spreading; inner tepals smaller, 27–38 mm long, limbs spreading. *Stamens* free; filaments 4–6 mm long, broad and contiguous in lower half, filiform above; anthers 5–6 mm. *Ovary* 10–14 mm long; style 2–3 mm long, branches ± 8 × 3–4 mm, crests 5–10 mm. *Capsules* ovoid, nodding to pendent, smooth, 30–35 × ± 12 mm, dehiscing irregularly, not along suture lines. *Chromosome number* 2*n* = 20. *Flowering time*: sporadically during the summer months.

Distribution and ecology: occurring in the southern Lebombo Mtns of Eswatini, northern KwaZulu-Natal, South Africa, and adjacent southern Mozambique (possibly in southern Mpumalanga); along forest margins, cliffs and lightly shaded areas, sometimes along streams.



Distribution of ***Dietes butcheriana***.

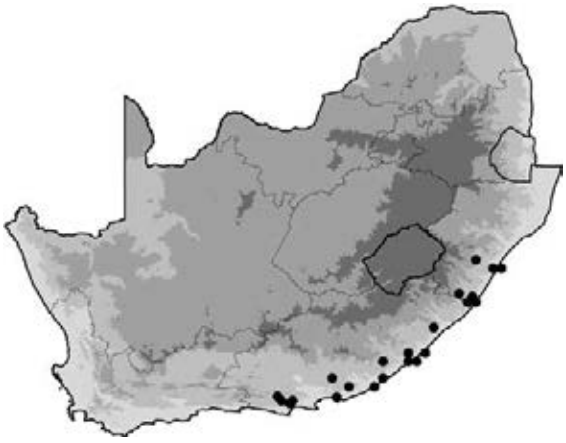


Distribution of ***Dietes flavida***.

Diagnosis: closely related to the widespread *Dietes iridioides* and easily confused with it, *D. flavida* has pale yellow flowers of much the same size and proportions and the outer tepals with brown-spotted nectar guides. The style branches are usually also creamy yellow or rarely very lightly flushed with purple, and the leaves have a greyish waxy covering. The capsules of *D. flavida* are ± ovoid, nodding to pendent, with a completely smooth surface and dehisce irregularly instead of along the carpel sutures. The ± cylindric capsules of *D. iridioides* are usually distinctly beaked, with an irregular, fissured surface, and eventually dehisce from the apex downwards for some distance, sometimes seemingly indehiscent.

5. **Dietes grandiflora** *N.E.Br.* in Journal of the Linnean Society, Botany 48: 35 (1928); Goldblatt: 150 (1981). Type: South Africa, [Eastern Cape], Kentani, *A. Pegler 484* (K, lecto., designated by Goldblatt: 150 (1981); BOL, isolecto.).

Plants mostly 1.1–1.5 m high. *Stem* erect, irregularly branched, bearing short, entirely sheathing bract-like leaves at upper nodes 25–50 mm long, apices obtuse apiculate. *Foliage leaves* 750–1 000 mm long, ± linear, 10–15(–20) mm wide. *Rhipidial spathes* obtuse to emarginate; inner 50–80 mm long, outer ± half as long. *Flowers* white, outer tepal limbs with velvety, yellow nectar guides at bases and dotted on claws, inner tepals streaked dark brown either side of white midline, style branches pale blue-mauve; outer tepals mostly 45–60 × 25–35 mm, claws 20–26 mm long, with a dense yellow beard along midline, limbs spreading or curving down distally; inner tepals (36–)40–45 × 22–25 mm, limbs spreading. *Stamens* free; filaments 10–13 mm long, broad and contiguous at bases tapering to slender upper half; anthers 7–10 mm long. *Ovary* 13–16 mm long; style ± 5 mm long, branches 12–20 × 6–8 mm, crests 12–15 mm long. *Capsules* ± ellipsoid, 28–45(–50) mm long, ridged and furrowed vertically. *Seeds* angular, dark brown. *Chromosome number* 2*n* = 20. *Flowering time*: sporadic, during spring and summer; usually lasting 3 days.



Distribution of ***Dietes grandiflora***.

Distribution and ecology: South Africa, extending from Inanda near Durban in southern KwaZulu-Natal in the north, to Grahamstown in Eastern Cape in the south; along the margins of bush and forest, sometimes along streams.

Diagnosis: the largest-flowered species of the genus, *Dietes grandiflora* is easily recognised not only by the larger flowers, which last three days in contrast to those of other members of the genus, but also by the floral markings. The white outer tepals are conspicuously marked with a velvety, yellow nectar guide at the base of the limbs, and a yellow velvety band in the centre of the claws while the inner tepals have dark brown lines either side of the pale midline. The flowers in well-grown plants may be up to 100 mm in diam.

The species is widely cultivated in areas of warm temperate and subtropical climates, and it will withstand light frost. Once established, the plants are extremely persistent even when neglected.

REFERENCES

BAKER, J. G. 1877 ['1878']. Systema Iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1892. *Handbook of the Irideae*. Bell, London.

BAKER, J. G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 9–171. Reeve & Co., London.

BROWN, N.E. 1928. The Iridaceae of Thunberg's Herbarium. *Journal of the Linnean Society, Botany*. 48: 34–42.

EATON, A. 1836. A botanical dictionary, edn. 4. Howe & Spaulding, New Haven.

GOLDBLATT, P. 1971. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460.

GAERTNER, J. 1788. *De fructibus seminibus plantarum*, vol. 1. Academiae Carolinae, Tübingen.

GERSTNER, F. J. 1943. *Dietes butcheriana* Gerstner. *Journal of South African Botany* 9: 149–151.

GOLDBLATT, P. 1981. Systematics, phylogeny and evolution of *Dietes* (Iridaceae). *Annals of the Missouri Botanical Garden* 68: 132–153.

GOLDBLATT, P. & MANNING, J.C. 2015. Two new subspecies of *Dietes* (Iridoideae), *D. iridioides* subsp. *angolensis* and *D. bicolor* subsp. *armeniaca*, and notes and range extensions in *D. butcheriana* and *D. iridioides*. *Bothalia* 45: 40–45.

KER GAWLER, J. 1811. *Iris moraeoides*. European moraea of Spanish nut. *Curtis's Botanical Magazine* 34: sub. t. 1407.

KITTEL, M.B. 1840. In A. Richard, *Nouveaux élémens de botanique*, edn. 3: 736 (German translation) (1840). Nürnberg.

KLATT, F.W. 1866. *Dietes* in Revisio Iridearum. *Linnaea* 34: 583–586.

KLATT, F.W. 1894 ['1895']. Irideae. In Th. Durand & H. Schinz, Conspectus florae africae 5: 143–230. Jardin botanique de l'Etat, Bruxelles etc.

LINDLEY, J. 1827. *Moraea catenulata*. Chain-dotted moraea. *Edwards's Botanical Register* 13: t. 1074
LINDLEY, J. 1831. *Iris bicolor*. Two-coloured iris. *Edwards's Botanical Register* 17: t. 1404.
LINNEAUS, C. 1767. *Mantissa plantarum*, vol. 1. Salvius, Stockholm.
LINNEAUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.
LODDIGES, G. 1832. *Iris crassifolia*. *The Botanical Cabinet* 19: t. 1861. C. Loddiges & Sons, London.
MEDIKUS, F.C. 1790. De diversa florum structura respectu cololarum. *Historiae et Commentationes Academiae Electoralis Scientiarum et Elegantiarum Theodosa-Palatinae* 6: 414–443.
MILLER, P. 1758. *Figures of plants* 2: t. 238, f. 1. P. Miller, London.
MOENCH, C. 1794. *Methodus plantas*. Libraria Academiae, Marburg.
OBERMEYER, A.A. 1967. *Dietes flavida*. *Flowering Plants of Africa* 38: t. 1488.
SALISBURY, R.A. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SALISBURY, R. A. 1812. On the cultivation of rare plants, etc. *Transactions of the Horticultural Society of London* 1: 261–360.
SPAE, D. 1846. *Dietes bicolor*. *Annales Societe Royale Agricole de Gand* 2: 233–234.
STEUDEL, E.G. 1841. *Nomenclator botanicus*, edn. 2. J.G. Cottae, Stuttgart & Tübingen.
SWEET, R. 1830. *Hortus britannicus*, edn. 2. Ridgeway, London.
SWEET, R. 1839. *Hortus britannicus*, edn. 3. Ridgeway, London.



Plate 74. A, ***Dietes bicolor*** subsp. ***armeniaca***, cultivated; B, ***D. butcheriana***, cultivated; C, ***D. grandiflora***, cultivated; D, ***D. bicolor*** subsp ***bicolor***, cultivated; E, ***D. flavida***, cultivated; F, ***D. iridoides*** subsp. ***iridoides***, Pietermaritzburg, KZN.

34. **Bobartia**

Bobartia *L.*, Species plantarum: 54 (1753). Type: *B. indica* L.

[*Hecaste* Sol. ex Schumach.: 10 (1793), invalid name only in synonymy.]

Revisionary account: Strid: 1–45 (1974).

Named for Jakob Bobart (1641–1719), German botanist and first curator of the botanic garden at Oxford, England.

Evergreen, mostly tufted perennials with creeping or erect rhizomes, often compact and corm-like. *Flowering stem* aerial, terete or flattened, usually with basal internode greatly elongated, laxly paniculately branched with sticky internodes in two species, smooth or minutely striate-furrowed. *Leaves* several, mostly basal, linear in 2 ranks or terete and usually resembling flowering stem, smooth or minutely striate-grooved, sometimes long and trailing, uppermost cauline leaf (spathe) subtending inflorescence, either green and leaf-like or dry and fibrous; margins when leaves plane with submarginal sclerenchyma without marginal vein. *Individual inflorescences* few- to several-flowered rhipidia, each solitary or usually few to many crowded in a tight cluster subtended by a prominent bract, usually with several additional overlapping bracts; rhipidial spathes green and leathery; pedicels ± hairy distally. *Flowers* actinomorphic, fugaceous, stellate or rotate, usually yellow, rarely deep blue (blue-mauve), unscented; with traces of nectar from septal nectaries; tepals free or rarely united in a short tube, subequal, spreading, without obvious claws. *Stamens* free, suberect; filaments slender; anthers yellow. *Ovary* excluded or included in rhipidial spathes, obovoid to top-shaped, smooth or tuberculate; style short, dividing into 3 filiform branches extending between filaments, stigmatic apically. *Capsules* ovoid-truncate, woody, with septa separating from central axis. *Seeds* numerous, angular. *Pollen grains* monosulcate, exine reticulate. *Basic chromosome number x* = 10.

Species 17, South Africa, in Western Cape and Eastern Cape, mainly on sandstone slopes or sandy flats in fynbos.

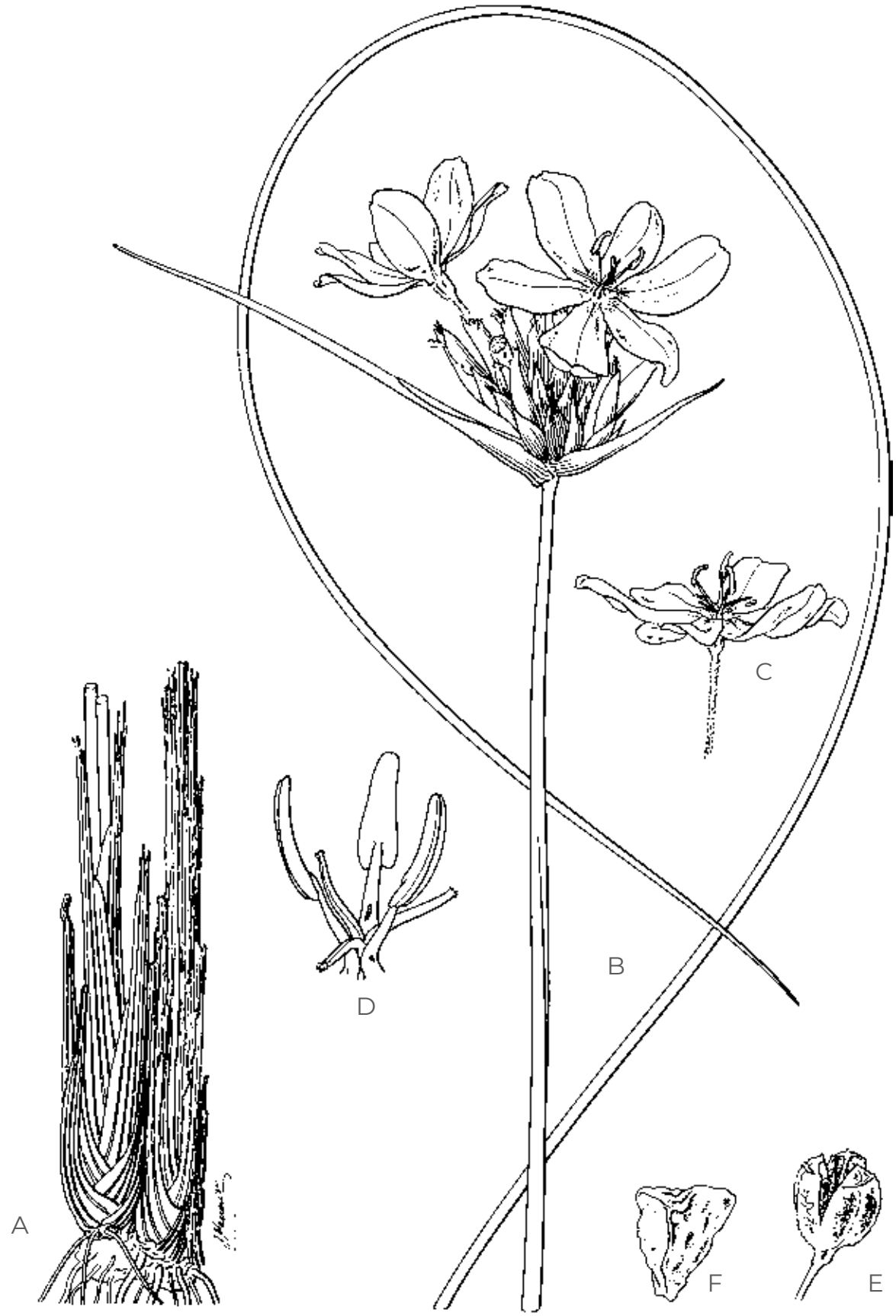
The genus comprises evergreen, often tufted, rhizomatous perennials with tough, fibrous leaves, these either plane and isobilateral or terete in section. The rhizomes are short and contracted, with each season's growth resulting in a rounded, corm-like increment. In most species the flowering stem consists of the basal, much elongated internode, and in many species both stems and leaves bear fine, longitudinal intercostal furrows containing the stomata surrounded by papillae or short hairs. The pedicels are ± hairy in the upper part just beneath the ovary and the flowers are rotate with six, subequal, spreading tepals, free suberect stamens, and a short style dividing into three slender branches stigmatic only at the tips. The individual inflorescences are few-flowered rhipidia. In most species these are crowded into a more-or-less dense head (a synflorescence), but *Bobartia paniculata* and *B. lilacina* have a laxly branched stem, the branches with sticky nodes and each bearing a single rhipidium. Similar branched stems with sticky nodes are characteristic of the early branching lineages in both *Ferraria* and *Moraea* and thus may represent the ancestral condition. The flowers are similar throughout the genus and yellow, except in *B. lilacina*, which has dark blue (blue-mauve) flowers. *Bobartia anceps* and *B. macrospatha* are exceptional in having the ovary included in the spathes, with the perianth usually exserted on a short tube.

There is an evident transition series from the laxly branched stem with two or three well-developed internodes in *Bobartia lilacina*, through *B. paniculata*, in which the stem is formed largely from the basal internodes but the flowering stem is laxly branched, to the remaining species in which the unbranched stem is formed entirely from the basal internode with several to many rhipidia crowded in a somewhat head-like synflorescence.

Molecular DNA sequence data associate *Bobartia* with the other genera of African Iridoideae *Dietes, Ferraria* and *Moraea*, where it appears most closely allied to *Dietes*, with which it shares hairy pedicels and the presence of fibres in the phloem tissue of the leaves. The morphologically simple flowers are evidently a reversal from the more complex *Iris*-type characterised by dimorphic tepal whorls and petaloid style branches.

The two species with laxly branches stems, *Bobartia lilacina* and *B. paniculata*, were segregated from the remaining species as sect. *Ramosae* by Lewis (1945) but the detailed anatomical investigations by Strid (1974) suggest that the relationships among the species are more complex. On the basis of stem anatomy Strid (1974) recognised three groups of species: 1. Stem without sclerenchyma strands; stomatal furrows and hairs lacking; cuticle thin; vascular bundles without sclerenchyma caps (*B. lilacina*); 2. Stem with sclerenchyma strands; stomatal furrows and hairs lacking; cuticle thick; vascular bundles with sclerenchyma caps (*B. filiformis, B. gladiata, B. paniculata*); 3. Stem with sclerenchyma strands; stomatal furrows and hairs present; cuticle thick; vascular bundles with sclerenchyma caps (all other species). Combining these anatomical observations with inflorescence structure suggests to us that a more natural classification recognises the four sections *Ramosae*, *Paniculatae*, *Gladiatae* and *Bobartia*.

Microscopic examination is necessary to determine whether or not the stomata are confined to intercostal furrows, especially in dried specimens where shrinkage



BOBARTIA. ***B. indica***: A, rhizome; B, flowering stem and leaf; C, flower; D, detail of stamens and style. ***B. fasciculata***: E, dehiscing capsule; F, seed.

causes superficial intercostal striations to form between the subdermal sclerenchyma ridges in those species in which they are present. The stems of *Bobartia lilacina* are unique in lacking sclerenchyma strands and are thus always smooth whereas those of *B. filiformis, B. gladiata* and *B. paniculata* are smooth when fresh but develop minute, shallow intercostal grooves when dry. The remaining species have stems that are finely and closely striate, with the papillae or hairs that occlude the stomatiferous intercostal furrows evident under high magnification.

The taxonomy of the genus remains problematic, despite the careful work by Strid (1974), and the circumscriptions of some species remain to be fully resolved.

Flowers in *Bobartia* last less than a day each, but preliminary observations reveal differences in the timing of anthesis among species, viz. flowers of *Bobartia indica* open mid-morning and fade mid-afternoon whereas those of *B. gladiata* open only in the late afternoon. Detailed observations are lacking for other species.

Key to sections and species

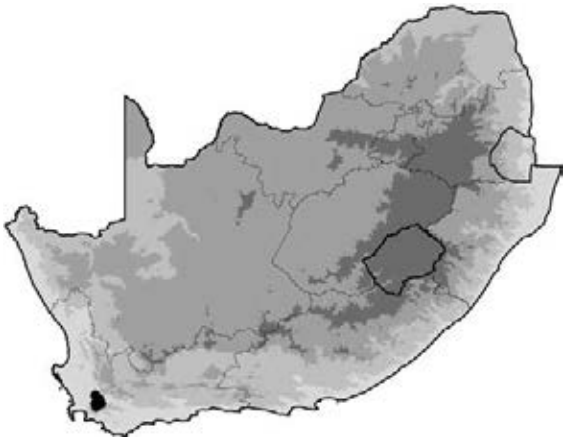
1a Rhipidia solitary and terminal on branches; stems sticky below nodes; leaves plane:
2a Stem with lower 2 internodes both well-developed; flowers deep blue (blue-mauve) [sect. 1. *Ramosae*] . . . . . 1. *B. lilacina*
2b Stem with lowermost internode greatly elongated and succeeding ones reduced; flowers yellow [sect. 2. *Paniculatae*]. . . . . 2. *B. paniculata*
1b Rhipidia several and congested, usually ± capitate in crowded synflorescence; stem not sticky below nodes:
3a Stem without stomatal furrows (smooth when fresh but shallowly grooved when dry), often linear and flattened; spathes always leaf-like; rhipidia only 1 to 6 per stem [sect. 3. *Gladiatae*]:
4a Stem 2.5–8.0 mm wide; synflorescence strongly flattened; inner rhipidial spathes 25–65 mm long . . . . . 5. *B. gladiata*
4b Stem up to 2 mm wide; synflorescence of 1 or more rhipidia but not flattened; inner rhipidial spathes 25–45 mm long:
5b Stem linear, ± 2 mm wide; synflorescence of 3 to 6 rhipidia; plants from Outeniqua Mtns . . . . . 3. *B. vlokii*
5b Stem linear or terete and up to 1.5 mm diam.; synflorescence of a solitary (rarely 2 or 3) rhipidium; plants from west of the Langeberg . . . . . .4. *B. filiformis*
3b Stem with numerous, fine stomatal furrows (apparently smooth at low magnification but with numerous, fine furrows lined with papillae or hairs visible at higher magnification), usually terete; subtending bract either leaf-like or dry and fibrous; rhipidia few to many crowded together [sect. 4. *Bobartia*]:
6a Ovary not exserted from rhipidial spathes and capsules remaining enclosed; pedicels 2–6 mm long; perianth tube absent or up to 7 mm long:
7a Stem and leaves terete or subterete; subtending bract ± brown and fibrous, dilated and partly sheathing synflorescence; rhipidia up to 15 in an obovoid head, suberect, inner spathe mostly 15–20 mm long; capsules 8–10 mm long . . . . . 16. *B. macrospatha*
7b Stem and leaves flat, rarely subterete; subtending bract green and leaf-like, narrow, not much expanded at base or sheathing synflorescence; rhipidia 15 to 40 in a globose head, spreading, inner spathe 12–15 mm long; capsules subglobose to broadly oblong, 5–8(–10) mm long. . . . . 17. *B. anceps*
6b Ovary and capsule exserted from rhipidial spathes; pedicels at least 8 mm long; perianth tube always lacking:
8a Subtending bract fibrous, grey or brown, dilated or expanded and ± sheathing young synflorescence:
9a Plants 150–400 mm high, slender; synflorescence narrow, of 3 to 7 rhipidia, ± completely enclosed by dark reddish or chestnut-brown subtending bract; capsules smooth; plants from Langeberg . . . . . .15. *B. parva*
9b Plants > 500 mm high; synflorescence of > 12 rhipidia; capsules smooth or tuberculate:
10a Stem 3–6 mm diam.; subtending bract usually green in upper part; tepals 20–32 mm long, inner > half as wide as outer; capsules conspicuously rugose to muricate; plants from southern coastal regions . . . . 14. *B. robusta*
10b Stem 1–4 mm diam.; subtending bracts usually entirely dry; tepals 16–23 mm long, inner half as wide as outer; capsules smooth to tubercled, plants from west coast mountains:
11a Synflorescence globose with rhipidia in distinct fascicles of 2 to 6; outer rhipidial spathe greyish brown and much shorter than inner spathes . . . . . 12. *B. fasciculata*
11b Synflorescence obconic, flat-topped, with rhipidia not or indistinctly grouped in fascicles; outer rhipidial spathe dark reddish brown, acuminate and not much shorter than inner spathe . . . . . 13. *B. rufa*
8b Subtending bract narrow, leaf-like, green or with a well-developed foliar tip, not or scarcely sheathing young synflorescence:
12a Leaves flexible, much longer than stem; subtending bract suberect or horizontally spreading; pedicel densely villous distally . . . . . 8. *B. indica*
12b Leaves about as long as stem; subtending bract usually suberect or erect; pedicels puberulous to villous:
13a Synflorescence of 10–80(–120) rhipidia; inner rhipidial spathes 10–18 mm long; capsules 4–6 mm long . . . . . 9. *B. orientalis*
13b Synflorescence of up to 10(–20) rhipidia; inner rhipidial spathes 18 mm or more long:
14a Ovary and capsules papillate or tubercled; subtending bract often greatly prolonged appearing as an extension of stem, synflorescence thus apparently lateral . . . . . 11. *B. aphylla*
14b Ovary and capsule smooth:
15a Capsules subglobose, strongly trilobed, 5–8 mm long. . . . . 10. *B. gracilis*
15b Capsules obovoid to top-shaped, 10–19 mm long:
16a Synflorescence shortly pedunculate; plants from Humansdorp to Grahamstown . . . . . 7. *B. macrocarpa*
16b Synflorescence usually sessile; plants from west of the Breede River . . . . . .6. *B. longicyma*

Sect. 1. **Ramosae** *G.J.Lewis* in Journal of South African Botany 11: 108 (1945). Type: *Bobartia lilacina* G.J.Lewis, lecto., designated here.

Flowering stem with lower 2 internodes subequally developed, laxly branched in upper half, sticky below nodes, without stomatal furrows or hairs and smooth when fresh and dry; anatomically without sclerenchyma strands, vascular bundles without sclerenchyma caps, cuticle thin. *Leaves* plane, linear. *Rhipidia* solitary at branch tips, spathes green, without associated bracts. *Flowers* blue to mauve.

1. **Bobartia lilacina** *G.J.Lewis* in Journal of South African Botany 11: 108 (1945). Type: South Africa, [Western Cape], Franschhoek Pass, Villiersdorp side, lower rocky slopes of Gem Peak, *E. Esterhuysen 11441* (SAM, holo.; BOL, iso.).

Plants 300–700 mm high. *Rhizome* short, erect, 5–15 mm diam. *Stem* 2 or 3 internodes long, terete or subterete, elliptic in section toward base, smooth, 2.5–4.0 mm diam. near base, laxly branched in upper $^1/_2$, viscid for some distance below nodes. *Foliage leaves* 6 to 11 in a basal fan, $^1/_3$ to $^1/_2$ as long as stem, linear, 4–11 mm wide, striate, uppermost leaf with plane blade, 30–100 mm long, well separated from first branch. *Rhipidia* solitary on slender branches; pedicels puberulous; spathes sometimes flushed purple, with translucent or brown-speckled membranous margins and apices; outer ± $^1/_3$ to $^1/_4$ as long as inner, 5–7 mm long, inner 15–22 mm long. *Flowers* deep blue (blue-mauve); tepals free, elliptic, outer 14–18 × 6–8 mm, inner slightly smaller. *Filaments* 4–6 mm long, pale blue-mauve; anthers ± 5 mm long, yellow. *Ovary* exserted, smooth; style 1–2 mm long, branches 5–7 mm long. *Capsules* obovoid to subglobose, smooth, 4–7 mm long. *Chromosome number* 2*n* = 20. *Flowering time*: January to March.



Distribution of ***Bobartia lilacina***.

Distribution and ecology: a narrow endemic of the mountains from Bain's Kloof to Franschhoek Pass in Western Cape, South Africa; restricted to cooler, S-facing sandstone slopes, from 600–1 500 m elevation, flowering mainly after fire.

Diagnosis: unique in the genus in the laxly branched stem and blue to blue-mauve flowers. The terete or subterete flowering stem, with conspicuously viscid or sticky patches below the nodes, is well differentiated from the plane leaves. The lowermost cauline leaf or spathe is inserted in the lower $^1/_3$ of the flowering stem and is leaf-like, with a short unifacial blade. The only other species with a similar laxly branched stem with sticky internodes, *Bobartia paniculata*, has yellow flowers and a bract-like spathe inserted in the upper $^1/_3$ of the stem at the top of a conspicuously elongated internode.

Sect. 2. **Paniculatae** *J.C.Manning & Goldblatt*, new section. Type: *Bobartia paniculata* G.J.Lewis

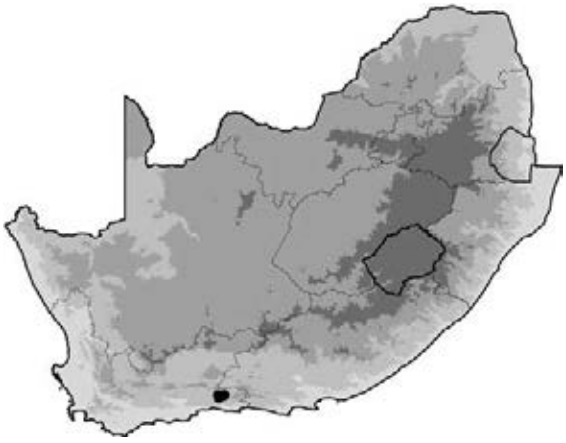
Flowering stem with basal internode greatly elongated, several-branched above, without stomatal furrows and hairs, smooth when fresh but shallowly grooved when dry; anatomically with sclerenchyma strands, vascular bundles with sclerenchyma caps, cuticle thick. *Leaves* plane, linear, unifacial. *Rhipidia* solitary on short branches, internodes sticky; subtending bract reduced and leaf-like. *Flowers* yellow.

2. **Bobartia paniculata** *G.J.Lewis* in Journal of South African Botany 7: 50 (1941). Type: South Africa, [Western Cape], Kamanassie Mts., lower slopes, *Zinn s.n.* (SAM 54287, holo.; BOL, iso.).

Plants 300–1 000 mm high, forming large, loose tufts. *Rhizome* compact and corm-like, ± 20 mm diam. *Stem* consisting of 1 long basal internode, slightly flattened, elliptic in section, 2–4 mm diam. near base, striate when dry but without stomatiferous furrows, branching in upper $^1/_3$, forming a hemispherical, ± laxly panicle. *Foliage leaves* 4 to 8 in a basal fan, ± $^2/_3$ as long as flowering stem, linear, 3–7 mm wide, striate. *Rhipidia* several, solitary at branch tips, together forming a lax panicle, on branches 10–30 mm long subtended by leaf-like bract with unifacial blade, 20–50 mm long, immediately associated with next bract, internodes viscid; pedicels subglabrous; spathes with translucent membranous margins and brownish apices; outer ± $^1/_3$ as long as inner, 4–7 mm long, inner 14–20 mm long. *Flowers* yellow; tepals free, elliptic, outer 10–16 × 4–6 mm, inner slightly smaller. *Filaments* 2–3 mm long; anthers ± 3 mm long. *Ovary* exserted, smooth; style 1–2 mm long, branches 3–4 mm long. *Capsules* broadly obovoid to subglobose, smooth, 6–10 mm long. *Flowering time*: December to February.

Distribution and ecology: endemic to the Kamanassie Mtns east of Oudtshoorn in Western Cape, South Africa; relatively common on the upper southern slopes of Mannetjiesberg, from 1 200–1 800 m elevation, flowering mainly after fire.

Diagnosis: distinguished by the hemispherical, paniculate inflorescence with sticky internodes and relatively small, yellow flowers. The basal internode of the stem is conspicuously elongated, with the inflorescence thus clearly borne at the tip. This is intermediate between the inflorescence type in *Bobartia lilacina*, in which the two or three lower internodes are subequally developed, and the remaining species in the genus, which have only the lowermost internode elongated and a congested inflorescence. The stem lacks stomatiferous furrows and is thus smooth when fresh but the presence of peripheral longitudinal sclerenchyma strands causes it to become slightly striate when dry.



Distribution of ***Bobartia paniculata***.

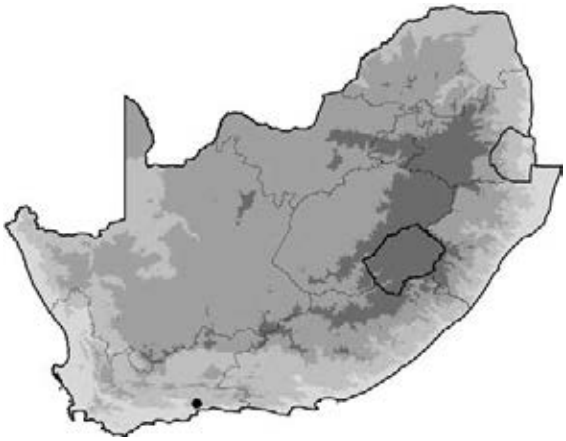
Sect. 3. **Gladiatae** *J.C.Manning & Goldblatt*, new section. Type: *Bobartia gladiata* (L.f.) Ker Gawl.

Flowering stem with basal internode elongated, without stomatal furrows and hairs, smooth when fresh but shallowly grooved when dry; anatomically with sclerenchyma strands, vascular bundles with sclerenchyma caps, cuticle thick. *Leaves* plane and linear or terete. *Rhipidia* sessile, single or several crowded in a compact, flattened synflorescence. *Flowers* yellow.

3. **Bobartia vlokii** *Goldblatt & J.C.Manning*, new species. Type: South Africa, Western Cape, Outeniqua Mtns, Jonkersberg, upper southern slopes of Skurweberg, in wet, peaty soil, 24 Oct. 1998, *J.H.J. Vlok 1654* (NBG, holo.; MO, iso.).

Plants 300–550 mm high, usually solitary or forming small tufts. *Rhizome* compact and corm-like, ± 10 mm diam. *Stem* formed by basal internode only, subterete to slightly flattened and elliptic in section or linear, often twisted, ± 2 mm diam., striate when dry but without stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal tuft, shorter than flowering stem, linear or subterete, often twisted, ± 1 mm wide, striate. *Rhipidia* 3 to 6, sessile crowded together, subtended by erect, leaf-like, rigid bract, 50–70 mm long; spathes grey-green, outer 10–15 mm long, inner 25–30 mm long; pedicels puberulous. *Flowers* yellow, sometimes flushed reddish on reverse; tepals free or connate at base, elliptic, outer 22–25 × 6–10 mm, inner slightly smaller. *Filaments* 3–4 mm long; anthers ± 6 mm long. *Ovary* shortly exserted, smooth; style ± 3 mm long, branches ± 4 mm long. *Capsules* obovoid, smooth, 8–10 mm long. *Flowering time*: October to November.

Distribution and ecology: restricted to the upper southern slopes of the Outeniqua Mtns near Mossel Bay, Western Cape, South Africa, recorded from Ruitersberg and Jonkersberg; in wet peaty soil on steep south-facing slopes from 800 to 1 200 m elevation.



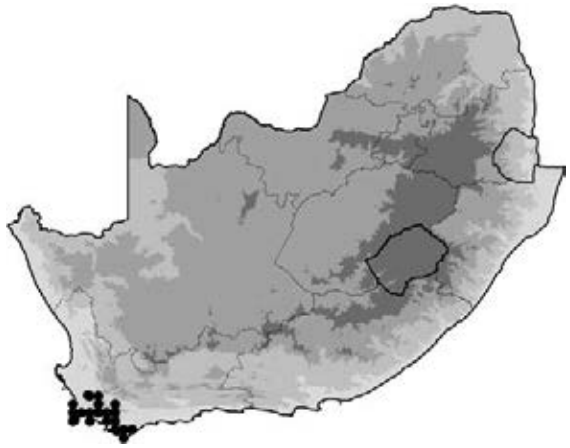
Distribution of ***Bobartia vlokii***.

Diagnosis: closely resembling *Bobartia filiformis* in stature and appearance, and anatomically in lacking stomatiferous furrows on the stem and leaves, but distinguished from it by the more numerous rhipidia, 3 to 6 per stem vs 1 (rarely 2 or 3) in *B. filiformis*.

Additional specimens

South Africa, Western Cape, 3322 (Oudtshoorn): Outeniqua Mtns, middle slopes of Ruitersberg, deep, wet, peaty soils on steep south-facing slope, (–CC), 24 Oct. 1986, *J.H.J. Vlok 1660* (MO, NBG); 7 Dec. 1986 [fruiting], *J.H.J. Vlok 1756* (MO, NBG).

4. **Bobartia filiformis** *(L.f.) Ker Gawl.*, Iridearum genera: 30 (1827). *Moraea filiformis* L.f.: 100 (1782). *Sisyrinchium filiforme* (L.f.) Spreng.: 166 (1824). *Marica filiformis* Ker Gawl.: t. 229 (1817). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* [UPS-THUNB 1215, lecto., designated by Strid: 22 (1974)].



Distribution of ***Bobartia filiformis***.

Plants 150–550 mm high, usually solitary or forming small tufts. *Rhizome* compact and corm-like, 5–10 mm diam. *Stem* consisting of basal internode only, subterete to linear and elliptic in section, 0.5–1.5 mm diam., striate when dry but without stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal tuft, shorter than flowering stem, linear or subterete, often twisted, 0.5–2.0 mm wide, striate. *Rhipidia* 1 (rarely 2 or 3), subtended by erect, leaf-like bract, usually shorter than rhipidia, 15–65 mm long; spathes grey-green, outer 7–16 mm long, inner 25–45 mm long; pedicels subglabrous or sparsely pubescent. *Flowers* yellow, sometimes speckled near base, often flushed reddish on reverse; tepals free or connate at base, elliptic, outer 17–26 × 8–13 mm, inner slightly smaller. *Filaments* 3.5–6.0 mm long; anthers ± 6 mm long. *Ovary* shortly exserted, smooth; style 1.5–3.0 mm long, branches 4–6 mm long. *Capsules* broadly obovoid, smooth, 8–12 mm long. *Chromosome number* $2n = 20$. *Flowering time*: September to December.

Distribution and ecology: restricted to the mountains in extreme southwestern Western Cape, from Michell's Pass near Ceres to the Cape Peninsula and Hottentots Holland Mtns to Bredasdorp, South Africa; mainly on S-facing sandstone slopes or moist flats, flowering best after fire.

Diagnosis: a small, slender species up to 550 mm high but often less, typically with a solitary rhipidium (rarely two or three) on a slender, plane, linear or subterete stem up to 1.5 mm diam. The stems and leaves are faintly striate but lack fine, stomatiferous furrows. Larger plants with two or three rhipidia are difficult to separate from *Bobartia gladiata*, and the two species may hybridise.

5. **Bobartia gladiata** *(L.f.) Ker Gawl.*, Iridearum genera: 30 (1827). *Ixia gladiata* L.f.: 93 (1782). *Moraea gladiata* (L.f.) Thunb.: 8 (1787). *Marica gladiata* (L.f.) Ker Gawl.: t. 229 (1817). *Sisyrinchium gladiatum* (L.f.) Spreng.: 166 (1824). Type: South Africa, without precise locality, *Sparrman s.n.* (LINN, probable holo.).

Plants 200–800 mm high, usually solitary or forming small tufts. *Rhizome* compact and corm-like, 10–25 mm diam. *Stem* formed by basal internode only, usually flattened and 2.5–8.0 mm wide, rarely subterete and 2–3 mm diam., striate when dry but without stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal fan, usually ± as a long as and resembling stem. *Rhipidia* 3 to 12 alternating in laterally flattened cluster subtended by erect, leaf-like, rigid bract, 20–120 mm long; pedicels sparsely to densely pubescent distally; spathes with outer greyish green or purplish, ± keeled, 7–16 mm long, inner green, 25–65 mm long. *Flowers* yellow, tepals sometimes speckled near base, sometimes flushed reddish on reverse; tepals free or connate at base, elliptic, outer 22–34 × 10–17 mm, inner slightly smaller. *Filaments* 3.0–4.5 mm long; anthers ± 9 mm long. *Ovary* shortly exserted, smooth; style 2–3 mm long, branches 4.5–7.0 mm long. *Capsules* obovoid, smooth, 9–16 mm long. *Chromosome number* $2n = 20$. *Flowering time*: September to December.

Distribution and ecology: restricted to the mountains in southwestern Western Cape, South Africa, from Bain's Kloof to Hermanus; on sandstone slopes in sandy places, mainly between 300–950 m elevation, flowering best after fire.

Diagnosis: usually readily recognised by the linear, flattened stems and leaves and the compressed inflorescence, but some forms have subterete or rarely terete leaves and stems. The stems and leaves are striate but lacking fine, stomatiferous furrows. Although microscopic, this character is reliable for separating terete-stemmed forms of the species from other, superficially similar species. Smaller, more delicate forms with only 3 rhipidia are difficult to distinguish from *Bobartia filiformis*.

Highly variable in size, three subspecies are recognised in *Bobartia gladiata*. The typical subspecies is characterised by flattened leaves and stem mostly up to 5 mm wide, and an inflorescence of 3 to 7 rhipidia. Plants from the southern Cape Peninsula with broader leaves 5–8 mm wide and an inflorescence of 6 to 12 rhipidia are segregated as subsp. *major*, and those with subterete or terete leaves and stems are treated as subsp. *teres*.

Key to subspecies

1a Leaves terete or subterete, 1.5–3.0 mm diam. . . . . 5c. subsp. *teres*
1b Leaves flat:
  2a Leaves 2.5–5.0 mm wide; rhipidia 3 to 7 per inflorescence . . . . . 5a. subsp. *gladiata*
  2b Leaves 5.0–8.0 mm wide; rhipidia 6 to 12 per inflorescence . . . . . 5b. subsp. *major*

5a. subsp. **gladiata**

Stem and leaves flat or rarely stem subterete, 2.5–5.0 mm wide. *Rhipidia* 3 to 7 per stem.

Distribution and ecology: throughout the range of the species but replaced by subsp. *major* in the southern Cape Peninsula; on seasonally moist sandy flats.

5b. subsp. **major** *(G.J.Lewis) Strid* in Opera Botanica 37: 24 (1974). *Bobartia gladiata* var. *major* G.J.Lewis: 50 (1941). Type: South Africa, [Western Cape], Cape Peninsula, Patrys Vlei, *T.M. Salter s.n.* (SAM, holo.).

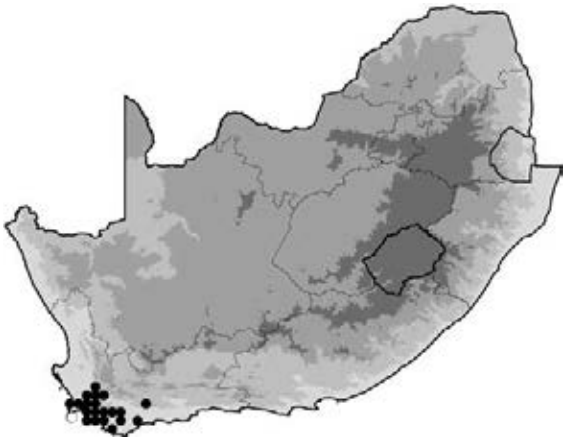
Stem and leaves flat, 5–8 mm wide. *Rhipidia* 6 to 12 per stem.

Distribution and ecology: restricted to the extreme southern Cape Peninsula, between Smitswinkel and Olifantsbosch, near seasonally marshy flats.

5c. subsp. **teres** *Strid* in Opera Botanica 37: 25 (1974). Type: South Africa, [Western Cape], Stellenbosch Division, western slopes of Helderberg, *Gillett 3749* (BOL, holo.; BM, BOL, K, SAM, iso.).

Stem and leaves subterete or rarely terete, 1.5–3.0 mm diam. *Rhipidia* 3 to 7 per stem.

Distribution and ecology: scattered through most of the range of the species, from Bain's Kloof to Hangklip.



Distribution of ***Bobartia gladiata*** subsp. ***gladiata*** and subsp. ***teres***, ●; subsp. ***major***, ○.

The status of this taxon is unclear. Some plants are evidently merely extreme variants of subsp. *gladiata*, but Strid (1974) also speculated that it may represent a stabilised hybrid swarm between *Bobartia gladiata* and *B. longicyma*.

Sect. 4. **Bobartia**

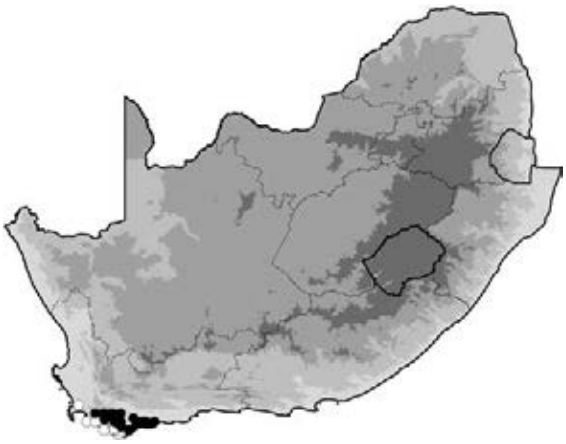
Flowering stem with basal internode greatly elongated, striate with numerous, fine stomatal furrows lined with papillae or short hairs; anatomically with sclerenchyma strands, vascular bundles with sclerenchyma caps, cuticle thick. *Leaves* usually terete, rarely flattened. *Rhipidia* sessile, several to many, congested but not flattened, with associated inflorescence bracts. *Flowers* yellow, rarely with well-developed perianth tube.

6. **Bobartia longicyma** *Gillett* in Journal of Botany, British and foreign 68: 104 (1930). Type: South Africa, [Western Cape], Caledon, Swartberg, 1300 ft [430 m], Oct. 1899, *H. Bolus 9158* (BOL, holo.).

Plants 0.5–1.8 m high, sometimes forming large tussocks. *Rhizome* compact and corm-like, 10–20 mm diam. *Stem* formed by basal internode only, terete, 1.5–4.0 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 8 in a basal tuft, ± as long as flowering stem, resembling stem but slightly thinner. *Rhipidia* 2 to 20, straight or curved, in a triangular or hemispherical head, subtended by erect, green, terete bract, sometimes extended in a long pungent tip; pedicels densely puberulous distally; outer rhipidial spathe and associated bracts firm textured, usually greenish or purplish, 8–20 mm long, ovate, often with dry papery tips, inner spathe 20–40 mm long, dull green. *Flowers* yellow, usually with reddish spots and reddish midline on reverse; tepals free, elliptic or oblong, outer 16–39 × 6–20 mm, inner slightly smaller. *Filaments* 2.5–4.0 mm long; anthers 6–9 mm long. *Ovary* scarcely or shortly exserted, smooth; style 2–3 mm long, branches 4.5–6.6 mm long. *Capsules* exserted, ovoid to narrowly ovoid, truncate or with shortly conical apex, smooth, 10–19 mm long, greyish to brown. *Flowering time*: mainly August to November, rarely to January.

Distribution and ecology: relatively common in southern Western Cape, South Africa, from Betty's Bay to the Breede River Mouth, with one record from the Cape Flats; mainly on sandy flats at low altitudes, flowering best after fire.

Diagnosis: a relatively poorly defined species recognised by its erect, leaf-like bract subtending the synflorescence



Distribution of ***Bobartia longicyma*** subsp. ***longicyma***, ●; subsp. ***magna***, ○.

and mostly relatively long rhipidia, the bracts often dry and papery at the tips, and the inner rhipidial spathe 20–40 mm long.

Strid (1974) recognised three subspecies but subsp. *microflora* from Potberg grades imperceptibly into subsp. *longicyma* and appears to represent merely the smaller extreme of that taxon.

Key to subspecies

1a Rhipidia 2 to 5, suberect, in narrowly obtriangular synflorescence; occurring east of Caledon . . . . . 6a. subsp. *longicyma*

1b Rhipidia 5 to 25, suberect or spreading, in hemispherical synflorescence; occurring west of Caledon . . . . . 6b. subsp. *magna*

6a. subsp. **longicyma**

Bobartia longicyma subsp. *microflora* Strid in Opera Botanica 37: 27 (1974), new synonym. Type: South Africa, [Western Cape], Bredasdorp Division, Potberg above Potberg Farm, ± 260 m, *Dahlgren & Strid 3637* (NBG, holo.; K, LD, iso.).

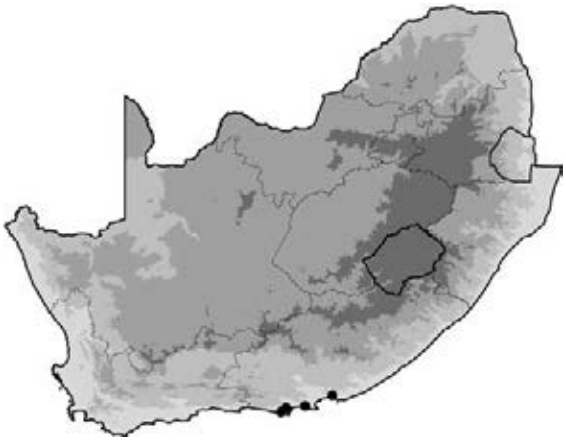
Distribution and ecology: from Caledon and Riviersonderend eastward to Potberg and the Breede River Mouth.

6b. subsp. **magna** *Gillett ex Strid* in Opera Botanica 37: 26 (1974). Type: South Africa, [Western Cape], Caledon Division, sandy flats ± 7 miles east of Stanford, ± 160 m, *Dahlgren & Strid 3699* (NBG, holo.; K, LD, iso).

Distribution and ecology: from the Cape Flats and Betty's Bay along the coast to Elim.

7. **Bobartia macrocarpa** *Strid* in Opera Botanica 37: 33 (1974). Type: South Africa, [Eastern Cape], grassy hillside, Port Elizabeth to East London, ± 150 ft [45 m], *Batten s.n.* (NBG, holo.).

Plants up to ± 1 m high, sometimes forming tussocks. *Rhizome* compact and corm-like, 10–20 mm diam. *Stem* formed by basal internode only, terete, ± 3 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal tuft, terete, ± as long as flowering stem, resembling stem but slightly thinner. *Rhipidia* 2 to 6, sessile, crowded in a triangular head on a short peduncle subtended by erect, green, terete bract, sometimes extended in a long pungent tip appearing as a continuation of stem; pedicels densely puberulous distally; bracts and outer rhipidial spathe firm textured, usually greenish or purplish, spathe 12–25 mm long, ovate, often with dry papery tips, inner spathe 30–45 mm long, dull green. *Flowers* yellow; tepals free, elliptic or oblong, outer 18–24 × 6–10 mm, inner slightly smaller. *Filaments* 3.0–4.5 mm long; anthers ± 6 mm long. *Ovary* shortly exserted, smooth; style ± 2.5 mm long, branches ± 5 mm long. *Capsules* exserted, obovoid to barrel-shaped, truncate, smooth, 10–16 mm long, dull green to brown. *Flowering time*: mainly August to February.



Distribution of ***Bobartia macrocarpa***.

Distribution and ecology: a local endemic of coastal Eastern Cape, South Africa, from Humansdorp to East London and Grahamstown; in grassy fynbos.

Diagnosis: a poorly understood species superficially resembling *Bobartia longicyma* subsp. *longicyma* but distinguished from it by the rhipidia borne on a short common peduncle above the spathe.

8. **Bobartia indica** *L.* in Species plantarum: 54 (1753). *B. juncea* Salisb.: 313 (1812), illegitimate superfluous name for *B. indica* L. Type: South Africa, [Western Cape], without precise locality [BM; herb. Hermann, lecto., designated by Strid: 27 (1974)].

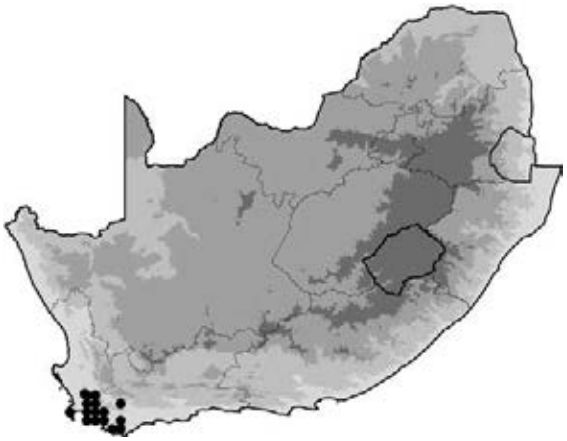
Moraea spathacea L.f.: 99 (1782). *Sisyrinchium spathaceum* (L.f.) Pers.: 50 (1805). *Marica spathacea* (L.f.) Ker Gawl.: sub. t. 229 (1817). *Aristea spathacea* (L.f.) Spreng.: 158 (1824). *Bobartia spathacea* (L.f.) Ker Gawl.: 30 (1827). *Hecaste spathacea* (L.f.) Kuntze: 309 (1898) genus invalid. Type: South Africa, without precise locality, *Thunberg s.n.* [UPS-THUNB 1228, lecto., designated by Strid: 27 (1974)].

Xyris altissima G.Lodd.: t. 1900 (1833). Type, South Africa, without precise locality or collector, illustration in G.Lodd.: t. 1900 (1833).

Bobartia purcellii Gillett: 105 (1930). Type: South Africa, Caledon, Zwartberg near the hot springs, April 1916, *Purcell 322* (SAM, holo.).

Bobartia indica var. *minor* G.J.Lewis in Journal of South African Botany 7: 51 (1941), new synonym. Type: South Africa, [Western Cape], Cape Peninsula, between Fish Hoek and Kommetjie, *T.M. Salter s.n. SAM53192* (SAM, holo.).

[*Hecaste juncea* Sol. ex Schumach.: 11 (1793), invalid name only in synonymy.]



Distribution of ***Bobartia indica***.

Plants 250–800 mm high, sometimes forming large clumps. *Rhizome* compact and corm-like, 5–15 mm diam. *Stem* formed by basal internode only, terete, 1.2–3.0 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal tuft, terete, much longer than flowering stem, flexible and trailing, resembling stem but slightly thinner. *Rhipidia* 6 to 40 in a dense, ± globose head subtended by horizontally spreading, rigid, terete, leaf-like bract, 30–80(–200) mm long, expanded at base and partially sheathing, succeeding bract similar but smaller; pedicels villous distally; rhipidial bracts and spathes firm textured, grey-green, outer 8–18 mm long, ovate, inner 18–30 mm long. *Flowers* yellow; tepals free, elliptic, outer 19–28 × 6–14 mm, inner slightly smaller. *Filaments* 4–6 mm long; anthers ± 6 mm long. *Ovary* exserted, smooth; style 1.5–3.0 mm long, branches 5–8 mm long. *Capsules* exserted, broadly ovoid, trilobed, smooth, 5–11 mm long, grey to blackish. *Chromosome number* 2*n* = 20. *Flowering time*: mainly October to March.

Distribution and ecology: endemic to the southwestern corner of Western Cape, South Africa, extending from Mamre and Goudini to Caledon, common on the Cape Peninsula; on sandy flats or slopes, mainly below 500 m elevation, flowering mainly after fire.

Diagnosis: distinguished from similar species with a narrow, leaf-like spathe subtending the synflorescence by the characteristically long, trailing leaves, much longer than the flowering stem. The dense, globose synflorescence of several to many, narrow rhipidia is subtended by two horizontally spreading, narrow, rigid, leaf-like bracts or spathes, the lowermost longest and the other much shorter and almost awl-like. The pedicels are characteristically densely villous distally. *Bobartia indica* is probably most closely allied to *B. orientalis*, which has leaves ± as long as the flowering stem, diagnostic short rhipidia with inner spathes 10–18 mm long and small, subglobose capsules mostly 4–6 mm long.

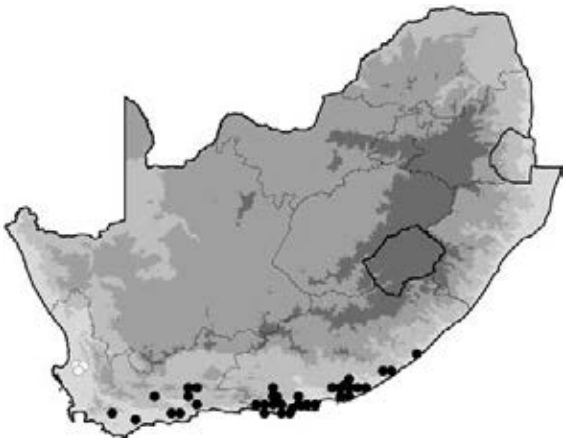
Although Strid (1974) considered var. *minor* G.J.Lewis (1941) to represent one extreme in a range of variation he neglected to formally relegate the name to synonymy.

9. **Bobartia orientalis** *Gillett* in Journal of Botany, British and foreign 68: 104 (1930). Type: South Africa, [Eastern Cape], Albany Division, Howison's Poort, *Gillett 2444* (BOL, holo.).

Plants 400–1 300 mm high, sometimes forming large tussocks. *Rhizome* compact and corm-like, ± 10 mm diam. *Stem* formed by basal internode only, terete, 1.2–2.5 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 8 in a basal tuft, ± as long as flowering stem, flexible, resembling stem but slightly thinner. *Rhipidia* 10–80(–120) sessile in a dense, ± globose head subtended by suberect or erect (rarely spreading) bract, usually green but rarely grey and fibrous, sometimes extended in a long flexible tip, not partially sheathing; pedicels slightly or more densely puberulous distally; rhipidial bracts and outer spathe firm textured, usually greenish but sometimes brown, usually short and obtuse or sometimes acute, 5–9 mm long, ovate, inner spathe narrow and often curved, 10–18 mm long, dull green. *Flowers* yellow; tepals free, elliptic or oblong, outer 11–22 × 3.5–9.0 mm, inner slightly smaller or only half as wide. *Filaments* 2.5–4.5 mm long; anthers 3.5–6.0 mm long. *Ovary* exserted, smooth or minutely tubercled; style 1.2–2.5 mm long, branches 3.5–6.0 mm long. *Capsules* exserted, subglobose, trilobed with rounded valves, smooth or minutely tubercled, 4–6 mm long, grey-green to brown. *Chromosome number* 2*n* = 20. *Flowering time*: mainly September to November.

Distribution and ecology: widespread and extending from Riviersonderend in Western Cape to the Kei River in Eastern Cape, South Africa, with outlying populations on the Swartberg and the Piketberg, mainly at lower altitudes along the coastal plain, where it may be locally common or even dominant, especially around Humansdorp and Grahamstown; on a wide variety of substrates, in fynbos, especially grassy fynbos, and in renosterveld; growth and flowering is strongly stimulated by fire.

Diagnosis: usually readily recognised by the dense inflorescence of up to 120 small, narrow rhipidia, the inner spathes 10–18 mm long and the outer ± one third as



Distribution of ***Bobartia orientalis*** subsp. ***orientalis***, ●; subsp. ***occidentalis***, ○.

long and often obtuse or truncate, and characteristic, small, subglobose capsules 4–6 mm long with strongly rounded valves. Forms with fewer or larger rhipidia are less easily recognised, and can be confused with several other species with narrow, green rhipidial spathes.

The isolated population from the Piketberg was distinguished as subsp. *occidentalis* Strid (1974). The status of this population deserves further investigation.

Key to subspecies

1a Bract subtending synflorescence usually green and leaf-like, rarely grey and fibrous, erect or spreading; lower rhipidial bracts usually green, rarely chestnut-brown, mostly obtuse or truncate but sometimes acute; capsules smooth or tubercled; occurring from Riviersonderend eastwards . . . . . 9a. subsp. *orientalis*

1b Bract subtending synflorescence grey, fibrous, spreading; lower rhipidial bracts chestnut-brown, acute; capsules tubercled; restricted to the Piketberg. . . . . 9b. subsp. *occidentalis*

9a. subsp. **orientalis**

Distribution and ecology: ranging from Riviersonderend east to the Kei River with outlying populations in the Little Karoo on the Swartberg and Gamkaberg.

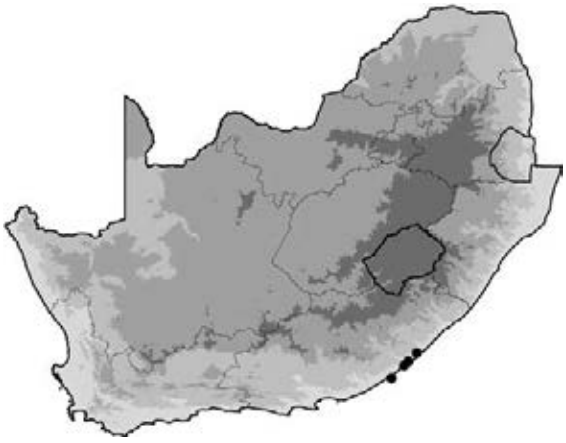
9b. subsp. **occidentalis** *Strid* in Opera Botanica 37: 33 (1974). Type: South Africa, [Western Cape], Piketberg, upper east slopes of Kapteinskloof, 2950 ft [900 m], 21 Oct. 1935, *Pillans 7797* (BOL, holo.).

Distribution and ecology: restricted to the Piketberg, where it has been collected from several localities on the range.

The characters used to discriminate this variant all occur in the typical subspecies and were it not for its highly disjunct distribution it is unlikely to have been recognised taxonomically. Its status requires further investigation.

10. **Bobartia gracilis** *Baker* in Bulletin of Miscellaneous Information Kew 1901: 134 (1901). Type: South Africa, [Eastern Cape], East London, West Bank, near Cove Rock, 21 Aug. 1898, *Galpin 3254* (K, lecto., designated by Strid: 31 (1974); PRE, isolecto.).

Plants 250–500 mm high, sometimes forming clumps. *Rhizome* compact and corm-like, ± 10 mm diam. *Stem* formed by basal internode only, subterete, 1–2 mm diam., with fine stomatiferous furrows. *Foliage leaves* 1 to 4 in a basal tuft, ± as long as flowering stem, resembling stem. *Rhipidia* erect, 2 to 6 in a narrow, shortly pedunculate head, often appearing lateral on stem, subtended by erect, terete, leaf-like bract, often greatly extended, stiff or flexible, appearing as a continuation of stem, green; pedicels puberulent distally; rhipidial bracts and spathes firm-textured, bracts and outer spathe lanceolate, 10–16 mm long, dull green or flushed purplish,



Distribution of ***Bobartia gracilis***.

inner 18–30 mm long, green. *Flowers* yellow; tepals free, elliptic, outer 16–23 × 6–9 mm, inner slightly smaller. *Filaments* 3–4 mm long; anthers ± 6 mm long. *Ovary* shortly exserted, smooth; style 2–3 mm long, branches 4–5 mm long. *Capsules* exserted, obovoid to subglobose, trilobed, smooth, 5–8 mm long, brown. *Flowering time*: throughout the year.

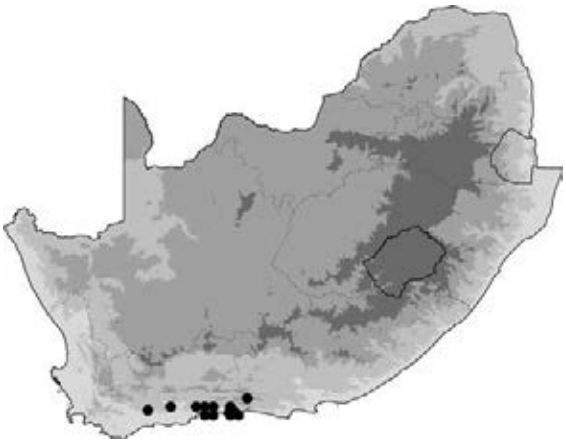
Distribution and ecology: restricted to the Eastern Cape coast, South Africa, from near East London to Kei River Mouth; on grassy slopes.

Diagnosis: superficially similar to *Bobartia aphylla* and distinguished by its small, smooth, subglobose capsules, 5–8 mm long. A poorly understood species that can also be difficult to separate from forms of *B. orientalis* but typically with fewer, longer rhipidia.

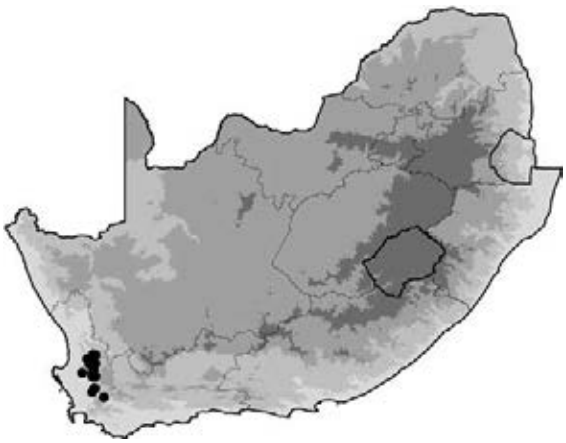
11. **Bobartia aphylla** *(L.f.) Ker Gawl.*, Iridearum genera: 30 (1827). *Moraea aphylla* L.f.: 99 (1782). *Marica aphylla* (L.f.) Ker Gawl.: t. 229 (1817). *Sisyrinchium aphyllum* (L.f.) Spreng.: 166 (1824). Type: South Africa, without precise locality, *Thunberg s.n.* [UPS-THUNB 1205 (left hand specimen), lecto., designated by Strid: 29 (1974)].

Bobartia keetii E.Phillips: 335 (1920). Type: South Africa, [Western Cape], Knysna Division, Gouna Plateau, *Keet 26* (PRE, holo.; K, iso.).

Plants 300–700 mm high, sometimes forming clumps. *Rhizome* compact and corm-like, 8–15 mm diam. *Stem* formed by basal internode only, subterete, 1–3 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal tuft, terete, usually shorter than flowering stem, resembling stem. *Rhipidia* erect, 3 to 10 in a narrow, shortly pedunculate head, often appearing lateral on stem, subtended by erect, terete, leaf-like bract, often greatly extended (up to ± 400 mm), stiff or flexible, appearing as a continuation of stem; pedicels puberulent distally; rhipidial bracts and spathes firm-textured, green, outer spathe lanceolate, inner 20–35 mm long. *Flowers* yellow; tepals free, elliptic, outer 18–26 × 8–12 mm, inner



Distribution of ***Bobartia aphylla***.



Distribution of ***Bobartia fasciculata***.

slightly smaller. *Filaments* 2–4 mm long; anthers ± 6 mm long. *Ovary* shortly or scarcely exserted, weakly to densely papillate; style ± 2 mm long, branches 4–6 mm long. *Capsules* exserted, obovoid, tuberculate, 8–13 mm long, dark reddish brown. *Chromosome number* 2*n* = 20 (Strid, 1974). *Flowering time*: mainly November to March.

Distribution and ecology: extending along the southern coast and near inland, from Mossel Bay in Western Cape to Plettenberg Bay in Eastern Cape, South Africa, extending up to 600 m elevation on the Outeniqua and Tsitsikamma Mtns and on the Langeberg; on sandy soils in grassy fynbos.

Diagnosis: a relatively slender species mostly less than 700 mm tall, with a narrow, shortly pedunculate synflorescence of 3 to 10 rhipidia subtended by a narrow, leaf-like spathe with terete blade often greatly prolonged and appearing as an extension of the stem, the synflorescence thus apparently lateral. The ± papillate ovaries develop into tuberculate capsules 8–13 mm long. The Langeberg populations are anomalous in their smooth ovaries and capsules.

The species is superficially similar to *Bobartia gracilis*, which is distinguished by its smaller, smooth, subglobose capsules 5–8 mm long.

12. **Bobartia fasciculata** *Gillett ex Strid* in Opera Botanica 37: 34 (1974). Type: South Africa, [Western Cape], near top of Gray's Pass, 20 Sept. 1965, *Dahlgren & Strid 3227* (NBG, holo.; K, LD, iso.).

Plants 0.8–1.5 m high, sometimes forming large clumps. *Rhizome* compact and corm-like, 10–20 mm diam. *Stem* formed by basal internode only, terete, 1.5–4.0 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal tuft, shorter than stem, terete, resembling stem but slightly thinner. *Rhipidia* 16 to 60 grouped in fascicles of 2 to 6 in a crowded, ± globose head, subtended by spreading, rigid, fibrous bract, usually grey and ± inconspicuous but sometimes with prominent green foliar tip, not much sheathing; pedicels pubescent distally; rhipidial bracts and outer spathe greyish brown, 10–16 mm long, ovate, inner spathe 18–24 mm long, straw-coloured. *Flowers* yellow; tepals free, elliptic, outer 16–23 × 8–11 mm, inner ± $^1/_2$ as wide. *Filaments* 3.5–4.5 mm long; anthers ± 5 mm long. *Ovary* shortly exserted, smooth or rugulose; style ± 2.5 mm long, branches 4.5–6.0 mm long. *Capsules* exserted, obovoid to ovoid, slightly to conspicuously rugulose, tubercled or smooth, 7–12 mm long, greyish. *Chromosome number* 2*n* = 20. *Flowering time*: August to November.

Distribution and ecology: endemic to the Olifants River and Elandskloof Mtns in Western Cape, South Africa, extending from south of Citrusdal to Hermon; on stony sandstone slopes in fynbos or transitional renosterveld, from 350 to 750 m elevation.

Diagnosis: distinguished by the fibrous spathe-like bract subtending the synflorescence, usually greyish and inconspicuous but sometimes with a long foliar tip, and the dense, globose inflorescence of 16 to 60 rhipidia characteristically grouped in fascicles of 2 to 6. The rhipidial bracts are grey or brown and much shorter than the straw-coloured inner spathe. The capsules are typically prominently rugose or tubercled but are smooth in populations from the Elandskloof Mtns in the south.

Bobartia fasciculata is closely allied to *Bobartia rufa*, sharing with it a similar fibrous bract subtending the synflorescence and ± tubercled (or smooth) capsules, and remarkably narrow inner tepals, ± half as wide as the outer. The two species are sympatric on the Olifants River Mtns and are readily confused there. *B. rufa* is distinguished by its ± flat-topped, obconical synflorescence with attenuate, dark red outer rhipidial bracts closely overlapping and concealing the inner rhipidial spathe.

13. **Bobartia rufa** *Strid* in Opera Botanica 37: 37 (1974). Type: South Africa, [Western Cape], Piketberg, upper southern part of Versfeld Pass, 27 Oct. 1965, *Dahlgren & Strid 3860* (NBG, holo.; LD, iso.).

Plants 500–900 mm high, sometimes forming clumps. *Rhizome* compact and corm-like, 10–16 mm diam. *Stem* formed by basal internode only, terete, 1–3 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal tuft, shorter than flowering stem, terete, resembling stem but slightly thinner. *Rhipidia* suberect, up to ± 50, grouped indistinctly in fascicles in a crowded, obconical, ± flat-topped head, subtended by suberect, fibrous, grey, expanded bract, following bract similar, together partially sheathing synflorescence; pedicels subglabrous; rhipidial bracts and outer spathe usually dark reddish brown, acuminate, 10–35 mm long, ± concealing inner spathe, this not or scarcely longer than the outer and straw-coloured. *Flowers* yellow; tepals free, elliptic, outer 15–19 × 7–9 mm, inner ± ½ as wide. *Filaments* 3.0–4.5 mm long; anthers ± 4.5 mm long. *Ovary* shortly exserted, smooth or rugulose; style ± 2.5 mm long, branches 4.0–5.5 mm long. *Capsules* exserted, obovoid, smooth or tubercled, 5–8 mm long, dark to reddish brown. *Flowering time*: September to November.

Distribution and ecology: endemic to the coastal and near interior mountains of the Atlantic Coast of Western Cape, South Africa, from Pakhuis Pass in the Cederberg through the Cold Bokkeveld and Olifants River Mtns to the Piketberg and Hex River Mtns; on sandstone slopes in fynbos from 900 to 1 400 m elevation.

Diagnosis: recognised by the obconical, ± flat-topped synflorescence partially sheathed by a pair of grey, fibrous spathe-like bracts, the rhipidia with conspicuous, acuminate, dark reddish brown bracts and lower rhipidial spathe not much shorter than the straw-coloured inner spathe and concealing it. The capsules are either smooth or tubercled.

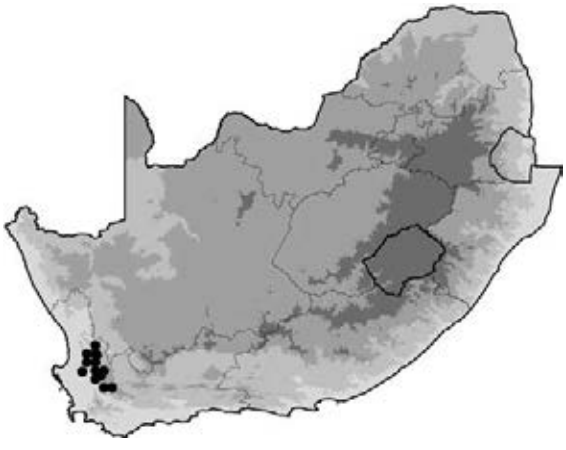
Bobartia rufa is clearly closely allied to *B. fasciculata*, sharing with it a similar fibrous spathe and ± tubercled capsules, and remarkably narrow inner tepals, ± half as wide as the outer. The two species are sympatric on the Olifants River Mtns and may be confused there. *Bobartia fasciculata* is distinguished by its globose inflorescence with more clearly fasciculate rhipidia with greyish or brown outer rhipidial spathes much shorter than the inner rhipidial spathes.

14. **Bobartia robusta** *Baker*, Handbook of the Irideae: 120 (1892). Type: South Africa, [Western Cape], without precise locality, *W. Burchell 6124* (K, holo.).

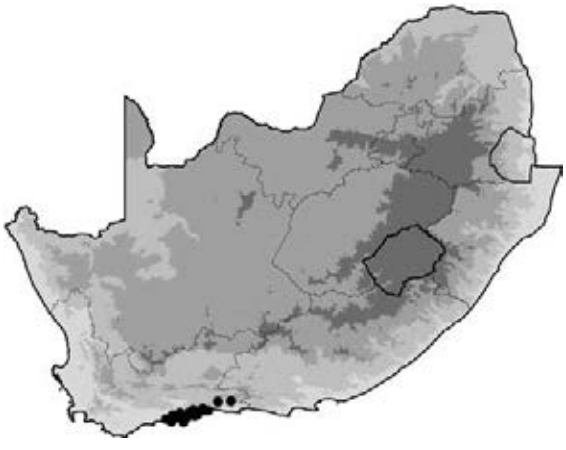
Plants 0.7–2.1 m high, sometimes forming large clumps. *Rhizome* compact and corm-like, 20–30 mm diam. *Stem* formed by basal internode only, terete, 3–6 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 7 in a basal tuft, sessile, ± as long as and resembling stem. *Rhipidia* suberect, 8 to 40 crowded in a dense obovoid head subtended by suberect bract, usually green in upper part but dry and ± papery or fibrous below, expanded and partially sheathing young synflorescence; pedicels sparsely pubescent distally; rhipidial bracts and spathes firm-textured, bracts and outer spathe broadly lanceolate, papery or fibrous, reddish brown, inner spathe 15–25 mm long, usually ± green. *Flowers* yellow, sometimes tinged red on reverse; tepals free, elliptic, outer 20–32 × 10–18 mm, inner slightly smaller. *Filaments* 3–5 mm long; anthers ± 8 mm long. *Ovary* scarcely exserted or not, weakly to densely papillate; style 2–3 mm long, branches 5–7 mm long. *Capsules* exserted, obovoid to broadly cylindric, conspicuously rugose or verrucose to muricate, 7–18 mm long, dark reddish brown. *Chromosome number* 2*n* = 20. *Flowering time*: mainly August to October.

Distribution and ecology: locally abundant on the coastal plain from south of Swellendam to George in Western Cape, South Africa; in coastal fynbos and renosterveld, usually in sand.

Diagnosis: a large, often clump-forming species with robust stems 3–6 mm diam. and a dense, obovoid synflorescence of 8 to 40 suberect rhipidia and ± papillate ovary scarcely exserted from the rhipidial spathes. The large flowers have tepals, 20–32 mm long and the large capsules, 7–18 mm long, are conspicuously rugose or verrucose to muricate. *Bobartia aphylla*, also with



Distribution of ***Bobartia rufa***.



Distribution of ***Bobartia robusta***.

usually verrucose capsules, is a smaller, more slender species mostly less than 700 mm tall, with a narrow, green, leaf-like spathe subtending a narrow, ellipsoid synflorescence of up to ten rhipidia. Old individuals form large, rush-like tussocks.

15. **Bobartia parva** *Gillett* in Journal of Botany, British and foreign 68: 104 (1930). Type: South Africa, [Western Cape], Swellendam, Lemonshoek Peak, 4 000 ft [1 220 m], *Thorne s.n.* (SAM, holo.).

Plants slender, 150–500 mm high, usually forming small tufts. *Rhizome* compact and corm-like, 5–10 mm diam. *Stem* formed by basal internode only, terete, 1–2 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal tuft, shorter to as long as stem, terete, resembling stem but slightly thinner. *Rhipidia* suberect, 2 to 7 crowded in a ± cylindric head subtended by broad, fibrous, dark reddish or chestnut-brown bract, usually without foliar tip, almost completely sheathing young synflorescence, next inflorescence bract similar in texture and size; pedicels subglabrous; rhipidial bracts and spathes firm-textured, bracts and outer spathe lanceolate, 6–10 mm long, brown, inner spathe ± 22 mm long, greenish. *Flowers* yellow; tepals free, elliptic, outer 14–18 × 5–8 mm, inner slightly smaller. *Filaments* 2–3 mm long; anthers ± 4 mm long. *Ovary* exserted, smooth; style 2–3 mm long, branches 3–4 mm long. *Capsules* exserted, obovoid, smooth, 8–10 mm long. *Flowering time*: November to February.

Distribution and ecology: a narrow endemic of the Langeberg above Swellendam in Western Cape, South Africa; on south-facing sandstone slopes at high altitude.

Diagnosis: a small, slender species, 150–500 mm tall, with 2 to 7 rhipidia in a narrow, cylindric synflorescence ± completely enclosed by an erect, broad, fibrous, dark reddish or chestnut-brown subtending bract. The species resembles small forms of *Bobartia macrospatha* but is distinguished by the exserted ovary and capsules.

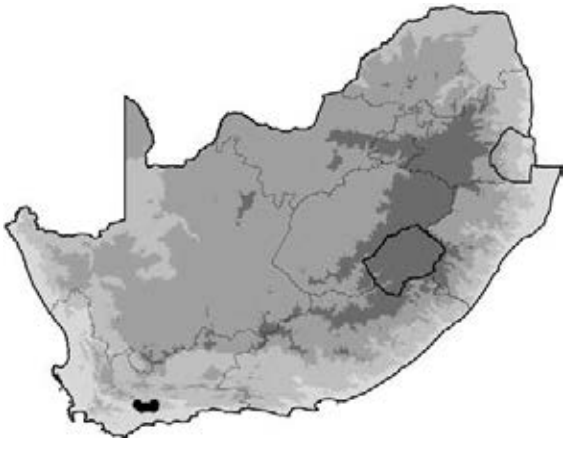
16. **Bobartia macrospatha** *Baker*, Handbook of the Irideae: 119 (1892). Type: South Africa, [Western Cape], Swellendam, *W. Burchell 6987* (K, holo.).

Bobartia burchellii Baker: 120 (1892). Type: South Africa, [Western Cape], Swellendam, *W. Burchell 7145* (K, holo.).

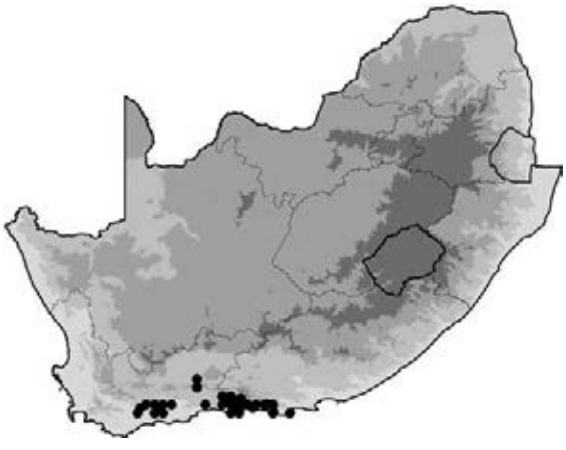
Bobartia tubata Gillett: 105 (1930). Type: South Africa, [Western Cape], Knysna, Goukamma uplands, *Gillett 1578* [BOL, lecto., designated by Strid: 35 (1974)].

Plants (0.25–)0.50–1.10(–1.50) m high, usually forming tufts. *Rhizome* compact and corm-like, ± 10 mm diam. *Stem* formed by basal internode only, terete or subterete, 1–3 mm diam., with fine stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal tuft, sessile, usually slightly shorter than but resembling stem. *Rhipidia* suberect, (3–)8 to 15 crowded in a dense obovoid head, subtended by suberect, dry, ± fibrous bract, expanded and partly sheathing young synflorescence; pedicels 2–6(–10) mm long, subglabrous; rhipidial bracts and spathes firm-textured, bracts and outer spathe broadly lanceolate, 6–11 mm long, dark reddish brown, inner 15–24 mm long, often silvery-papillose. *Flowers* yellow; tepals free or connate in a tube 4–7 mm long, elliptic, outer 18–32 × 9–15 mm, inner slightly smaller. *Filaments* 1.5–3.5 mm long; anthers ± 5 mm long. *Ovary* included, smooth; style 4–10 mm long, branches 5–6 mm long. *Capsules* included, ovoid, smooth, (8–)10–15 mm long. *Chromosome number* $2n = 20$. *Flowering time*: mainly September to November.

Distribution and ecology: occurring along the southern foothills of the Langeberg and Outeniqua Mtns from Swellendam in Western Cape to Humansdorp in Eastern Cape, South Africa, but evidently absent between Riversdale and George although also occurring in the Long Kloof with outlying populations in the Great Swartberg; on lower sandstone slopes from 150–350 m elevation, in fynbos or transitional fynbos.



Distribution of ***Bobartia parva***.



Distribution of ***Bobartia macrospatha***.

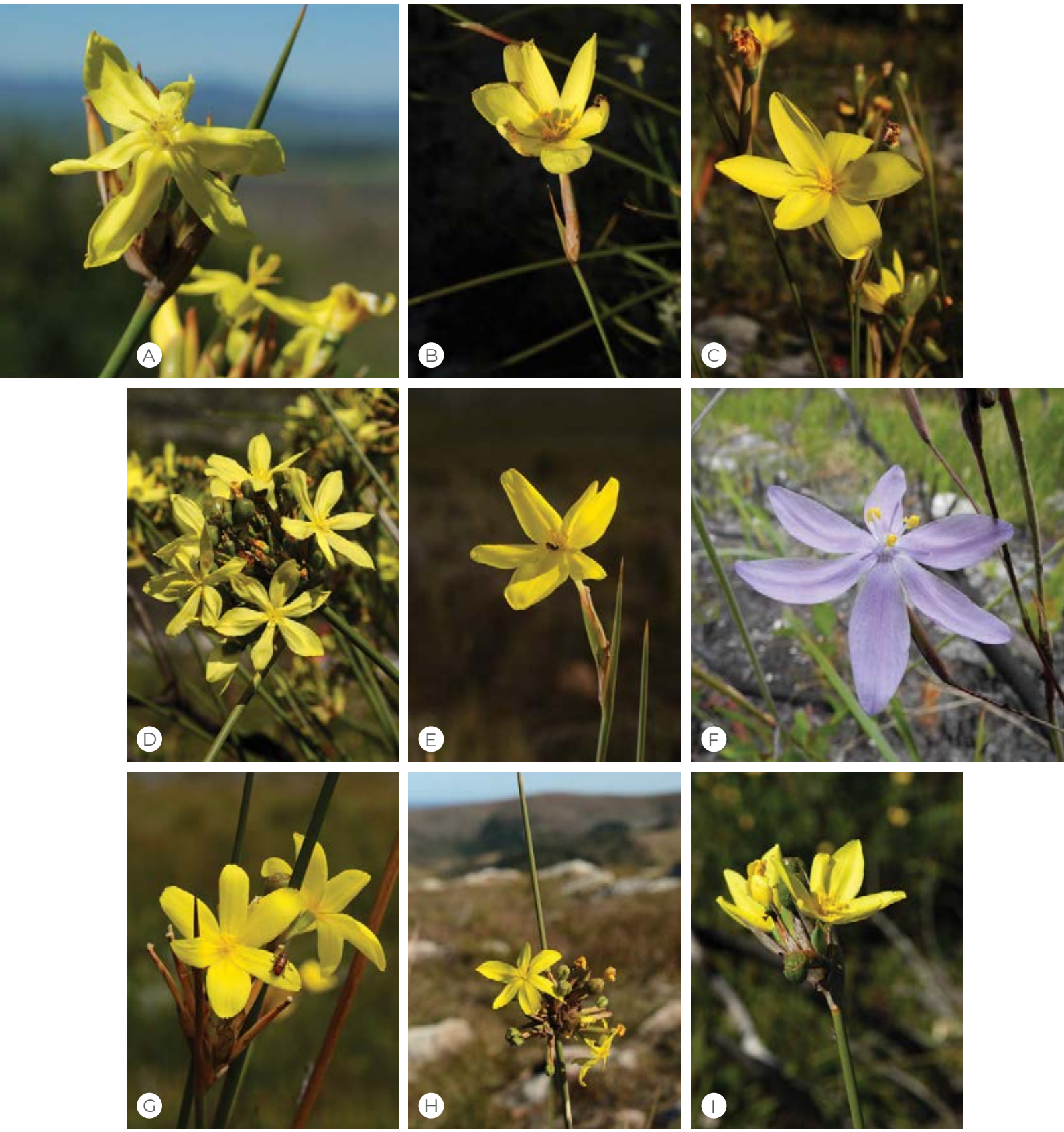


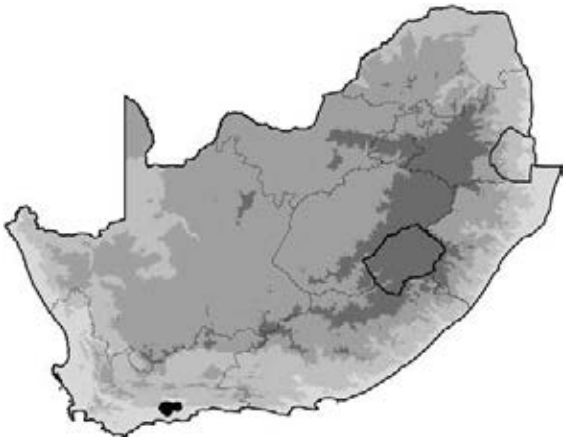
Plate 75. A, ***Bobartia fasciculata***, Hermon, WC; B, ***B. filiformis***, Cape Peninsula, WC; C, ***B. gladiata*** subsp. ***gladiata***, Cape Peninsula, WC; D, ***B. indica***, Cape Peninsula, WC; E, ***B. longicyma*** subsp. ***longicyma***, Napier, WC; F, ***B. lilacina***, Bain's Kloof, WC (photograph: R. Saunders); G, ***B. longicyma*** subsp. ***magna***, Betty's Bay, WC; H, ***B. orientalis***, Grahamstown, EC; I, ***B. robusta***, Still Bay, WC.

Diagnosis: one of two species in the genus with the ovary included in the rhipidial spathes, and the capsules remaining concealed by the bracts, *Bobartia macrospatha* is distinguished from *B. anceps* by its terete or subterete leaves and stem, the mostly dry and fibrous bract subtending a relatively small synflorescence of up to 15 suberect rhipidia. The bract is ± expanded at the base and sheaths the relatively small inflorescence. The inner spathes of the suberect rhipidia are (13–)15–20 mm long. The capsules are ovoid and 8–10 mm long.

Both *Bobartia macrospatha* and *B. anceps* occur in Garcia's Pass and intermediates may represent hybrids between them. The presence of these intermediates convinced Strid (1974) to treat the two as subspecies of a single variable species but nearly all specimens can be assigned to one or other of the taxa, and the several differences between them suggest that separation at species rank is more appropriate.

17. **Bobartia anceps** *Baker*, Handbook of the Irideae: 121 (1892). *B. macrospatha* subsp. *anceps* (Baker) Strid: 36 (1974). Type: South Africa, [Western Cape], Swellendam, *W. Burchell 6913* (K, holo.).

Plants (0.25–)0.50–1.10(–1.50) m high, usually forming tufts. *Rhizome* compact and corm-like, ± 10 mm diam. *Stem* formed by basal internode only, flattened or rarely subterete and elliptic in section, 3–6 mm wide, with fine stomatiferous furrows. *Foliage leaves* 2 to 6 in a basal fan, usually slightly shorter than flowering stem, resembling stem. *Rhipidia* 15 to 40, spreading, crowded in a dense rounded head, subtended by usually spreading, green, leaf-like bracts with narrow blade; pedicels 2–6(–10) mm long, subglabrous; rhipidial bracts and spathes firm-textured, bracts and lower spathe broadly lanceolate, 6–11 mm long, dark reddish brown, inner 13–15 mm long. *Flowers* yellow; tepals free or connate in a tube 4–7 mm long, elliptic, outer 18–32 × 9–15 mm, inner slightly smaller. *Filaments* 1.5–3.5 mm long; anthers ± 5 mm long. *Ovary* included, smooth; style 4–10 mm long, branches 5–6 mm long. *Capsules* included, subglobose to broadly oblong, smooth, 4–8(–10) mm long. *Flowering time*: mainly September to November.



Distribution of ***Bobartia anceps***.

Distribution and ecology: a local endemic of the Langeberg foothills near Riversdale in Western Cape, South Africa, and best known from Garcia's Pass; on stony clay or loamy soils.

Diagnosis: distinguished from *Bobartia macrospatha,* the only other species in the genus with the ovary not exserted from the rhipidial spathes, by its flattened or subterete leaves and stem, 3–6 mm wide, mostly spreading, leaf-like spathe not expanded or enclosing the synflorescence, and the more numerous, spreading rhipidia densely clustered in a rounded head. The individual rhipidia are relatively small, with the inner spathe 13–15 mm long, and the capsules are also small, subglobose to broadly oblong, 4–8(–10) mm long.

REFERENCES

BAKER, J.G. 1892. *Handbook of the Irideae*. Bell, London.

BAKER, J.G. 1901. Diagnoses Africanae XIII. *Bulletin of Miscellaneous Information Kew* 1901: 119–138.

GILLETT, J.B. 1930. *Bobartia longicyma, orientalis, parva, purcellii* and *tubata*. Novitates Africanae. *Journal of Botany, British and foreign* 68: 102–107.

KER GAWLER, J.B. 1817. *Marica gladiata*. Hairy-stalked Marica. *The Botanical Register* 3: t. 229.

KER GAWLER, J.B. 1827. *Iridearum generum*. De Mat, Brussels.

KUNTZE, 0. 1898. *Revisio generum plantarum*, vol. 3(3). Leipzig.

LEWIS, G.J. 1941. Iridaceae: new genera and species and miscellaneous notes. *Journal of South African Botany* 7: 19–59.

LEWIS, G.J. 1945. Plantae novae Africanae XXIV. *Journal of South African Botany* 11: 99–126.

LINNAEUS, C. 1753. *Species plantarum*. Stockholm.

LINNAEUS, C. fil. 1782 ['1781']. *Supplementum plantarum*. Brunsvig.

LODDIGES, G. 1833 ['1832']. *Xyris altissima. The Botanical Cabinet* 19: t. 1900. C. Loddiges & Sons, London.

PERSOON, C.H. 1805. *Synopsis plantarum*, vol. 1. Paris and Tübingen

PHILLIPS, E.P. 1920. *Bobartia keetii.* Diagnoses Africanae LXXIV. *Bulletin of Miscellaneous Information Kew* 1920: 329–335.

SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.

SCHUMACHER, C.F. 1793. *Om Bobartia, beskreven af Ridder Linné i hans Flora Zeylanica. Skrivter af Naturhisorie-Selskabet*. Copenhagen 3: 8–11.

SPRENGEL, C. 1824. *Systema vegetabilium*, edn. 16, vol. 1. Göttingen.

STRID, A.K. 1974. A taxonomic revision of *Bobartia* L. (Iridaceae). *Opera Botanica* 37: 1–45.

THUNBERG, C.P. 1787. *Dissertation botanica de Moraea*. Uppsala.

35. **Ferraria**

Ferraria *Burm. ex Miller*, Figures of plants, vol. 2: 187 t. 280 (1759a) and The Gardener's Dictionary, edn. 7 (1759b). Type species: *Ferraria foliis lanceolatis* etc. ... = *F. crispa* Burm.

Revisionary account: Goldblatt & Manning: 1–140 (2011).

Named for the 15th century artist, Giovanni Ferrari, whose illustrated works were much celebrated by contemporaries; his *Flora seu de florum cultura* (Flora of cultivated plants) included the first illustration of *Ferraria*, *F. crispa* drawn from plants grown in Italy (Ferrari 1633).

Small to medium-sized seasonal perennials. *Corm* depressed-globose, consisting of several internodes, producing roots from terminal bud, lacking tunics when mature. *Stem* aerial or largely to entirely underground, usually branched, branches often short and crowded distally. *Leaves* several, lower 3 or 4 lacking blades, thus cataphylls, foliage leaves with isobilateral, sword-shaped to linear, unifacial blades, sometimes not produced on flowering stem, basal 1 or more, largest, progressively smaller above, becoming entirely sheathing and bract-like at distal nodes; margins with subepidermal sclerenchyma without marginal vein. *Inflorescences* 2- to several- flowered rhipidia; spathes green, often leafy, enclosing flower buds, inner always longer than outer, margins free to base. *Flowers* actinomorphic, fugaceous or lasting 2(3) days, often dull coloured, usually creamy white to buff-coloured or brownish, sometimes yellow, rarely blue-violet, spotted and blotched dark brown, green or purple, without scent or scented with sweet, spicy or rotting odours; tepals free, clawed, outer slightly to significantly larger than inner, claws forming a wide or narrow cup or shallow basin, limbs spreading to slightly reflexed, margins crisped, tips attenuate and twisted; producing nectar from nectaries at base or middle of claws. *Stamens* symmetrically arranged; filaments united in lower ± $^{2}/_{3}$ in smooth column, free and diverging in upper $^{1}/_{4}$–$^{1}/_{3}$; anthers appressed to style branches, lobes joined to connective but not to each other, parallel and ± contiguous or diverging from tips. *Ovary* included or exserted, sometimes with sterile beak; style enclosed by filament column, dividing at column apex into short branches, each forked into flattened, diverging, conduplicate arms, usually prominently fringed on adaxial margins, stigmatic surfaces terminal on style branches or on grooved lobe below tip of abaxial margin. *Capsules* globose-truncate, ovoid or ellipsoid, then often beaked. *Seeds* usually angular, mostly 5- or 6-sided, facets separated by winged angles, ± smooth or wrinkled, in one species ± globose and reticulate. *Pollen grains* monosulcate, exine reticulate. *Basic chromosome number x* = 10.

Species 18; dry parts of central and southwestern Africa, with a centre along the southern African west coast and near interior, 15 in southern Africa; generally favouring sandy soils.

The small African genus *Ferraria* stands out in its unusual flowers with the style branches somewhat flattened and terminating in a feathery tuft of fine segments. The tepals are more-or-less equal in size and distinctly clawed, the claws together forming a wide to shallow cup and bearing nectaries of various shapes and sometimes colours. The flowers are scented, sometimes pleasantly but more often not, with odours reminiscent of bitter cocoa or burned sugar in combinations difficult to describe and the tepals are usually dull-coloured and darkly spotted. The flowers of some species are specialised for fly pollination and others for wasps.

The four species of summer-rainfall southern and tropical Africa have an open-branched stem and sticky, viscid nodes, both probably ancestral features whereas the species of the winter-rainfall west coast and interior of southern Africa have smooth stems with short branches hidden by leafy bracts. Some of the latter are almost acaulescent, with the flowers produced almost at ground level. *Ferraria* is sister genus to the larger genus *Moraea* and the two differ not only in the flowers, those of *Moraea* most often *Iris*-like, but in the corms and leaves. In *Ferraria* the corm is persistent, consists of multiple internodes and has soft, evanescent tunics, and the foliage leaves are isobilateral as in most Iridaceae. In *Moraea* the corm is annual, replaced at the end of the growing season, consists of a single internode and has fibrous, persistent tunics and the leaves are dorsiventral and usually channelled. Despite these several and fundamental differences the two genera have been shown by molecular studies to be immediately related.

Key to species

1a Anthers with filament insertion in lower $^{1}/_{3}$ and lobes parallel and usually contiguous above filament insertion when fully dehisced; capsules globose- to ovoid-truncate or acute or beaked in one species; perianth with the tepal claws usually forming a shallow cup and bearing prominent nectaries $^{1}/_{3}$–$^{1}/_{2}$ as long as claw; stigmas minute, terminal on apices of style branch arms:

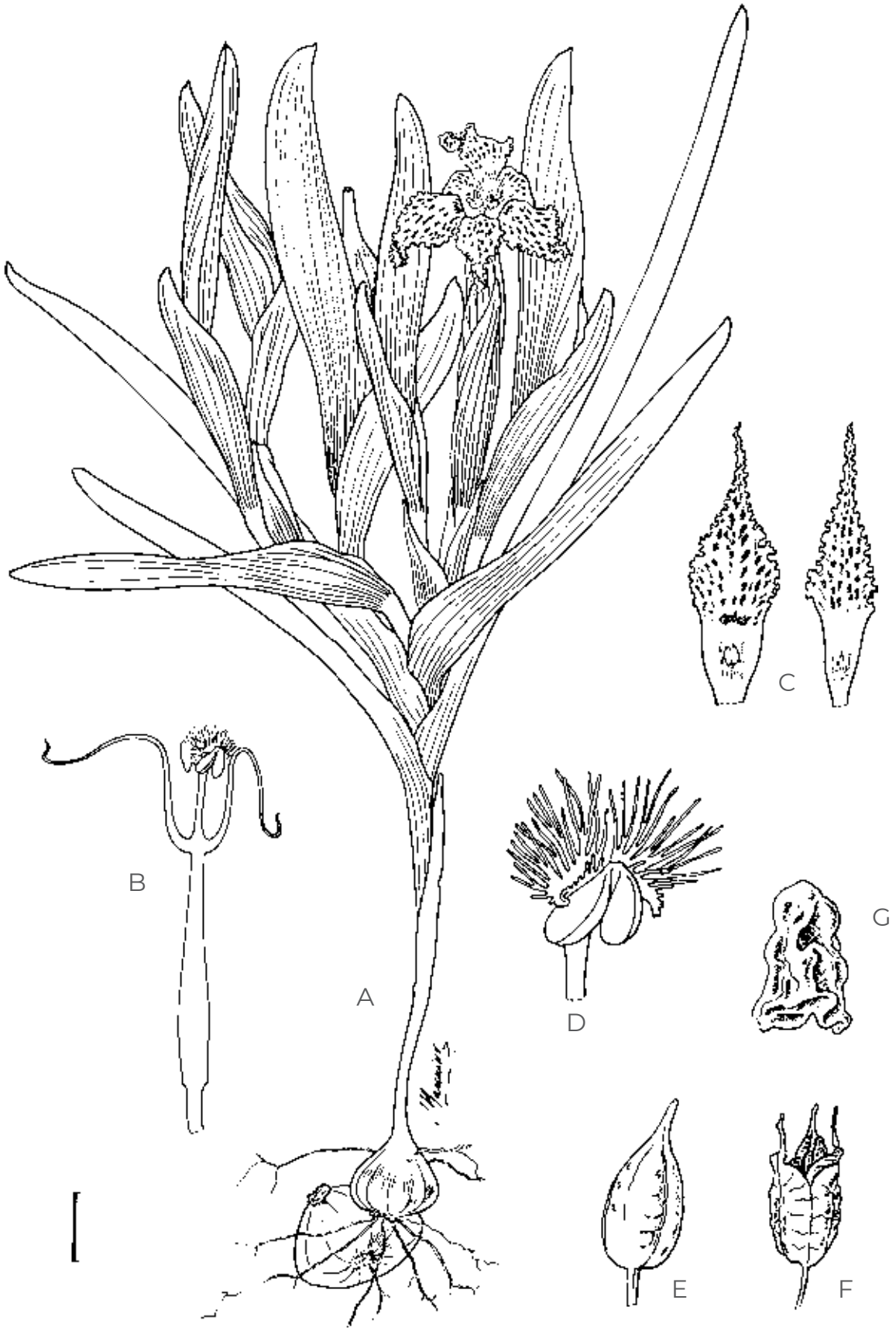
2a Upper internodes below flower clusters with sticky exudate; ovary ovoid- to globose-truncate, short, < 10 mm long; capsules ovoid to globose and truncate (subg. *Glutinosae*). . . . . 1. *F. glutinosa*

2b Plants ± acaulescent or stem aerial, then upper internodes below flower clusters not sticky; ovary ± fusiform, > 10 mm long; capsules usually ovoid, rounded at apex or with short sterile beak (sect. *Ferraria*):
3a Stem aerial, slender with internodes partly exposed; basal leaves linear to falcate, with blades usually < 5 mm wide:
4a Plants ± acaulescent; tepal claws narrow in lower 1/3, thus forming a windowed cup; nectaries concave, at apex of narrow part of claw and with raised and lobed to fringed distal edge . . . . . 7. *F. ornata*
4b Plants with aerial stems: tepal claws broad and not abruptly narrowed in lower part, cup not windowed; nectaries relatively large, in centre of tepal claws and without raised distal edges:
5a Cauline leaves lanceolate-attenuate; flowers grey or blue-green with minute brown, maroon or violet speckling; nectaries yellowish green . . . . . 6. *F. densepunctulata*
5b Cauline leaves ovate-cucullate; flowers yellow with brown margins and a few conspicuous spots; nectaries cream-coloured streaked maroon . . . . . 5. *F. ovata*
3b Stem stout, mostly covered by leaf bases; leaves sword-shaped to falcate, with blades > 5 mm wide:
6a Ovary with short tapering beak, ± 8 mm long; tepals 22–25(–30) mm long, pale yellow with dark brown margins and blotches, often coalescing in outer quarter; flowers sweetly scented . . . . . 4. *F. schaeferi*
6b Ovary fusiform, without tapering beak; tepals 25–35 mm long, flowers variously coloured, usually dark maroon or purple with paler margins or cream-coloured to pale yellow and variously striped and blotched; flowers with an unpleasant, burnt-sugar or putrid scent:
7a Blades of basal leaves with a slightly thickened zone in middle and prominent central vein; leaves 2-ranked . . . . . 2. *F. crispa*
7b Blades of basal leaves much thickened in middle but with weakly developed central vein; leaves spirally 2-ranked . . . . . 3. *F. foliosa*
1b Anthers with filament insertion in upper 1/3 and lobes held together only at tips, usually widely divergent when fully dehisced, rarely subparallel but not contiguous (not always so in freshly opened flowers); capsules always prominently beaked; perianth with tepal claws forming deep, narrow or wide cup; stigmas consisting of groove below tips of style branch arms (sect. *Macroscyphae*):
8a Floral cup widening substantially toward apex, rim ± as wide or wider than depth of cup:
9a Flowers small, sweetly, slightly clove-scented; floral cup ± 8 mm deep, ± 7 mm wide at rim; outer tepals 18–22 mm long; filament column ± 6 mm long . . . . . 9. *F. parva*
9b Flower relatively large, unscented or faintly unpleasantly scented; floral cup 12–15 mm deep, 13–20 mm wide at rim; outer tepals 30–45 mm long; filament column 8–13 mm long:
10a Plants usually subacaulescent and stem mostly covered by sheathing parts of leaves; flowers lasting 2 days; seeds (4)5(6)-sided, facets separated by raised angles, surface smooth . . . . . 11. *F. variabilis*
10b Plants with aerial stem and branching only distally; flowers lasting a single day; seeds ± globose, surface matte . . . . . 10. *F. divaricata*
8b Flowers with narrow cup, sides ± erect (rim of cup 1/2–2/3 as wide as depth of cup):
11a Stem produced well above ground; basal leaves sharply distinct from cauline leaves and with internodes partly exposed; flowers with floral cup 17–20 mm deep; outer tepals 30–40 mm long . . . . . 8. *F. ferrariola*
11b Stem not or only shortly extended above ground (unless growing in shade); basal leaves often hardly distinct from cauline leaves (or from spathes enclosing flower clusters); floral cup 10–12 mm deep; outer tepals 25–35 mm long:
12a Basal leaves broad, leathery-succulent, 8–20 mm wide, cauline leaves and spathes different from basal leaves; flowers lasting a single day, deep yellow; anthers and pollen yellow . . . . . 12. *F. flava*
12b Basal leaves hardly distinct from cauline leaves, rarely exceeding 12 mm wide, flowers lasting two days, watery yellow, blue or shades of beige to cream-coloured dotted with blue spots; anthers and pollen usually orange to ± red:
13a Flowers usually predominantly blue to violet with dull yellow-green to khaki-coloured margins, occasionally tepal limbs pale bluish or cream-coloured, then speckled dark blue; margins of at least lowermost leaves conspicuously thickened, hyaline and partly crisped and undulate; marginal thickenings smooth . . . 13. *F. uncinata*
13b Flower pale watery yellow with darker yellow to buff- or khaki-coloured margins; leaf margins either thickened then lower leaves with margins plane or serrulate to crenate, or sometimes slightly crisped or unthickened and margins plane; marginal thickenings when present often shortly velvety:
14a Basal leaves with extended, lanceolate to linear blades longer than sheaths . . . . . 14. *F. macrochlamys*
14b Leaves with short, oblique, ovate blades < 1/2 as long as sheaths . . . . . 15. *F. brevifolia*

Subg. 1. **Glutinosae**

Subg. **Glutinosae** *(M.P.de Vos) Goldblatt & J.C.Manning* in Bothalia 41: 11 (2011). *Ferraria* sect. *Glutinosae* M.P.de Vos: 329 (1979). Type: *F. glutinosa* (Baker) Rendle

Plants with open, aerial branching system and stem sticky below the nodes. *Rhipidia* with > 2 and up to 6 flowers each. *Flowers* with tepals claws forming a wide cup, bearing prominent nectaries with dry nectar. *Filaments* inserted in lower 1/3 of anthers; anther lobes parallel, contiguous above filament insertion when fully dehisced. *Ovary* exserted, ovoid; stigmas minute, terminal on apices of style branch arms. *Capsules* globose- to ovoid-truncate.



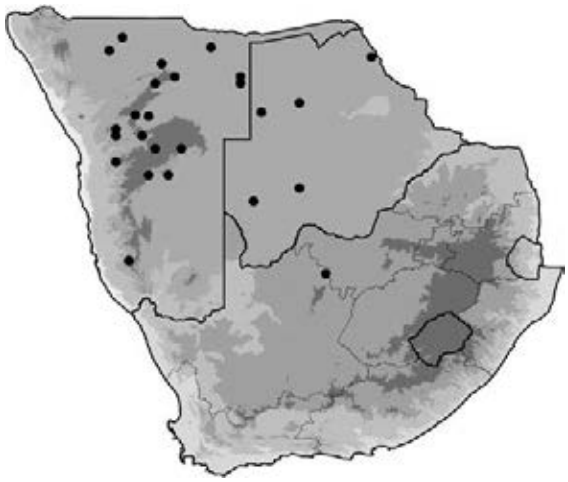
Ferraria parva: A, flowering plant; B, half-flower; C, detached outer tepal (left) and inner tepal (right); D, detail of anther and one stigmatic branch; E, undehisced capsule; F, dehisced capsule; G, seed.

1. **Ferraria glutinosa** *(Baker) Rendle*, Catalogue of the African plants collected by Dr. Friedrich in 1853–61, vol. 1: 27 (1899); Goldblatt & Manning: 11 (2011). *Moraea glutinosa* Baker: 271 (1878). Type: Angola, Huila, near Lopollo, Ferrão da Sola, Feb. and Apr. 1860, *Welwitsch 1543* (BM, holo.; K, LISU, P, iso.).

Ferraria bechuanica Baker: 344 (1898). Type: Botswana, Ngamiland, Kalahari Desert near Manumwe, 'flowers chocolate with yellow fringe', 26 Feb. 1897, *Lugard 237* (K, holo.).

Moraea randii Rendle in Rand: 144 (1898). *Ferraria randii* (Rendle) Rendle: 54 (1905). Type: Zimbabwe, Bulawayo, January 1898, *Rand 223* (BM, lecto., designated by Goldblatt & Manning: 11 (2011); BR, isolecto.).

Ferraria viscaria Schinz: 77 (1900). Type: Namibia, Omupanda, *Wulfhorst 45* (Z, holo.).



Distribution of ***Ferraria glutinosa***.

Plants mostly 400–600 mm high. *Stem* exposed above sheaths of lower leaves, branched from upper nodes, branches rarely also branched; distal 5–6 mm of upper internodes sticky, often with sand adhering. *Leaves* at base solitary or up to 4, sometimes basal leaf poorly developed; blades linear, straight, 4–6(–10) mm wide, with visible central vein, cauline leaves moderately well-developed, often longer than basal, progressively reduced above, becoming largely sheathing. *Rhipidia* 4- to 6-flowered; inner spathe 30–42 mm long, outer entirely sheathing, usually ± $^1/_3$–$^1/_2$ as long. *Flowers* on pedicels as long or longer than spathes; usually dark brown to dull purple or maroon; tepal limbs with pale yellow to gold-coloured margins, sometimes limbs marked or sparsely spotted yellow near base or with large irregular brown blotches on pale background; claws brown or yellow streaked with purple or brown, odourless; tepals diverging, claws forming wide cup ± 10 mm deep, 15–18 mm wide at rim, limbs spreading to ± reflexed; margins crisped; nectaries dark brown, 1.5 × 2.0 mm, 3–4 mm above claw bases; outer tepals 23–33 × ± 10 mm; inner tepals slightly smaller, claws tapering to narrow base. *Filaments* united in minutely papillate column, 8–11 mm long, free in upper 1.5–2.0 mm; anthers parallel, 5–6 mm long, shorter after anthesis, dark brown; pollen orange. *Ovary* narrowly ovoid, usually exserted, 5–7 mm long; style branches 2 mm long, dividing into diverging, fringed arms 2–3 mm long, fringes smooth or minutely papillate, 4–5 mm long; stigmas terminal on style arms. *Capsules* ovoid- to globose-truncate, mostly 12–18 mm long. *Seeds* glossy, brown, 4–5 mm long, ± 5-sided, facets separated by raised ridges, wrinkled. *Chromosome number* 2*n* = 40. *Flowering time*: mostly January to March, occasionally later; lasting a single day.

Distribution and ecology: occurring across a wide belt of summer-rainfall southern and central Africa, and relatively common across Botswana and northern Namibia, also in Northern Cape and North West Provinces of South Africa (and in Angola, Zimbabwe and Malawi); usually in sandy ground with corms deeply buried, also in rocky places.

Diagnosis: differing from all other southern African species of the genus in the sticky stems, open branching habit, and rhipidia with several (usually 4 to 6) flowers. The capsules are subglobose and flat-topped, unlike capsules of the remaining southern African species. Flowers are variously coloured, ranging from almost uniformly brown to dark purple or maroon with pale yellow to light brown crisped margins to partly marked with yellow streaks or bands. The corms are edible and eaten raw or roasted.

Subg. 2. **Ferraria**

Plants acaulescent or with aerial stems with relatively short branches enclosed by leaf sheaths. *Stems* not sticky below nodes. *Rhipidia* 2-flowered. *Flowers* with tepal claws widely diverging, forming a shallow cup, with large nectaries with non fluid nectar, or forming a deep, wide to narrow cup with small nectaries and with fluid nectar. *Filaments* inserted in lower $^1/_3$ or near apex of anthers; anther lobes parallel and usually contiguous above filament insertion or lobes not contiguous and becoming widely divergent when fully dehisced. *Ovary* included, with or without sterile beak; stigmas minute, terminal on apices of style branch arms, or larger, on lobes below style arms tips. *Capsules* ovoid-oblong and obtuse or with prominent beak.

Sect. 1. **Ferraria**

Ferraria [unranked] *Brachyscyphae* Baker: 106 (1877). Type: *F. undulata* L. = *F. crispa* Burman, lecto., designated here.

Flowers with tepal claws widely diverging, forming a shallow cup, with large nectaries with non fluid nectar; filaments inserted in lower $^1/_3$ of anthers; anther lobes parallel and contiguous above filament insertion; ovary ellipsoid, sometimes with sterile beak; stigmas minute, terminal on apices of style branch arms; capsules ovoid-oblong and obtuse or with prominent beak.

2. **Ferraria crispa** *Burman* in Nova acta physico-medico Academiae Caesareae Leopoldino-Carolinae germanicae naturae curiosorum 2: 199 (1761); Goldblatt & Manning: 17 (2011). Type: South Africa, without precise locality, illustration in Burman: 199, t. 3, f. 1 (1761).

Ferraria undulata L.: 1353 (1763), illegitimate superfluous name for *F. crispa* Burman. *Moraea undulata* (L.) Thunb.: no. 14 (1787). Type: South Africa, without locality or collector, illustration in Miller: 187, t. 280 (1759a), lecto., designated by Goldblatt & Manning: 17 (2011).

Ferraria ensiformis Mill. (1768), illegitimate superfluous name for *F. crispa* Burman. Type: not designated, probably as for *F. crispa*.

Ferraria obtusifolia Sweet: t. 148 (1826a). Type: illustration in Sweet: t. 148 (1826a).

Ferraria atrata G.Lodd., The Botanical Cabinet 14: t. 1356 (1828), new synonym. Type: illustration in G.Lodd.: t. 1356 (1828).

Ferraria vandermerwei L.Bolus: 276, fig. D (1932). Type: South Africa, [Western Cape], near Swellendam, cultivated in Cape Town, Sept.–Oct. 1932, *Van der Merwe s.n.* (BOL, holo.).

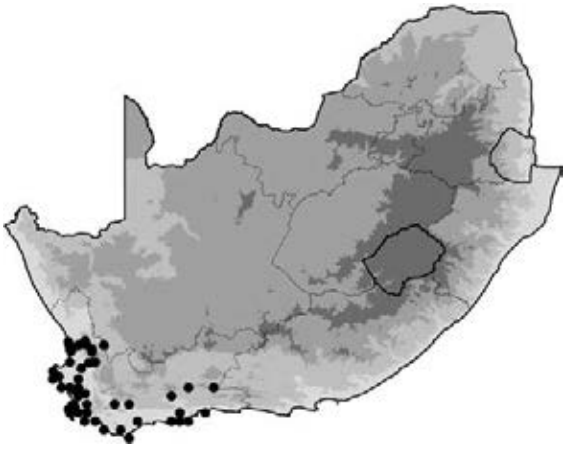
Ferraria crispa subsp. *nortieri* M.P.de Vos: 338 (1979). Type: South Africa, [Western Cape], heights north of Verlorenvlei, 28 Aug. 1976, *De Vos 2366* (NBG, holo.).

[*Ferraria major* Eckl.: 18 (1827), invalid name without description.]

Plants usually robust, (300–)450–1 500 mm high. *Stem* much branched in upper half, sheathed by leaf bases below; cataphylls and bases of leaf sheaths often speckled pale on red background. *Leaves* several, linear to sword-shaped, (4–)6–12 mm wide, basal longest, with visible main vein. *Rhipidia* 2-flowered; spathes green with membranous margins, inner 45–65 mm long, outer ± half as long, usually entirely sheathing. *Flowers* on pedicels 40–60 mm long, variously pale yellow to beige with brown to dull purple mottling and brown margins to mostly brown with pale yellow margins, strongly scented, odour ± of caramel or molasses, tepals widely diverging, claws forming shallow bowl 6–8 mm deep, 13–18 mm wide at mouth, nectary covering ± half length of claw, limbs spreading; outer tepals 28–35 mm long, claws 8–12 mm long, limbs up to 25 mm long, inner tepals slightly shorter and narrower. *Filaments* united in smooth column ± 6 mm long, free in upper 3 mm; anthers ± 3 mm long, thecae parallel, shortly apiculate; pollen orange. *Ovary* ellipsoid, without beak, included in spathes, 12–20 mm long; style branches ± 4 mm long, forked in upper half, divided into diverging arms; 4–5 mm long, prominently fringed; stigmas terminal on style arms. *Capsules* ovoid to oblong, 15–25 mm long, obtuse or pointed at apex. *Seeds* angular, mostly 5-sided, ± 4 mm long, facets slightly wrinkled. *Chromosome number* $2n$ = 40, 60. *Flowering time*: August to October; lasting a single day.

Distribution and ecology: best known from the Atlantic Coast of Western Cape, South Africa, extending from Pakhuis Pass through the Witteberg and Swartberg Mtns to Georgida in the Baviaanskloof of Eastern Cape and along the coast as far as Herold's Bay near George; most common along the coast but showing a striking ecological shift, also in montane habitats, sometimes along streams in deep, coarse sand, or on seasonally moist south-facing slopes; coastal populations flower annually but the montane populations flower well only after fire the previous summer.

Diagnosis: recognised by the growth habit, with stems produced well above the ground and bearing numerous branches crowded in the upper half, *Ferraria crispa* has a flower with a wide, shallow cup and an ovoid to ellipsoid capsule rounded or acute at the apex and lacking a beak. The sword-shaped lower leaves and shorter cauline leaves have a definite main vein and form two opposed ranks. The strongly scented flowers have tepals speckled or blotched dark brown to dull purple on a cream-coloured to pale yellowish background, or occasionally predominantly dark brown, always with pale crisped margins, these sometimes almost golden



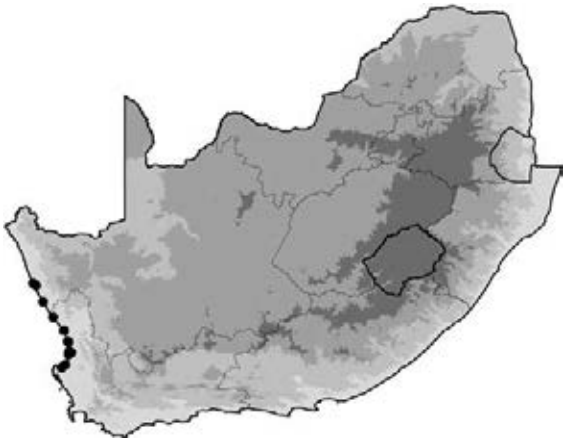
Distribution of ***Ferraria crispa***.

yellow when the tepals are otherwise brown. The tepal claws each bear a large, glistening nectary, often covering almost half the surface. The nectaries produce minute droplets of concentrated nectar scattered over the entire surface.

Northern populations of *Ferraria crispa* have been treated as subsp. *nortieri* because of their pale green rather than slightly glaucous leaves, and slightly smaller flowers with the floral cup mostly ± 8 mm deep and ± 10 mm wide at the rim, and the ovary < 20 mm long. The distinction is less clear than at first believed and these northern populations are not recognised here. The northern populations are tetraploid, $2n$ = 40, whereas those in the south and east are hexaploid, $2n$ = 60. The ecological range of *F. crispa* is remarkable but there appear to be no vegetative or floral differences between coastal populations that favour rocky outcrops and those from sandy mountain slopes, except the latter may be taller, sometimes reaching up to 1.5 m.

3. **Ferraria foliosa** *G.J.Lewis* in Annals of the South African Museum 40: 117 (1954); Goldblatt & Manning: 18 (2011). Type: South Africa, [Western Cape], near Elandsbaai [Elands Bay], 12 Sept. 1955, *Lewis 2301* (SAM [*SAM60809*], holo.; NBG, SAM [2 sheets], PRE, iso.).

Plants 300–800 mm high. *Stem* leafy and much-branched, branches rotated in clockwise fashion. *Leaves*: basal (and juvenile) linear, diamond-shaped in cross section, thickened in midline, ± 8–10 mm wide, main vein hardly evident below thickened midline; cauline leaves falcate, channelled below, distally horizontal, main vein often not evident, arranged in a two-ranked spiral. *Rhipidia* 2-flowered; inner spathe 48–50 mm long, often inflated, outer 28–30 mm long, sheathing below, diverging in upper half, hooked at tips. *Flowers* on pedicels 17–20 mm long, dull maroon to purple or dark brown, usually with darker purple-maroon blotches, margins pale brown, claws usually maroon-speckled with white, putrid- or molasses-smelling, tepal claws broad, forming a wide cup, 7.5–8.0 mm deep, 13–18 mm wide at rim, nectaries pale green, heart-shaped, prominent, covering $^1/_3$–$^1/_2$ of claw, limbs ± spreading; outer tepals 33–40 mm long, inner tepals 28–35 mm long, claws 9–10 mm long. *Filaments* united in a column 8–11 mm long, upper 1.5–2.5 mm free; anthers ± 3.5 mm long before anthesis, thecae parallel; pollen orange. *Ovary* ellipsoid, not beaked, included, 15–20 mm long; style branches ± 4.5 mm long, diverging, with prominently fringed arms; stigmas terminal on style arms. *Capsules* ellipsoid, 28–35 mm long, round at apex. *Seeds* angular, ± 5-sided, ± 3 mm long, facets slightly wrinkled, light brown, shiny. *Chromosome number* $2n$ = 20. *Flowering time*: late August to October; lasting a single day.



Distribution of ***Ferraria foliosa***.

Distribution and ecology: extending along the Atlantic Coast of Northern and Western Cape, South Africa, from near Hondeklipbaai in the north to Velddrif in the south; on dunes and sandy beaches in deep sand.

Diagnosis: vegetatively, *Ferraria foliosa* can be distinguished by the long, linear basal leaves much thickened in the midline, thus ± diamond-shaped in cross section, and sometimes dry by flowering time. The basal leaves differ markedly from the shorter, broader cauline leaves, the blades also thickened in the middle and arching outward, ultimately spreading horizontally. Successive leaves are opposed but collectively the leaves have a spirally two-ranked arrangement. This is also reflected in the short lateral branches, which are crowded in the upper half of the stem, the successive ones rotated slightly in a clockwise direction. The flowers differ little from those of closely related *F. crispa* in their darkly mottled pigmentation, broad tepal claws with large nectaries, and wide, shallow floral cup. Whereas the flowers of *F. crispa* are usually shades of dull yellow, buff-coloured and brown, those of *F. foliosa* are mottled dull purplish, or brownish maroon on a paler grey-purple background.

4. **Ferraria schaeferi** *Dinter* in Repertorium Novae Species Regni Vegetabilium 16: 339 (1920). Goldblatt & Manning: 19 (2011). Type: Namibia, Klinghardt Mtns, Dreikugelberg, 14 Aug. 1913, *Schäfer 562* [B, neo., designated by De Vos: 344 (1979)].

Plants 200–500 mm high. *Stem* sheathed by leaf bases, branching repeatedly in upper axils, branches rotated in clockwise spiral; corm bearing long runners from base, each terminating in a small corm. *Leaves* with overlapping sheaths; blades thick and leathery, thickened in midline and main vein usually evident, arranged in a two-ranked spiral, spreading horizontally above, 12–20 mm wide. *Rhipidia* 2-flowered; spathes firm, leafy in texture, with translucent membranous upper margins, inner 50–60 mm long, outer somewhat shorter, sheathing only near base, arching outward in upper half. *Flowers* on pedicels 40–50 mm long; creamy yellow with small to large brown spots, margins dark brown, usually sweetly scented (of violets), tepal claws broad, forming a wide cup, ± 8 mm deep, 12–15 mm wide at rim, with brownish purple, heart-shaped nectaries in lower half, ± half as long as claw; outer tepals ±



Distribution of ***Ferraria schaeferi***.

25 mm long, inner tepals 22–24 mm long, claws of both whorls ± 8 mm long. *Stamens* with filament united in a column ± 7.5 mm long, free in upper 2 mm; anther thecae parallel, ± 5 mm long at anthesis, later shrinking; pollen dull brown to orange. *Ovary* ellipsoid, 20–25 mm long, tapering to a slender beak, ± 8 mm long, included; style branches ± 2 mm long, diverging into prominently fringed arms ± 2 mm long; stigmas terminal on style arms. *Capsules* ± ellipsoid, 20–25 mm long, excluding beak. *Seeds* light brown, glossy, 5- or 6-angled, ± smooth. *Chromosome number* 2*n* = 40, 60. *Flowering time*: mid-July to September; lasting a single day.

Distribution and ecology: extending from near Lüderitz Bay in southwestern Namibia in the north to Grootmis in Northern Cape, South Africa, in the south; in deep sands and dunes, mainly along the coast, or a short distance inland.

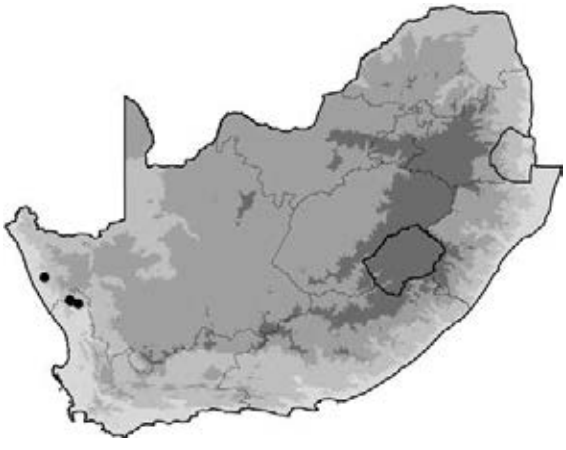
Diagnosis: unlike the flowers of the related species, *Ferraria crispa* and *F. foliosa*, those of *F. schaeferi* sometimes have, at least to the human nose, a pleasant, sweet scent reminiscent of violets, but with a slightly sour undertone. The flowers otherwise resemble those *F. crispa* and *F. foliosa*, having widely spreading tepals, the broad claws forming a shallow cup, ± 8 mm deep and some 12 mm wide at the rim. The tepal claws bear large heart-shaped nectaries, while the limbs have a creamy pale yellow ground colour speckled with small dark brown spots, the same colour as the crisped margins. In vegetative form, *F. schaeferi* most closely resembles *F. foliosa*, which also has the leaves and branches arranged in a two-ranked spiral, and the leaf blades are similarly thick and leathery with a weakly defined central vein. In addition to the differently coloured perianth, the ovary and capsule have a pronounced beak up to 8 mm long. This readily separates *F. schaeferi* from *F. foliosa*. In its sandy habitat, plants spread vegetatively by long runners produced from the base of the stem that can extend below the ground a metre or more from the parent plant, each terminating in a corm.

5. **Ferraria ovata** *(Thunb.) Goldblatt & J.C.Manning* in Novon 12: 461 (2002); Goldblatt & Manning: 20 (2011). *Moraea ovata* Thunb.: 186 (1800). Type: South Africa, [Northern Cape], Namaqualand, near Kooksfontein [as Koksfontein, also Cocksfonteyn], (now Soebatsfontein), probably in 1793, *Masson s.n.* (UPS–THUNB 1225, holo.).

Plants often small, (40–)100–200 mm high. *Stem* erect, unbranched, lower half partly exposed. *Leaves*: basal and juvenile with short, linear blades, up to 45 × 2 mm; cauline entirely bifacial, broadly ovate to rotund, amplexicaul, 15–18 mm long, spreading, concave; margins membranous, often reddish. *Rhipidia* 2-flowered; spathes leafy, green, often brown at tips, inner 18–20 mm long, outer 12–20 mm long, sheathing in lower half, arching outward above. *Flowers* on pedicels 7–12 mm long, pale yellow with brown spots in midline and base of limbs, margins closely crisped, dark brown, acrid-smelling; tepal claws broad, 7–8 mm long, forming a cup ± 7 mm deep, ± 8 mm wide at rim, nectaries ± 2 mm long, above base of claws, ± 2 × 2 mm, paired or bilobed, greenish, tepal limbs spreading; outer tepals 17–20 mm long, limbs 8–12 mm long, inner slightly smaller than outer. *Filaments* united in a column 7–8 mm long, free in upper 1 mm; anther thecae parallel, ± 2 mm long; pollen orange. *Ovary* ellipsoid, ± 6 mm long, without beak, included; style branches ± 2 mm long, diverging into prominently fringed arms; stigmas terminal on style arms. *Capsules* ovoid (mature capsules and seeds unknown). *Flowering time*: June to July; lasting a single day.

Distribution and ecology: restricted to central Namaqualand in Northern Cape, where it is recorded from a few isolated sites from Soebatsfontein in the north to the low hills of the southern Kamiesberg between Bitterfontein and Kliprand; usually in gritty granitic gravel among rocks that provide protection from predation.

Diagnosis: the parallel anthers, wide and shallow tepal cup, spindle-shaped ovary without a beak, and stigmas



Distribution of ***Ferraria ovata***.

terminal on the style arms, place *Ferraria ovata* in sect. *Ferraria* where it is unusual in the few-branched or simple stem and strongly dimorphic leaves, the basal linear and the cauline bifacial, short and spoon-shaped. The relatively small flowers are strikingly coloured yellow and glossy dark brown. The nectaries are bilobed or paired well above the bases of the tepal claws.

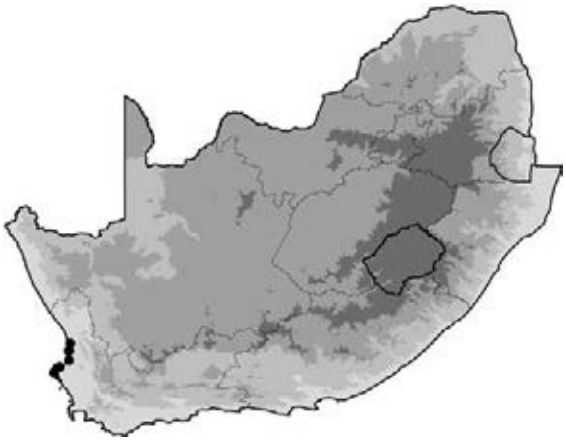
Ferraria ovata is one of three winter-flowering species in the genus, the others being the coastal species *F. densepunctulata* and *F. ornata*.

6. **Ferraria densepunctulata** *M.P.de Vos* in Journal of South African Botany 45: 346 (1979); Goldblatt & Manning: 22 (2011). Type: South Africa, [Western Cape], Elandsbaai, 14 Jun. 1974, *Loubser sub De Vos 2317* (NBG, holo.; PRE, iso.).

Plants slender, mostly 120–250 mm high. *Stem* few-branched in upper half, lower half of stem partly visible; leaf sheaths and cataphylls often flushed red with pale spotting. *Leaves*: basal with long compressed-cylindric blades, loosely 2-ranked, 3–5 mm wide, margins hyaline to reddish; cauline shorter, spreading outward, tips often hooked; juvenile leaves up to 6 in 2-ranked cluster, terete, hollow, dark green. *Rhipidia* 2-flowered; spathes green with narrow membranous margins pale or flushed red; inner 40–50 mm long, outer ± 25 mm long, sheathing below, diverging and hooked distally. *Flowers* on pedicels slightly shorter to ± as long as spathes; pale greenish to grey-blue, outer tepals densely speckled with small maroon to purple or dark blue spots, inner tepal limbs maroon to purple or dark blue blotch in lower half, faintly spice-scented, tepal claws forming a shallow cup, ± 9 mm deep, 15–20 mm wide at rim; nectaries bilobed, above base of outer tepal claws, in midline of inner tepal claws, tepal limbs spreading horizontally, undulate or only slightly crisped; outer tepals 25–30 × 11–13 mm, inner tepals 20–23 × ± 10 mm, claws of both whorls ± 10 mm long, inner narrower than outer. *Filaments* united in a column 8–10 mm long, free in upper ± 2 mm; anther thecae parallel, ± 4 mm long before anthesis; pollen orange or dull yellow. *Ovary* ellipsoid, without beak but sterile in upper 3–4 mm, sometimes exserted, 12–15 mm long; style ± 10 mm long, style branches ± 3 mm long, divided in upper $^1/_3$ into diverging, fringed arms; stigmas terminal on style arms. *Capsules* ovoid, 15–25 mm long, apex subacute. *Seeds* pale, glossy brown, ± 3 mm diam., 5-sided, lightly wrinkled. *Chromosome number* 2*n* = 20. *Flowering time*: May to July; lasting two days.

Distribution and ecology: restricted to the Atlantic Coast of Western Cape, South Africa, from Lambert's Bay in the north to Langebaan in the south; on granite or limestone outcrops or calcareous sands.

Diagnosis: early flowering and relatively rare, *Ferraria densepunctulata* is distinctive in the narrow basal leaves, oval in cross section, and rather different from the shorter, broader cauline leaves, and in the unusually coloured flowers, minutely dark blue to purple spotted on a pale greenish to grey-blue background, but with the limbs of the inner tepals so densely speckled as to appear solidly coloured, either maroon or dark slate blue. The flowers are also unusual in having the tepal limb margins undulate instead of closely crisped. Small bilobed nectaries are located at the base of the outer tepals but in the midline of the inner tepal claws, the lower halves of which are linear and ± 1 mm wide. Like other members of sect. *Ferraria*, the stigmas are terminal on the arms of the style branches and the ovary is not beaked. The flowers are unique in the section in lasting two days instead of a single day. The leaves of non-flowering plants are so strikingly different from those of mature, flowering individuals that they appear to represent a different species. Four to six in number, they are held in a close, 2-ranked fan and the blades are dark green, terete and hollow.



Distribution of ***Ferraria densepunctulata***.

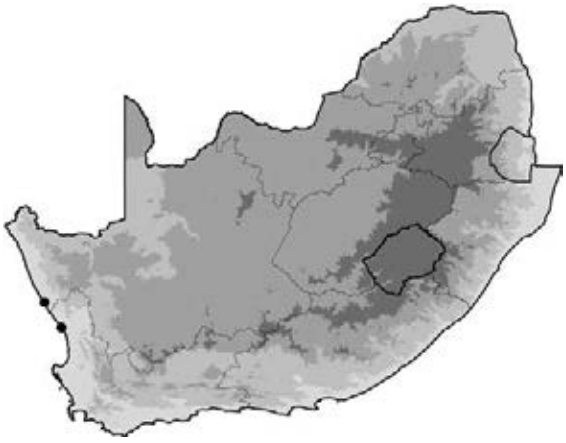
The early flowering habit of *Ferraria densepunctulata* is matched in the genus by *F. ornata* and *F. ovata*, both of which also have the narrow basal leaves differentiated from the shorter and broader cauline leaves.

7. **Ferraria ornata** *Goldblatt & J.C.Manning* in Bothalia 41: 24 (2011). Type: South Africa, Northern Cape, central Namaqualand, sandy slopes 10 km inland of Groen River Mouth, Farm Van Zylsrus, 500 m along dirt track N of main road, strandveld in deep sand, 2 June 2008, *Manning 3174* (NBG, holo.; MO, iso.).

Plants acaulescent, 50–80 mm high. *Stem* closely 2- to 4-branched; replacement corms not present at flowering, developing later; cataphylls (usually only uppermost) turning red above ground. *Leaves* 4 or 5, clasping stem, lanceolate-concave, up to 40 × 15 mm, glaucous with purple tips; margins membranous, reddish, finely crisped, basal leaf with blades 5–10 mm long, subterete to cylindric, obtuse-apiculate, 3–4 mm diam.; non-flowering plants with 1 to 3(–5) leaves; blades suberect or falcate, subterete or cylindric, ± 4-sided to

round in section, 60–80 × 2–4 mm, obtuse-apiculate, glaucous with purple apex and sheath, sheath margins and veins minutely hairy abaxially. *Rhipidia* 2-flowered; spathes leathery, glaucous, with translucent, membranous margins, inner 40–50 mm long, outer about half as long, sheathing in lower half, arching outward. *Flowers* on pedicels 30–40 mm long; white with base of tepal limbs yellow, limbs finely brown-spotted basally and with fewer, larger brown spots distally, margins finely crisped, yellow and brown, claws streaked with brown, unscented, with bilobed, concave nectaries in middle of claws, distal nectary margin prominently crested, pale lilac with purple streaks, tepal claws narrowed below, forming a windowed cup 7–8 mm deep and ± 10 mm wide at rim, limbs spreading or slightly reflexed; outer tepals ± 19 × 10 mm with claws ascending, ± 8 mm long, narrowed below and ± 2 mm wide, inner ± 13 × 6 mm with claws ± 6 mm long, narrow proximal part ± 1.5 mm wide. *Filaments* united in column 8–9 mm long, upper ± 2 mm free; anthers diverging, thecae parallel, ± 3 mm long, brown; pollen orange. *Ovary* ellipsoid, 10–12 mm long, included; style branches diverging, deeply divided into diverging, fringed arms; stigmas terminal on style arms. *Capsules* broadly ovoid, 14–18 mm long, tapering to acute tip. *Seeds* irregularly 5(6)-sided, ± 3 × 2 mm, facets separated by pale straw-coloured, wavy ridges, usually ± plane, dark brown. *Flowering time*: May to early June; lasting a single day.

Distribution and ecology: known from two extended populations on the Atlantic Coast of South Africa, one on slopes above the lower Groen River in central Namaqualand, Northern Cape, and the other west of Koekenaap in Western Cape, some 120 km to the south; in deep sandy soils in sandveld.



Distribution of ***Ferraria ornata***.

Diagnosis: stemless and with the tepal claws unusually narrow in the lower part, thus forming a windowed cup, *Ferraria ornata* is easily recognised by these features, as well as its small size, flowering individuals standing only 50–80 mm high. The apparently scentless flowers are unique in the fleshy crests bordering the distal margins of the nectaries, which are situated in the middle of the tepal claws and secrete miniscule quantities of sticky, sweet nectar. The short, concave cauline leaves of flowering plants contrast with the long, cylindric leaves of juvenile and non-flowering individuals. Both the early flowering and unusual, concave cauline leaves of flowering plants suggest it is most closely allied to *F. ovata*, which has a similar growth strategy of early flowering and small, concave cauline leaves on a taller flowering stem. Replacement corms of flowering individuals are absent at flowering and develop later as the capsules ripen.

Sect. 2. **Macroscyphae** *(Baker) M.P.de Vos* in Journal of South African Botany 45: 349 (1979). *Ferraria* [unranked] *Macroscyphae* Baker: 106 (1877); Goldblatt & Manning: 25 (2011) [as 'sect. *Macroscyphae* Baker']. Type: *Ferraria divaricata* Sweet, lecto., designated by De Vos: 350 (1979).

Flowers with tepal claws forming a deep, wide or narrow cup containing fluid nectar; filaments inserted near apex of anthers; anther lobes when fully dehisced usually widely divergent, rarely parallel but never contiguous; ovary always with sterile beak; stigmas on lobes below apices of style branch arms; capsules with prominent beak.

Ser. **Subdivaricatae** *Goldblatt & J.C.Manning*, new series. Type: *Ferraria ferrariola* (Jacq.) Willd.

Tepal claws forming a narrow cup 7–12 mm diam. at rim. *Anther* thecae ± parallel at dehiscence, later divergent.

8. **Ferrari**a **ferrariola** *(Jacq.) Willd.*, Species plantarum, edn. 4, 3: 581 (1800); Goldblatt & Manning: 25 (2011). *Moraea ferrariola* Jacq.: 141 (1791). Type: South Africa, without precise locality or collector, illustration in Jacq.: 24, t. 450 (1804).

Ferraria viridiflora Andrews: 285 (1803) [*F. viridis* Ker Gawl. (1804), orth. var.]. Type: South Africa, collected by W. Synnot, without precise locality, illustration in The Botanist's Repository 4: t. 285 (1803); no preserved material known.

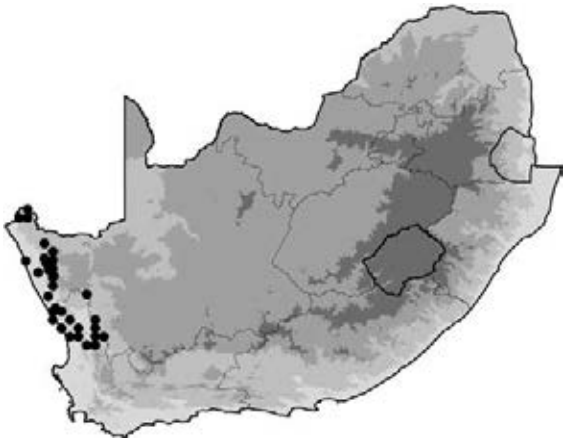
Ferraria longa Barnes: 313 (1930). Type: South Africa, [Northern Cape], Nieuwoudtville, cultivated at Kirstenbosch, Jul. 1930, *P. Ross-Frames s.n. BOL19720* (BOL, holo.).

Plants slender, mostly 150–250 mm high. *Stem* sheathed below by mottled cataphylls and leaf sheaths; lower internodes usually partly exposed, usually branched in upper half. *Leaves*: basal linear, unifacial, usually slightly longer than stem, mostly 2–3 mm wide, main

vein usually well delineated; cauline leaves markedly shorter and broader than basal leaves and resembling spathes. *Rhipidia* 2-flowered; spathes glaucous or pale green, with broad transparent margins, hooked at tips, inner 45–60(–70) long, often inflated, outer ± $^{1}/_{2}$–$^{2}/_{3}$ as long, sheathing below, diverging in upper half. *Flowers* on pedicels 20–30 mm long; greenish blue, grey-blue, or pale watery yellow to pale green, usually with darker spots and streaks on outer tepal limbs, faintly sweet- or spice-scented, sometimes odourless, tepal claws forming a narrow, closed cup, 17–20 mm deep, ± 12 mm wide at mouth; nectaries small, at base of tepals; outer tepals (30–)35–40 mm long, claws fairly narrow, 17–20 mm long, inner slightly shorter and narrower, limbs of outer ± spreading, inner usually reflexed. *Filaments* united in a column 14–19 mm long, upper 1–2 mm free; anther thecae initially parallel, ± 4 mm long at anthesis, later diverging and shrinking to almost 2 mm. *Ovary* ellipsoid, 20–25 mm long, with sterile beak, (5–)8–12 mm long; included; style branches ± 2.5 mm long, with diverging, fringed arms, ± 2.5 mm long; stigmas irregularly shaped lobes in middle of style arms, arching over anthers. *Capsules* ovoid-oblong, 14–20(–25) mm long, beak (5–)8–12 mm long. *Seeds* mostly 5-sided, 3.0–3.5 × 2.5–3.0 mm, smooth, shiny, brown, facets separated by prominent, pale wavy ridges, facets light yellow-brown, smooth or slightly wrinkled. *Chromosome number* 2*n* = 20. *Flowering time*: June to August; lasting two days.

Distribution and ecology: relatively common along the Atlantic Coast of South Africa, extending from the Richtersveld in northern Namaqualand to the Bokkeveld Mtns in Northern Cape and through the Olifants River Valley as far south as Clanwilliam in Western Cape; on granite and sandstone slopes, or in sandy ground usually not far from rock outcrops .

Diagnosis: *Ferraria ferrariola* is readily recognised by the linear basal leaves, quite different from the shorter cauline leaves, the stem usually partly exposed, and with red-flushed and white-speckled cataphylls and lowermost leaf sheath. The large flowers have a deep and relatively narrow floral cup, 17–20 mm deep and ± 12 mm wide at the mouth. The flowers are usually shades of turquoise-grey to pale slate-blue with a pale yellow nectar guide lightly speckled with darker colour on the limbs of the outer tepals. The flowers have a faint sweet odour, often with spicy overtones of almond, cinnamon or vanilla, unique in the genus. *Ferraria ferrariola* has been confused with *F. parva*, which has flowers of similar shape with a narrow floral cup but much smaller, with a floral cup ± 6 mm deep and outer tepals 18–22 mm long compared to (30–)35–40 mm in *F. ferrariola*. The sheaths and cataphylls of *F. parva* also lack the red flush and white speckling characteristic of *F. ferrariola*.

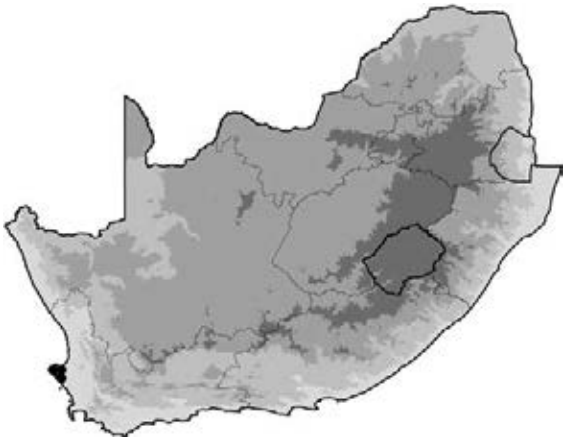


Distribution of ***Ferraria ferrariola***.

9. **Ferraria parva** *Goldblatt & J.C.Manning* in Bothalia 41: 26 (2011). Type: South Africa, Western Cape, sandveld west of Vredenburg, north side of Saldanha highway, opposite cemetery, under shrubs and restios, 19 Sept. 2007, *Goldblatt & Manning 13000* (NBG, holo.; MO, iso.).

Plants mostly 80–150 mm high, excluding basal leaves. *Stem* branched near base and in upper part, lower half often partly exposed; cataphylls and sheath of lowermost leaf pale. *Leaves* unifacial, basal 2 or 3 ± linear, usually exceeding spathes, 3–5 mm wide, upper leaves subtending branches lanceolate, spreading, shorter and wider than basal, mostly 4–6 mm wide, margins and main vein not evident when alive; non-flowering plants with 2 or 3 linear leaves, oval in cross section. *Rhipidia* 2-flowered; spathes pale green, apices slightly hooked, inner 45–65 mm long, often inflated with age, margins transparent, outer spathe ± half as long as inner, often diverging in upper $^{1}/_{3}$. *Flowers* on pedicels 18–20 mm long; spotted with dark brown in a dull yellow, light red-brown or pale greenish blue background, margins crisped, buff- to khaki-coloured, sweetly scented of jasmine and coconut, tepal claws forming a narrow cup ± 8 mm deep, ± 7 mm wide at rim; outer tepals 18–22 × 8–10 mm, claws 7–8 mm long with a pouch-like bilobed nectary in lower midline; inner tepal slightly shorter and ± half as wide, limbs slightly reflexed, inner more so than outer. *Filaments* united in a column ± 6 mm long, free in upper ± 1.5 mm; anther thecae initially parallel, later divaricate, ± 3 mm long at anthesis, later ± $^{2}/_{3}$ as long. *Ovary* spindle-shaped, 12–15 mm long, with a sterile beak up to 7 mm long; style branches ± 2 mm long, forked in upper half, prominently fringed; stigmas narrow, at lateral ends of style branches, arching forward. *Capsules* ovoid-oblong, 15–20 mm long, with beak up to 2–7 mm long. *Seeds* angular, smooth, shiny, golden-brown, mostly 5-sided, facets smooth or slightly wrinkled. *Flowering time*: late August to mid-September; lasting two days.

Distribution and ecology: a narrow endemic of the Atlantic Coast and near interior of Western Cape, South Africa, from the lower Berg River Valley near Hopefield to Vredenburg (and possibly further south); in sandveld and limestone fynbos in deep sandy ground, sometimes over limestone, or in cracks in limestone or calcrete pavement.



Distribution of ***Ferraria parva***.

Diagnosis: a small plant reaching up to 150 mm and with the stem usually covered by leaf sheaths, *Ferraria parva* has flowers with a narrow floral cup ± 8 mm deep and tepals 18–22 mm long with slightly reflexed limbs. It has been confused with the larger-flowered *F. ferrariola,* which has a floral cup 17–20 mm deep and tepals (30–)35–40 mm long. The cataphylls and basal leaf sheath of *F. parva* are uniformly pale coloured, whereas those of *F. ferrariola* are speckled and usually flushed red.

Ser. **Macroscyphae** *(Baker) Goldblatt & J.C.Manning*, new rank. *Ferraria* [unranked] *Macroscyphae* Baker in Journal of the Linnean Society, Botany 16: 106 (1877). Type: *F. divaricata* Sweet

Flowers relatively large, floral cup widening substantially upwards, rim ± as wide as or wider than depth of cup, 13–20 mm diam. at rim. *Anther* thecae divergent.

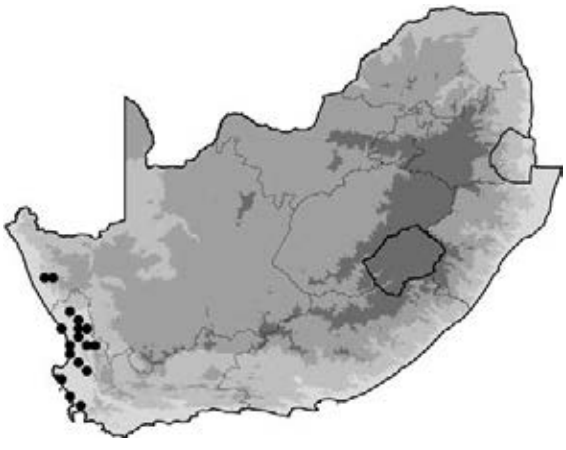
10. **Ferraria divaricata** *Sweet* in British Flower Garden: t. 192 (1827); Goldblatt & Manning: 27 (2011). Type: South Africa, without precise locality, collected by W. Synnot, illustration in Sweet: t. 192 (1827) (no preserved material known).

    Ferraria divaricata subsp. *arenosa* M.P.de Vos: 358 (1979). Type: South Africa, [Western Cape], Clanwilliam, Nardouw Pass, Farm de Lille, Oct. 1973, *Van Breda sub De Vos 2295* (NBG holo.; PRE, iso.).

Plants (250–)350–500 mm high. *Stem* well developed, much-branched distally. *Leaves* sword-shaped to linear, 6–15 mm wide, often with a slightly raised main vein, glaucous, margins sometimes slightly raised, basal leaves longest, cauline leaves progressively shorter above and becoming bract-like. *Rhipidia* 2-flowered; spathes glaucous, with broad membranous margins, inner 70–85 mm long, outer ± half as long, sheathing entirely or in lower $^{2}/_{3}$, then often slightly S-shaped. *Flowers* on pedicels 6–15 mm long; variously dark chocolate to golden-brown, crisped part of margins similarly coloured or paler, claws pale, streaked with fine longitudinal lines or with a broad median darker centre, forming a cup, 14–18 mm deep, 15–18 mm wide at rim, outer tepals (30–)35–44 × 14–16 mm, inner tepals (28–)36–38 × 8–10 mm, claws of both whorls (13–)16–19 mm long, nectaries at base of claws, ± black or pale yellow-green, 1.3–4.0 mm long. *Filaments* united in a column 11–13 mm long, free and arching outward in upper ± 3 mm; anther thecae usually widely diverging, initially ± 4 mm long, shrinking after dehiscence; pollen orange. *Ovary* ellipsoid, 33–42 mm long, including beak 15–20 mm long; style branches ± 2 mm long, dividing into diverging, prominently fringed arms ± 4 mm long; stigmas on small lobes below tips of style arms, arching over anthers. *Capsules* 15–22 mm long (excluding beak 15–20 mm long). *Seeds* globose, ± 3 mm diam., pale matte brown, surface lightly wrinkled, epidermal cells concave. *Chromosome number* $2n = 20$. *Flowering time*: mainly late September to early November; lasting a single day.

Distribution and ecology: extending along the west coast and adjacent mountains of Northern Cape and Western Cape, South Africa, from near Komaggas in northern Namaqualand southward to the Cape Flats; in deep sandy soils, in sandveld or marginal fynbos habitats.

Diagnosis: one of the taller species of *Ferraria, F. divaricata* has a branched stem up to 500 mm high and flowers with divaricate anthers, a beaked ovary, and beaked capsules. As in most *Ferraria* species, floral colour and patterns are variable: the tepal limbs may be uniform in colour except for the margins, and range from light to chocolate-brown with paler margins or dull yellow-brown, then with little or no colour difference at the margins. The tepal claws are creamy white to palest yellow with fine, dark, longitudinal streaks and usually a dark median stripe. A second species, *F. variabilis*, has been confused with *F. divaricata* but is typically a low-growing, usually ± tufted plant, mostly 100–200 mm tall. It has similar flowers but more varied in colour. The vegetative differences are correlated with differences in the seeds. Those of *F. divaricata* are globose with a wrinkled surface and concave epidermal



Distribution of ***Ferraria divaricata***.

cells, whereas other *Ferraria* species, including *F. variabilis*, have angular seeds with 5 or 6 flattened facets separated by thickened ridges. Flowers of *F. divaricata* last a single day whereas those of *F. variabilis* last two or sometimes three days.

11. **Ferraria variabilis** *Goldblatt & J.C.Manning* in Bothalia 35: 73 (2005) & 29 (2011). Type: South Africa, [Northern Cape], Nieuwoudtville, Klipkoppies, lower slopes, 15 Sept. 1961, *Barker 9537* (NBG, holo.; MO, iso.).

Ferraria antherosa Ker Gawl.: t. 751 (1804), illegitimate superfluous name for *F. viridiflora* [as *F. viridis*] Andrews [= *F. ferrariola* (Jacq.) Willd.]. Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 751 (1804).

Ferraria divaricata subsp. *australis* M.P.de Vos: 359 (1979). Type: South Africa, [Western Cape], Karoo Garden, Whitehill, 17 Sept. 1945, *Compton 17412* (NBG, holo.).

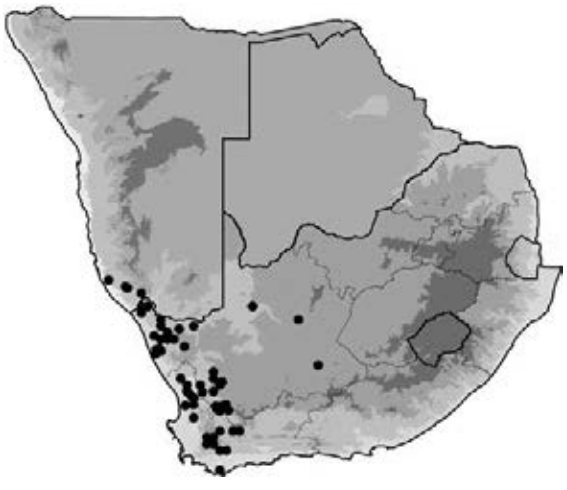
Plants 60–200(–300) mm high. *Stem* often branched just above base, branches crowded and ± equal in length, often forming small tufts. *Leaves* sword-shaped to linear, usually ± as long as stem, sometimes up to twice as long, (2–)3–15(–22) mm wide, mostly subbasal, without visible midrib, often slightly striate, margins often slightly thickened, rarely obscurely crisped, sheaths usually overlapping and concealing stem. *Rhipidia* 2-flowered; spathes glaucous-green, inner mostly 60–75 mm long, outer slightly shorter to ± as half as long, entirely sheathing or arching outward in distal $^1/_3$. *Flowers* on pedicels 10–15 mm long; predominantly pale to dull yellowish to pale or mid-brown, or dull grey-blue, limbs with solid dark brown to blackish purple at base, or with scattered dark spots, margins darker or paler in colour, claws uniformly pale or with dark longitudinal streaks or with a broad darker median streak, forming a floral cup 12–15 mm deep, 13–15 mm wide at rim, usually slightly putrid smelling, nectaries usually basal, rarely in pouches in centre of claws, pale or dark coloured; outer tepals 30–40(–45) × 10–15 mm, claws 10–15 mm long; inner tepals 25–40(–45) × 8–10 mm. *Filaments* united in a column 8–13 mm long, free and arching outward in the upper 2–4 mm; anthers 3.5–5.0 mm long, shorter after dehiscence, thecae joined only at apices, usually widely diverging (rarely almost parallel). *Ovary* ellipsoid, 15–20 mm long, with sterile beak 5–8 mm long; style branches 2–3 mm long, dividing into diverging, prominently fringed arms, ± 4 mm long; stigmas on small lobes below tips of style arms and arching over anthers. *Capsules* ellipsoid, 30–50 mm long. *Seeds* rounded, usually angled by pressure, dull-coloured and lightly wrinkled. *Chromosome number* $2n$ = 20, 40. *Flowering time*: August to November; lasting two (three) days.

Distribution and ecology: widespread in the western parts of southern Africa, from the Klinghardt Mtns of southwestern Namibia though Northern and Western Cape, South Africa, to Oudtshoorn, including Bushmanland and the Upper Karoo and as far east as Upington and Britstown; in a variety of habitats including shale flats, granite outcrops, and deep sands.

Diagnosis: *Ferraria variabilis* is distinguished by its fairly low, tufted habit, rarely exceeding 200 mm in height, with the relatively few branches crowded near the base, combined with fairly large flowers with broad tepal claws forming a deep, relatively wide bowl in which nectar accumulates in a pool. The spreading tepal limbs vary considerably in colour and marking. In the north of its range, in Namaqualand and southern Namibia, flowers have light brown tepal limbs with a dark purple longitudinal band toward the base and light brown margins, while the claws are pale greenish cream-coloured with a narrow darker band running down the midline. The nectaries in the northern populations are fairly large and green or less often purple-black. In the western and southern Karoo and the southern Cape, populations have greenish yellow or pale to middle brown tepal limbs, usually darker in the midline, and with small or medium-sized spots in the lower $^1/_3$ or when brown then often with spots irregularly scattered across the limb and the margins sometimes slightly darker coloured. The claws are pale, usually with a darker streak in the midline and have a small dark nectary at the base or on the inner tepals, shortly above the base. Perianth colour can vary as much within a population as across the entire southern Cape and western Karoo.

Ferraria variabilis is heteroploid, the northern populations are diploid, $2n$ = 20, whereas the southern are tetraploid, $2n$ = 40, this based on several counts across its range.

A notable variant from the Olifants River Valley and adjacent mountains has leaves broader and more succulent than found elsewhere, up to 20–22 mm wide (versus typically 4–12 mm for most other populations), and the rest of the plant is also larger, thus the outer spathes are 50–70 mm long and the inner may reach



Distribution of ***Ferraria variabilis***.

85 mm. Plants form circular mats in stony ground, which suggests spreading by vegetative means.

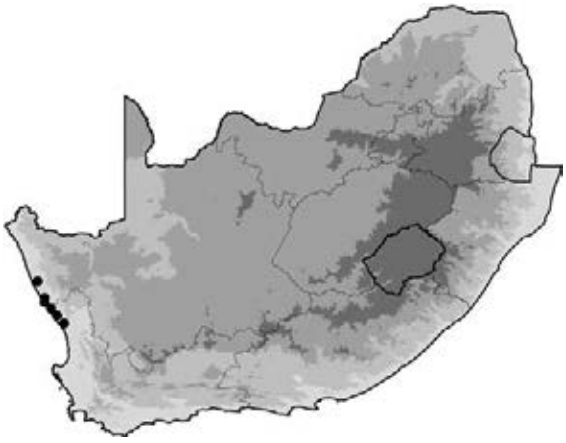
Populations from the Tanqua Basin and nearby hills stand out in having the nectaries located in prominent pouches in the middle of the tepal claws, rather than at the bases of the claw. The anthers in these populations and some others from nearby have the anther thecae held ± parallel, although joined together only at the tips, as they are in plants from other parts of the range, which have widely diverging anther thecae.

12. **Ferraria flava** *Goldblatt & J.C.Manning* in Bothalia 41: 31 (2011). Type: South Africa, Western Cape, sandveld west of Koekenaap, Farm Kommandokraal, 10 Sept. 2008, *Goldblatt & Porter 13105* (NBG, holo., K, MO, PRE, iso.).

Ferraria divaricata subsp. *aurea* M.P.de Vos: 359 (1979). Type: South Africa, [Western Cape], ± 9 miles [± 13.5 km] north of Lambert's Bay, Farm Langdam, 28 Sept. 1973, *Van Breda sub M.P. de Vos 2297* (NBG, holo.; PRE, iso.).

Plants ± acaulescent, up to 120 mm high, excluding leaves. *Stem* with (2)4 or 5 primary branches produced from below or shortly above ground level, each with several secondary branches, crowded basally and congested, together bearing up to 50 rhipidia. *Leaves* suberect, 5 to 7, sword-shaped, up to 300 mm long, lower 3 to 5 much exceeding spathes and flowers, mostly 12–20 mm wide, glaucous, ± succulent, without visible main vein. *Rhipidia* 2-flowered, numerous, crowded on short, ± horizontal or ascending branches; spathes green, margins transparent, inner mostly 40–55 mm long, outer ± $^{2}/_{3}$ as long, usually entirely sheathing or diverging above, apex curving inward. *Flowers* on pedicels up to 10 mm long; clear yellow, tepal limbs with minute blue-green spots in lower $^{1}/_{3}$, margins slightly paler in colour, claws translucent white inside, forming a floral cup 14–15 mm deep, 8–9 mm wide at rim, tepals limbs spreading, crisped, usually sweet vanilla-scented, nectaries at tepal bases pale green; outer tepals ± 30 × 10 mm, inner tepal limbs ± 12 × 5 mm, claws of both whorls ± 15 mm long. *Filaments* united in a column 11–12 mm long, free and diverging in upper ± 1 mm; anthers pale yellow with dark purple-brown on lines of dehiscence, ± 3.5 mm long, shorter after dehiscence, thecae joined at apices, widely diverging; pollen pale yellow. *Ovary* ellipsoid, 20–25 mm long, with sterile beak ± 10 mm long, style branches ± 3 mm long, with diverging, prominently fringed arms, ± 5 mm long; stigmas on small lobes below tips of style arms and arching over anthers. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 20. *Flowering time*: September to late October; lasting a single day.

Distribution and ecology: restricted to the sandveld of coastal Western and Northern Cape, South Africa, from the flat sandy country north of Lambert's Bay and Klawer to the Groen River and Komaggas in Namaqualand; in deep sand among sandveld species such as *Willdenowia* (Restionaceae) and the willowy *Wiborgia obcordata* (Fabaceae), often on the slopes of low, stabilised and vegetated dunes.



Distribution of ***Ferraria flava***.

Diagnosis: *Ferraria flava* is immediately recognised by the bright yellow, sweetly scented flowers and typically stemless habit, with well-grown plants bearing 3 or 4 main branches arising below the ground and with numerous rhipidia set closely together. The several broad, firm to rigid leathery leaves, up to 300 × 20 mm, recall those of *F. divaricata*, which has aerial stems and larger, usually predominantly brown flowers (but sometimes dull yellow) with a wider floral cup. The flowers of *F. flava* resemble those of *F. macrochlamys* and its immediate allies in having a relatively narrow floral cup but are larger, with tepals ± 30 × 10 mm and claws ± 15 mm long, and last a single day, unlike those of the *F. macrochlamys* group, which have smaller tepals with claws 10–14 mm long, and last two days.

Ferraria divaricata var. *aurea* is provisionally included here as a synonym. The type, from near Lambert's Bay, has short, aerial stems but flower colour and shape are consistent with *F. flava*. Plants should be examined at the type locality to confirm their identity.

Ser. **Uncinatae** *Goldblatt & J.C.Manning*, new series. Type: *Ferraria uncinata* Sweet

Flowers small to moderately sized with narrow cup, sides ± erect and rim of cup $^{1}/_{2}$–$^{2}/_{3}$ as wide as depth of cup, 5–7 mm diam. at rim. *Anther* thecae divergent.

13. **Ferraria uncinata** *Sweet* in British Flower Garden: t. 161 (1826b); Goldblatt & Manning: 33 (2011). Type: South Africa, without precise locality, illustration in Sweet: t. 161 (1826b), originally collected by *W. Synnot* (no preserved specimen known).

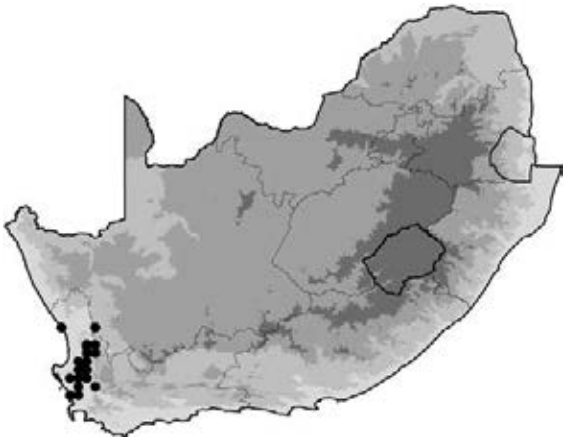
Ferraria framesii L.Bolus: 123 (1931). Type: South Africa, [Western Cape], ± 6 miles [± 9 km] south of Clanwilliam, 22 Oct. 1931, *Ross Frames s.n. BOL19928* (BOL, holo.; SAM, iso.).

Plants 90–200(–300) mm high. *Stem* either ± subterranean and few-branched at base, or stem produced above ground and branched from upper nodes. *Leaves* lanceolate, mostly 8–12 mm wide, sheaths usually concealing stem, usually prominently multi-veined without visible main vein, flat or lightly twisted, apex often hooked, margins thickened, hyaline, smooth, usually crisped and undulate at least proximally. *Rhipidia* 2-flowered; spathes green, usually with hooked tips, inner mostly 40–60 mm long, outer ± $^{1}/_{2}$–$^{2}/_{3}$ as long as inner, usually entirely sheathing. *Flowers* on pedicels 12–20 mm long; usually pale to dark blue-violet, or light brown with blue speckling, margins crisped, dull yellow-green to khaki-coloured, with a narrow cup, 8–12 mm deep, ± 7 mm wide at rim, often unscented, lightly foetid-smelling, or scented of lemon and cinnamon, nectaries minute, at base of tepals; outer tepals 28–35 × 7–10 mm, limb at least 1.5 times as long as claw, and up to three times as long, often long-attenuate and coiled, claws 8–12 mm long; inner tepals 28–30 mm long, limbs reflexed, claws slender, 7–12 mm long. *Filaments* united in a column 7–11 mm long, free in upper ± 1.5 mm; anthers ± 3 mm long, ± half their length after dehiscence, thecae divergent. *Ovary* ellipsoid, 15–28 mm long, with beak 8–12 mm long; style branches ± 1.5 mm long, with diverging, prominently fringed arms, ± 1.5 mm long; stigmas on small lobes below tips of style arms and arching over anthers. *Capsules* 12–16 mm long, excluding beak. *Seeds* 3–4 mm long, dark brown, angular, 5- or 6-sided, surfaces slightly wrinkled. *Chromosome number* 2*n* = 20. *Flowering time*: late August to October; lasting two days.

Distribution and ecology: endemic to the Western Cape, South Africa, from the slopes of the Gifberg near Klawer southward through the Olifants River Valley and the Piketberg to Malmesbury and Mamre, some 65 km north of Cape Town; mostly in sandstone outcrops in relatively dry sites, but sometimes in open ground in coarse, granite-derived gravel or on sandstone slopes in deep sand.

Diagnosis: typically with a tufted habit, *Ferraria uncinata* has flowers with a narrow floral cup 8–12 mm deep, the tepals either deep blue to violet edged with dull yellow-green or in the north of its range buff-coloured to dull yellow with violet speckles and yellow-brown margins. The leaf margins are thickened with at least the edges of the lower leaves crisped and undulate. The margin surface itself is smooth. The hooked tips of the leaves and spathes, the character for which the species was named (*uncinatus* = Latin for hooked), is frequent, though not constant, not only in *F. uncinata* but in several other species of the genus.

The yellow-flowered central Namaqualand species, *Ferraria macrochlamys* has at times been included in *F. uncinata*, but is now understood to be a separate species differing not only in the pale yellow flower colour but in the fine structure of the thickened leaf margins, which resemble those of *F. uncinata* only superficially. In *F. macrochlamys* subsp. *macrochlamys* the marginal thickenings are usually densely ciliate and irregularly



Distribution of ***Ferraria uncinata***.

serrulate or crenulate, as well as sometimes being slightly crisped. The tepal limbs of *F. uncinata* are at least 1.5 times as long as the claws and up to three times as long in the northern populations, and the tepal apices are unusually extended. In *F. macrochlamys* the tepal limbs are slightly shorter to ± 1.5 times as long as the claws and are less prominently attenuate.

14. **Ferraria macrochlamys** *(Baker) Goldblatt & J.C.Manning* in Novon 14: 293 (2004); Goldblatt & Manning: 34 (2011). *Lapeirousia macrochlamys* Baker: 338 (1876). *F. uncinata* subsp. *macrochlamys* (Baker) M.P.de Vos: 369 (1979). Type: South Africa, without precise locality or date, as Herb. Forsyth (K, holo.).

Plants mostly 70–100 mm high, forming low tufts. *Stem* few- to several-branched (rarely simple), branches crowded close to base, branches and spathes all ± same length. *Leaves* narrowly sword-shaped to linear, mostly (2.0–)4.5–7.0 mm wide, ± straight, or all curving to same side, or serpentine (loosely wavy in concertina fashion), tips oblique or hooked, sometimes densely papillate-ciliate; margins heavily thickened then sometimes velvety, often irregularly serrulate or crenate, sometimes slightly crisped. *Rhipidia* 2-flowered; inner spathes 37–62 mm long, abaxial margins sometimes crisped, outer 24–50 mm long, usually entirely sheathing, or free distally, often hooked at apex. *Flowers* on pedicels 10–23 mm long; pale watery yellow with slightly darker yellow to light brown margins, outer tepal limbs often minutely speckled grey-blue at base, with a narrow cup, 9–13 mm deep, 5–7 mm wide at rim, with a faint, green apple or slightly sour odour; outer tepals 26–32 mm long, limbs spreading to slightly reflexed, inner tepals 26–28 mm long, limbs often ultimately ± reflexed, claws of both whorls 10–14 mm long. *Filaments* united in a column 10–12 mm long, free and diverging in upper ± 1 mm; anthers 2.2–3.0 mm long, thecae divergent; pollen orange. *Ovary* ellipsoid, 15–20 mm long with beak 7–15 mm long; style branches 1.0–1.5 mm long, with diverging, prominently fringed arms, 1.0–1.5 mm long; stigmas on small lobes below tips of style arms and arching over

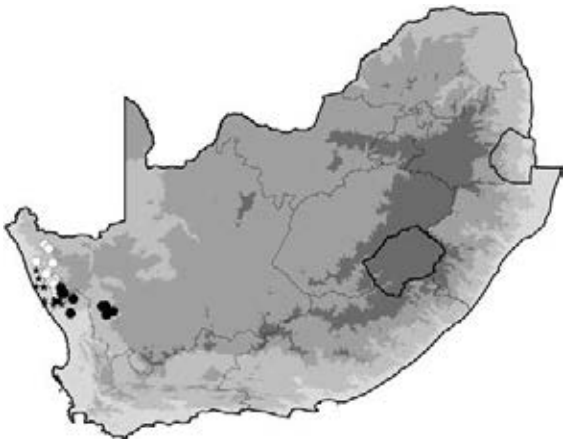
anthers. *Capsules* 15–20 mm long excluding beak. *Seeds* angular, mostly 5- or 6-sided, ± 2.7–3.0 mm diam., dark brown, facets slightly wrinkled. *Chromosome number* 2*n* = 20. *Flowering time*: late August to the end of September, rarely to mid-October; lasting two days.

Distribution and ecology: restricted to Namaqualand in western Northern Cape, South Africa, from Steinkopf in the north to the southern foothills of the Kamiesberg near Bitterfontein in the south and west toward the coast, with isolated populations inland in the western Karoo near Loeriesfontein; on a variety of soils, subsp. *macrochlamys* and subsp. *kamiesbergensis* in gritty to loamy granite-derived soils, sometimes in granite outcrops, in vegetation dominated by succulent-leaved shrubs, and subsp. *serpentina* mostly in quartzitic sand, usually among rocks.

Diagnosis: recognised by the tufted habit and small, pale yellow flowers with a narrow floral cup and divaricate anther thecae, *Ferraria macrochlamys* is exceptionally variable in leaf morphology. Three subspecies are currently accepted, based mainly on leaf morphology and minor size differences in the flowers. Typical subsp. *macrochlamys* has leaves with heavily thickened margins irregularly serrate to crenate, or sometimes crisped, and sometimes densely velvety; subsp. *kamiesbergensis* has leaves with smooth, straight margins, not or very little thickened and the blades curving in the same direction; and subsp. *serpentina*, also with unthickened leaf margins, has the blades serpentine, thus loosely wavy in concertina fashion.

Key to subspecies

1a Leaf margins thickened, hyaline, and sometimes shortly velvety, at least lower leaves with serrulate to crenulate margins; leaf blades ± straight or laxly undulate; outer spathes sheathing for most of their length and not > $^{2}/_{3}$ as long as inner . . . . . 14a. subsp. *macrochlamys*



Distribution of ***Ferraria macrochlamys*** subsp. ***macrochlamys***, ●; subsp. ***kamiesbergensis***, ○; subsp. ***serpentina***, ★.

1b Leaf margins hardly, if at all, thickened, and smooth:
2a Leaf blades in upper half inclined to curving to the same side; outer spathes not sheathing in distal half and ± as long as inner; outer tepals 30–35 mm long; filament column ± 12.5 mm long . . . . . 14b. subsp. *kamiesbergensis*
2b Leaf blades in upper half serpentine, thus loosely folded back on themselves in concertina fashion; outer spathes sheathing for most of their length and ± $^{2}/_{3}$ as long as inner; outer tepals 25–28 mm long; filament column 10–11 mm long . . . . . 14c. subsp. *serpentina*

14a. subsp. **macrochlamys**

Ferraria crispulata L.Bolus: 260 (1931). Type: South Africa, [Northern Cape], near Bowesdorp, 27 Aug. 1929, *L. Bolus s.n.* (BOL[*19162*], holo.; BM, K, iso.).

Plants with leaves often densely papillate-ciliate; margins heavily thickened, thickenings smooth or densely ciliate, often irregularly serrulate or crenate, sometimes lightly crisped. *Rhipidial spathes*: inner 45–62 mm long, abaxial margins sometimes crisped, outer 30–50 mm long, usually entirely sheathing, or tips free. *Flowers* with narrow cup 11–13 mm deep, ± 7 mm wide at rim, with faint, green-apple or slightly sour odour; outer tepals 28–32 mm long, limbs spreading to slightly reflexed, inner tepals 26–28 mm long, claws of both whorls (11–)12–14 mm long. *Filaments* united in column ± 12 mm long, free and diverging in upper ± 1 mm; anther thecae ± 3 mm long before dehiscence. *Ovary* 23–28 mm long with beak 15–18 mm long. *Flowering time*: late August to late September.

Distribution and ecology: restricted to central Namaqualand, subsp. *macrochlamys* extends from Steinkopf in the north to Garies in the south and inland to the northern Kamiesberg; in gritty to loamy granite-derived soils.

Diagnosis: subsp. *macrochlamys* stands out in its spreading leaves with thickened margins, either crenate or crisped and sometimes velvety. The flowers often serve to distinguish it from subsp. *serpentina* in their slightly larger size, but that difference is not consistent. Subsp. *macrochlamys* is always acaulescent, whereas subsp. *serpentina*, in years of ample rainfall, develops an aerial stem rendering it very different in general appearance.

14b. subsp. **kamiesbergensis** *(M.P.de Vos) Goldblatt & J.C.Manning* in Bothalia 41: 36 (2011). *Ferraria kamiesbergensis* M.P.de Vos: 362 (1979). Type: South Africa, [Northern Cape], Kamiesberg, Rondefontein, 1 Sept. 1976, *Oliver 5970* [NBG, lecto., designated by Goldblatt & Manning: 292 (2004)].

Plants forming low tufts, usually few-branched. *Leaves* firm, suberect to falcate, mostly 70–100 × 3–6 mm, all weakly to strongly curving in the same direction; margins plane, slightly or not at all thickened. *Rhipidial spathes*: inner 50–65 mm long, outer 50–57 mm long, sheathing in lower half, arching outward distally.

Flowers with tepal claws forming narrow cup mostly 12–14 mm deep, ± 7 mm wide at rim, limbs laxly spreading; outer tepals 25–35 mm long, 8–10 mm at widest, limbs 13–20 mm long, slightly exceeding claws, inner tepals 25–30 mm long, claws of both whorls 12–14 mm long. *Filaments* united in a column 10.5–12.5 mm long, free upper 1 mm; anther thecae ± 3 mm long, shorter after anthesis. *Ovary* 18–22 mm long with tubular beak ± 12 mm long; style branches ± 1 mm long, dividing into diverging, prominently fringed arms, ± 2 mm long. *Flowering time*: September to early October; lasting 2 days.

Distribution and ecology: centred in central Namaqualand, Northern Cape, extending from Rooiberg in the Kamiesberg south to near Bitterfontein in Western Cape, with isolated populations to the southeast near Loeriesfontein and the hills northwest of Calvinia; usually in coarse, gritty decomposed granite or in cracks in granite pavement.

Diagnosis: subsp. *kamiesbergensis* is distinctive only in its vegetative morphology, having firm and leathery to almost succulent leaves, usually dark green and in the upper half all curve to the same side and the margins are plane, smooth and not at all, or only barely, thickened. Otherwise plants have the tufted habit of subsp. *macrochlamys* and flowers virtually identical to that subspecies. Their ranges do not overlap, with subsp. *macrochlamys* mostly from the highlands west and north of the Kamiesberg but also from Leliefontein and nearby in the Kamiesberg, which is north of the range of subsp. *kamiesbergensis*.

14c. subsp. **serpentina** *Goldblatt & J.C.Manning* in Bothalia 41: 37 (2011). Type: Northern Cape, NE of Kotzesrus, road to Garies, 16 Sept. 2001, *Goldblatt & Porter 11900* (NBG, holo.; K, MO, PRE, iso.).

Plants either like subsp. *macrochlamys* without aerial stem and branches crowded close to base or with short aerial stem and branching above ground, thus rounded. *Leaves* in a loose fan, linear, (2–)3–4 mm wide, without main vein, blades serpentine (loosely wavy in concertina fashion, sometimes appearing coiled when pressed); margins plane, not thickened. *Rhipidial spathes*: inner 37–45 mm long, outer $^{2}/_{3}$ as long, sheathing in lower $^{2}/_{3}$. *Flowers* on pedicels 10–15 mm long; tepal claws forming a narrow cup, 9–11 mm deep, ± 5 mm wide at rim; outer tepal limbs 16–18 mm long, tips attenuate and twisted, inner tepal limbs ± 16 mm long, slightly reflexed, claws of both whorls 10–12 mm long. *Filaments* united in a column 10–11 mm long, free in upper 1 mm; anther thecae ± 2.2 mm long. *Ovary* 15–28 mm long, with a beak 7–18 mm long; style branches diverging, with style arms ± 1 mm long. *Flowering time*: late August and September, rarely to mid-October.

Distribution and ecology: restricted to central southern Namaqualand, from near Komaggas and Killian's Pass south to Kotzesrus; on low, sandy or stony hills inland of the coast in gravelly soils, either on stony slopes or in deep, red, quartzitic sand.

Diagnosis: the flowers of subsp. *serpentina* closely resemble those of subsp. *macrochlamys* and subsp. *kamiesbergensis* and differ if at all only in their slightly smaller size, and the subspecies is distinguished by its leaves, the narrow blades of which are wavy in a loose concertina fashion, with plane, smooth margins not at all thickened. This contrasts with the straight leaves of subsp. *macrochlamys*, which have strongly thickened, crisped or crenate margins, and in some populations, shortly velvety. The flowers of subsp. *serpentina* have a floral cup, 9–11 mm deep, ± 5 mm wide at the rim, outer tepals 26–28 mm long, and filaments 10–11 mm long, thus slightly smaller than in most populations of subsp. *macrochlamys*, which have a cup, 11–13 mm deep, 6–7 mm wide at the rim, outer tepals 28–32 mm long, and filaments ± 12 mm long. The inner spathes are 37–45 mm long, compared to 45–62 mm in subsp. *macrochlamys*, and the flowers have pedicels 10–15 mm long (versus 20–23 mm in subsp. *macrochlamys*), reflecting the shorter spathes. A particularly narrow-leaved form of subsp. *serpentina* has been recorded in the Komaggas area west of Springbok, the blades ± 2 mm wide and when dry, showing the outline of a raised central vein.

15. **Ferraria brevifolia** *G.J.Lewis* in Annals of the South African Museum 40: 119 (1954); Goldblatt & Manning: 37 (2011). Type: South Africa, [Western Cape], 2 miles [± 3 km] south of Nuwerus, Sept. 1945, *Lewis 1374* (SAM, holo.).

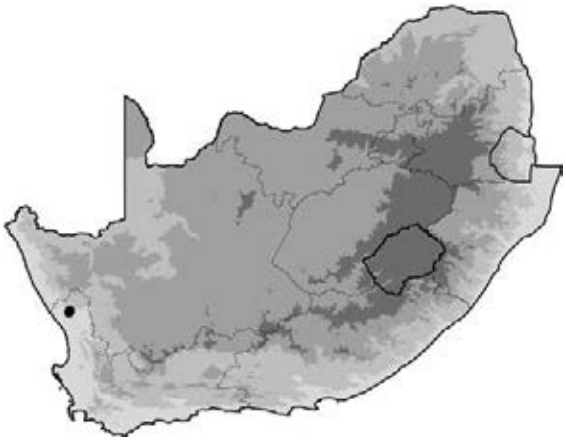
[*Ferraria namaquensis* Schltr. ms: *Schlechter 11031* (SAM)].

Plants 70–120(–180) mm high, usually ± acaulescent. *Stem* with 2 to 4 short, subequal branches borne close to ground. *Leaves* overlapping to form a tight fan, sheaths completely enclosing stem and much exceeding blades, blades oblong, 7–15 × 5–7(–10) mm, obtuse or acute, often hooked at tips; margins thickened especially abaxially, thickenings often crenate to slightly crisped. *Rhipidia* 2-flowered; inner spathe mostly 45–55 mm long, outer ± $^{2}/_{3}$ as long, sheathing in lower $^{2}/_{3}$, arching outward distally. *Flowers* on pedicels 15–23 mm long; pale to watery yellow with darker yellow to brown or orange margins, nectaries small, at base of tepals, claws forming a narrow cup, ± 12 mm deep, ± 7 mm wide at rim, faintly sweet-scented; outer tepals 32–40 × ± 9 mm, attenuate, tips slightly coiled, claws slender, 10–13 mm long, inner tepals 30–37 mm long. *Filaments* united in column ± 10 mm long, free in upper ± 1 mm; anther thecae divergent, ± 2.5 mm long, shorter after dehiscence; pollen orange. *Ovary* ellipsoid, (15–)18–25 mm long, with beak 8–12 mm long; style branches ± 1.5 mm long, diverging into prominently fringed arms, ± 1.5 mm long; stigmas on small lobes below tips of style arms and arching over anthers. *Capsules* ovoid, 15–25 mm long. *Seeds* angular, irregularly 5- or 6-sided, ± 3 mm diam., brown, shiny. *Chromosome number* 2*n* = 20. *Flowering time*: August and September; lasting two days.

Distribution and ecology: restricted to southern Namaqualand in Western Cape, South Africa, with a

range covering a linear distance of ± 40 km from near Bitterfontein in the north to a short distance south of Nuwerus; on slopes of gritty, granite-derived gravel.

Diagnosis: distinctive in *Ferraria*, the leaves of *F. brevifolia* form a tight, 2-ranked fan, with elongate sheaths 40–80 mm long, much exceeding the short, ovate, obtuse blades, 7–15 mm long. The blades, usually less than half as long as the sheaths, have relatively thick margins and oblique, acute or apiculate, hooked tips. The pale yellow flowers are virtually identical to those of *F. macrochlamys*, with a narrow floral cup, ± 12 mm deep, and tepal limbs, 22–28 mm long, with crisped, light brown or rarely reddish brown margins. The flowers produce a faint, slightly sweet scent. They can be distinguished from those of *F. macrochlamys*, if at all, by their somewhat longer outer tepals with long, tapering loosely coiled tips.



Distribution of ***Ferraria brevifolia***.

UNCERTAIN SPECIES

Ferraria fimbriata Burman in Nova acta physico-medico Academiae Caesareae Leopoldino-Carolinae germaniae naturae curiosorum 2: 201 (1761). Type: South Africa, without precise locality, illustration in Burman, l.c.: t. 3, f.. 2 (1761). The woodcut illustration is inadequate to identify this plant to species. It may represent *Ferraria divaricata* or *F. variabilis*.

EXCLUDED SPECIES

Ferraria blanda Salisb., Prodromus stirpium in horto ad Chapel Allerton vigentium: 42 (1796), superfluous name for *Moraea iridioides* L. = *Dietes iridoides* (L.) Sweet ex Klatt.

Ferraria lugubris Salisb., Prodromus stirpium in horto ad Chapel Allerton vigentium: 42 (1796) = *Moraea lugubris* (Salisb.) Goldblatt

Ferraria ocellaris Salisb., Prodromus stirpium in horto ad Chapel Allerton vigentium: 41 (1796) = *Moraea aristata* (D.Delaroche) Asch. & Graebn.

Ferraria tricuspis Willd., Enumeratio plantarum horti regii berolinensis: 691 (1809), illegitimate superfluous name = *Moraea tricuspidata* (L.f.) G.J.Lewis

Ferraria tristis (L.f.) Salisb., Prodromus stirpium in horto ad Chapel Allerton vigentium: 42 (1796). *Iris tristis* L.f., Supplementum plantarum: 97 (1782) = *Moraea vegeta* L.

REFERENCES

ANDREWS, H. 1803. *Ferraria viridiflora. The Botanist's Repository* 4: t. 285.

BAKER, J.G. 1876. New Gladioleae. *Journal of Botany, British and foreign* 14: 333–339.

BAKER, J.G. 1877 ['1878']. Systema Iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.

BAKER, J.G. 1878. On the Liliaceae, Iridaceae, Hypoxidaceae, and Haemodoraceae of Welwitsch's Angolan herbarium. *Transactions of the Linnean Society, London, ser. 2, Botany* 1: 245–273.

BAKER. J.G. 1898. Iridaceae. In W.T. Thiselton-Dyer, *Flora of tropical Africa* 7: 337–376. Reeve, London.

BARNES, P.E. 1930. Plants—new and noteworthy. *South African Gardening and Country Life* 20: 313, 314.

BOLUS, L. 1931. Novitates africanae: New Iridaceae. *Journal of Botany, British & Foreign* 69: 258–262.

BOLUS, L. 1932. Plants—new and noteworthy. *South African Gardening and Country Life* 22: 275–277.

BURMAN, J. 1761. Ferrariae character. *Nova acta physico-medico Academiae Caesareae Leopoldino-Carolinae germanicae naturae curiosorum* 2: 198–202.

DE VOS, M.P. 1979. The African genus *Ferraria*. *Journal of South African Botany* 45: 295–375.

DINTER, K. 1920. Plantae novae Schäferianae. *Repertorium Novarum Species Regni Vegetabilium* 16: 335–344.

ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon.* Reiseverein, Esslingen.

FERRARI, G.B. 1633. *Flora seu de florum cultura.* Rome [1746 Amsterdam].

GOLDBLATT, P. & MANNING, J.C. 2002. Rediscovered after 200 years, *Moraea ovata* Thunberg is a rare *Ferraria* (Iridaceae: Iridoideae) from Namaqualand, South Africa. *Novon* 12: 460–464.

GOLDBLATT, P. & MANNING, J.C. 2004. New species of *Ixia* (Crocoideae) and *Moraea* (Iridoideae), and taxonomic notes on some other African Iridaceae. *Novon* 14: 288–298.











Plate 76. A, ***Ferraria crispa***, Langebaan, W; B, ***F. ferrariola***, Bitterfontein, NC; C, ***F. glutinosa***, cultivated; D, ***F. machrochlamys*** subsp ***macrochlamys***, Karkams, NC, E, ***F. foliosa***, Eland's Bay, WC.













Plate 77. A, ***Ferraria macrochlamys*** subsp. ***serpentina***, Kliprand, NC; B, ***F. ornata***, Groen River Mouth, NC; C, ***F. parva***, Vredenburg, WC; D, ***F. uncinata***, Clanwilliam, WC; E, ***F. variabilis***, Worcester, WC; F, ***F. variabilis***, Bushmanland, NC.

GOLDBLATT, P. & MANNING, J.C. 2005. Taxonomic notes on *Babiana* and *Ferraria* (Iridaceae) in arid western southern Africa. *Bothalia* 35: 71–74.
GOLDBLATT, P. & MANNING, J.C. 2011. Systematics and biology of the African genus *Ferraria* (Iridaceae: Irideae). *Bothalia* 41: 1–40.
JACQUIN, N.J. 1791 ['1790']. *Collectanea*, vol. 4. C.F. Wappler, Vienna.
JACQUIN, N.J. 1804. *Plantarum rariorum horti caesarei schoenbrunnensis*, vol. 4. C.F. Wappler, Vienna.
KER GAWLER, J. 1804. *Ferraria antherosa*. Green variegated ferraria. *Curtis's Botanical Magazine* 19: t. 751.
LEWIS, J.G. 1954. Iridaceae—new species and miscellaneous notes. *Annals of the South African Museum* 40: 115–135.
LINNAEUS, C. 1763. *Species plantarum*, edn. 2. Salvius, Stockholm.
LINNAEUS, C. (fil). 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.
LODDIGES, G. 1828. *Ferraria atrata*. *The Botanical Cabinet* 14: t. 1356. C. Loddiges & Sons, London.
MILLER, P. 1759a. *Figures of plants*, vol. 2. P. Miller, London.
MILLER, P. 1759b. *The Gardener's Dictionary*, edn. 7. P. Miller, London.
MILLER, P. 1768. *The Gardener's Dictionary*, edn. 8. P. Miller, London.
RAND, R.F. 1898. Wayfaring notes in Rhodesia. *Journal of Botany, British and foreign* 36: 141–145.
RENDLE, A.B. 1899. *Catalogue of the African plants collected by Dr. Friedrich in 1853–61*, vol. 1, 2. British Museum (Natural History), London.
RENDLE, A.B. 1905. Apetalae and monocotyledons. In A.B. Rendle, Mr. Eyles's Rhodesian plants: 52–54. *Journal of Botany, British and foreign* 43: 44–54.
SALISBURY, R.A. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SCHINZ, H. 1900. Iridaceae. In C. de Candolle, E. Koehne & H. Schinz, Diagnoses plantarum Africanum novarum. *Mémoires de l'Herbier Boissier* 10: 77.
SWEET, R. 1826a. *Ferraria obtusifolia*. *British Flower Garden*: t. 148.
SWEET, R. 1826b. *Ferraria uncinata*. *British Flower Garden* t. 161.
SWEET, R. 1827. *Ferraria divaricata*. *British Flower Garden*: t. 192.
THUNBERG, C.P. 1800. *Prodromus plantarum capensium*. Edman, Uppsala.
THUNBERG, C.P. 1787. Dissertation de *Moraea*. Uppsala.
WILLDENOW, C.L. 1800. *Species plantarum*, edn. 4, vol. 3. Berlin.
WILLDENOW, C.L. 1809. *Enumeratio plantarum horti regii berolinenesis*. Berlin.

36. **Moraea**

Moraea *Miller*, Figures of Plants 2: 159, t. 238 (1758) [as *Morea*], name and spelling conserved. Type also conserved: *M. vegeta* L.

Vieusseuxia D.Delaroche: 31 (1766). Type: *V. spiralis* D.Delaroche, lecto., designated by Goldblatt: 8 (1976a) = *Moraea bellendenii* (Sweet) N.E.Br.

Galaxia Thunb.: 50 (1782a). Type: *G. ovata* Thunb., lecto. designated by Goldblatt: 396 (1979a) = *Moraea galaxia* (L.f.) Goldblatt & J.C.Manning).

Homeria Vent.: no. 2 (1808). Type: *H. collina* (Thunb.) Salisb. = *Moraea collina* Thunb.

Hexaglottis Vent.: no. 3 (1808). Type: *H. longifolia* (Jacq.) Salisb. = *Moraea longifolia* (Jacq.) Pers.

Phaianthes Raf.: 30 (1838). Type: *P. lurida* (Ker Gawl.) Raf. = *Moraea lurida* Ker Gawl.

Plantia Herbert.: 89 (1844). Type: *P. flava* Herb. (probably = *Moraea virgata* Jacq.)

Hymenostigma Hochst.: 24 (1844). Type: *H. schimperi* Hochst. = *Moraea schimperi* (Hochst.) Pic.-Serm.

Gynandriris Parl.: 49 (1854). Type: *G. sisyrinchium* (L.) Parl. = *Moraea sisyrinchium* (L.) Ker Gawl.

[*Iridopsis* Welw. ex Baker: 270 (1878), invalid name only in synonymy.]

Helixyra Salisb. ex N.E.Br.: 348 (1929b) [*Helixyra* Salisb.: 305 (1812), invalid name], illegitimate superfluous name for *Gynandriris*. Type: not indicated by author.

Barnardiella Goldblatt: 312 (1976c). Type: *B. spiralis* (N.E.Br.) Goldblatt(= *Moraea herrei* (L.Bolus) Goldblatt

Roggeveldia Goldblatt: 840 (1979b). Type: *R. fistulosa* Goldblatt = *Moraea fistulosa* (Goldblatt) Goldblatt

Rheome Goldblatt: 92 (1980a). Type: *R. maximiliani* (Schltr.) Goldblatt = *Moraea maximiliani* (Schltr.) Goldblatt

Sessilistigma Goldblatt: 156 (1984a). Type: *S. radians* Goldblatt = *Moraea radians* (Goldblatt) Goldblatt

Revisionary accounts: Goldblatt: 681 (1976a) & 20 (1986a), both partial; Goldblatt: 239–260 (1980b, sect. *Gynandriris*); Goldblatt: 413–503 (1981, sect. *Homeria*).

[*Freuchenia* Eckl.: 14 (1827), invalid name without description.]

Named by Philip Miller for the English botanist Robert More and originally spelled *Morea* but later changed by Linnaeus to *Moraea*, thus honouring his wife, Elisabeth Moraea and her father, Johan Moraeus, physician in Falun, Sweden.

Large to small seasonal perennials, sometimes acaulescent. *Rootstock* a tunicate corm consisting of a single internode, roots arising from base of shoot at apex of corm; tunics coarsely to finely fibrous or woody with layers unbroken or fragmenting irregularly. *Leaves* few to several, lowermost without blades, thus cataphylls, these usually membranous and pale, turning brown with age, occasionally coarsely fibrous; foliage leaves several to solitary, blades bifacial, channelled to flat, or margins inrolled, or sometimes terete, without central vein; 1 to several sheathing bract-like leaves without blades usually present, up to 1 internode long. *Flowering stem* simple or branched, sometimes with 1 long terminal internode, then branches and foliage leaf (or leaves) crowded apically, entirely subterranean in several species. *Inflorescences* 1 to several rhipidia usually enclosed by large paired opposed bracts (spathes), usually entirely sheathing one another, occasionally outer free distally (rarely rhipidia indistinguishable from leaves; rhipidia 1- to several-flowered; spathes green or becoming dry, usually firm to leathery, inner spathe usually longer, both tightly sheathing or outer spathe curving outward distally, obtuse to attenuate at apex; floral bracts enclosed, shorter than spathes, membranous, with 2 green keels. *Flowers* radially symmetric, mostly ± *Iris*-like, fugaceous or lasting up to 3(4) days, pedicellate (rarely sessile), often blue to violet or yellow, also white, pink, red, usually with a yellow (white) mark (nectar guide) at base of outer tepal limbs, sometimes sweetly or unpleasantly scented, often producing nectar from perigonal nectaries at bases of outer or all tepals; tepals usually free, or united in a solid tube, usually clawed, claws ascending or short and clasping base of filament column, outer tepals often larger than inner or tepals subequal, limbs spreading to reflexed or those of inner tepals erect to suberect, inner sometimes tricuspidate to hair-like, or inner tepals occasionally lacking. *Stamens* symmetrically arranged with filaments partly to completely united, occasionally ± free; anthers mostly appressed to style branches (rarely alternate with them). *Ovary* exserted or included in spathes, sometimes extending upward as hollow tube (beak); style slender below, dividing near base or at apex of filament column into 3 branches, these often compressed, petal-like and wider than anther, terminating in large paired, entire, petaloid crests (crests single and fringed in *M. lugubris*), stigma usually transverse, sometimes 2-lobed or 2, at base of crests, or style branches reduced and narrow, 2-lobed sometimes with stigma terminal and crests vestigial or lacking, rarely style branches filiform or each divided into paired filiform arms extending between anthers, then stigmatic at tips. *Capsules* globose to ovoid or club-shaped, apex truncate or shortly beaked (rarely beak elongate), leathery to woody or submembranous, usually exserted, or included when ovary ± sessile. *Seeds* angular and prismatic, ± globose or compressed and discoid; surface cells domed, plane

or concave, outlines ± smooth to reticulate. *Pollen grains* monosulcate, exine reticulate to retipilate. *Basic chromosome number x* = 10, but a wide range of other numbers present (Goldblatt 1971c).

Species ± 230, 209 in southern Africa; mainly sub-Saharan Africa, also Mediterranean Basin and Middle East, most diverse and species-rich in western southern Africa, and with marked secondary centres in the mountains of eastern southern Africa and the East African highlands, favouring open habitats, including desert scrub, rocky grassland, rock outcrops, and shrubland, often flowering well only after fires.

Although remarkably diverse in floral morphology, *Moraea* is immediately recognised by the cormous rootstock comprising a single internode and produced annually, that of the past season being completely resorbed, and the dorsiventral leaf (unless terete). Plants are almost universally seasonal, thus deciduous in the dry season. Flowers range from the typical *Iris*-type, with larger outer tepals bearing markings at the base of the limbs, smaller inner tepals usually spreading to reflexed, and petaloid style branches with paired, plane appendages or crests. The filaments are typically at least partially united, sometimes entirely so, and each anther is appressed to a style branch and typically held below the transverse, simple or bilobed stigma. Departures from this apparently ancestral condition include reduction of the style branches, then often lacking crests, and the associated development of subequal inner and outer tepals, both whorls of which usually bear markings, as in all members of subg. *Homeria* and several species of other subgenera. In *M. lugubris* (subg. *Plumarieae*) the style crests are fringed and feathery, and the stigmatic surfaces are located at the tips of apically divergent style branches, both features reminiscent of *Ferraria*. The style branches are further reduced in sect. *Hexaglottis* and a few unrelated species into paired filiform arms extended horizontally between the stamens. In the *Roggeveldia* group of sect. *Pseudospicatae* and in *M. simplex* (subg. *Visciramosae*) the style branches are each reduced to a single filiform arm extended between the stamens.

The tepals are typically divided into an ascending claw and a spreading or reflexed limb, the claw varying from about as long as the limb and concealing the anthers to much shorter than the limbs, thus leaving the stamens exposed and often prominently displayed. The tepals in *Moraea* are usually free (unlike *Iris* in which they are typically joined basally in a cup or tube) but are united in a short, solid tube in subg. *Galaxia* plus a few other species scattered across the genus. Species of subg. *Acaules* have an underground stem and the flowers are raised well above the ground on a contractile stipe (possibly the pedicel) that contracts after fertilisation to pull the developing capsule back to ground level. In most species of subg. *Vieusseuxia* the inner tepals are reduced to three-lobed structures, often with a prominent central lobe, but in the *M. tripetala* species group they are further reduced into a thread- or cusp-like structure or may even be absent.

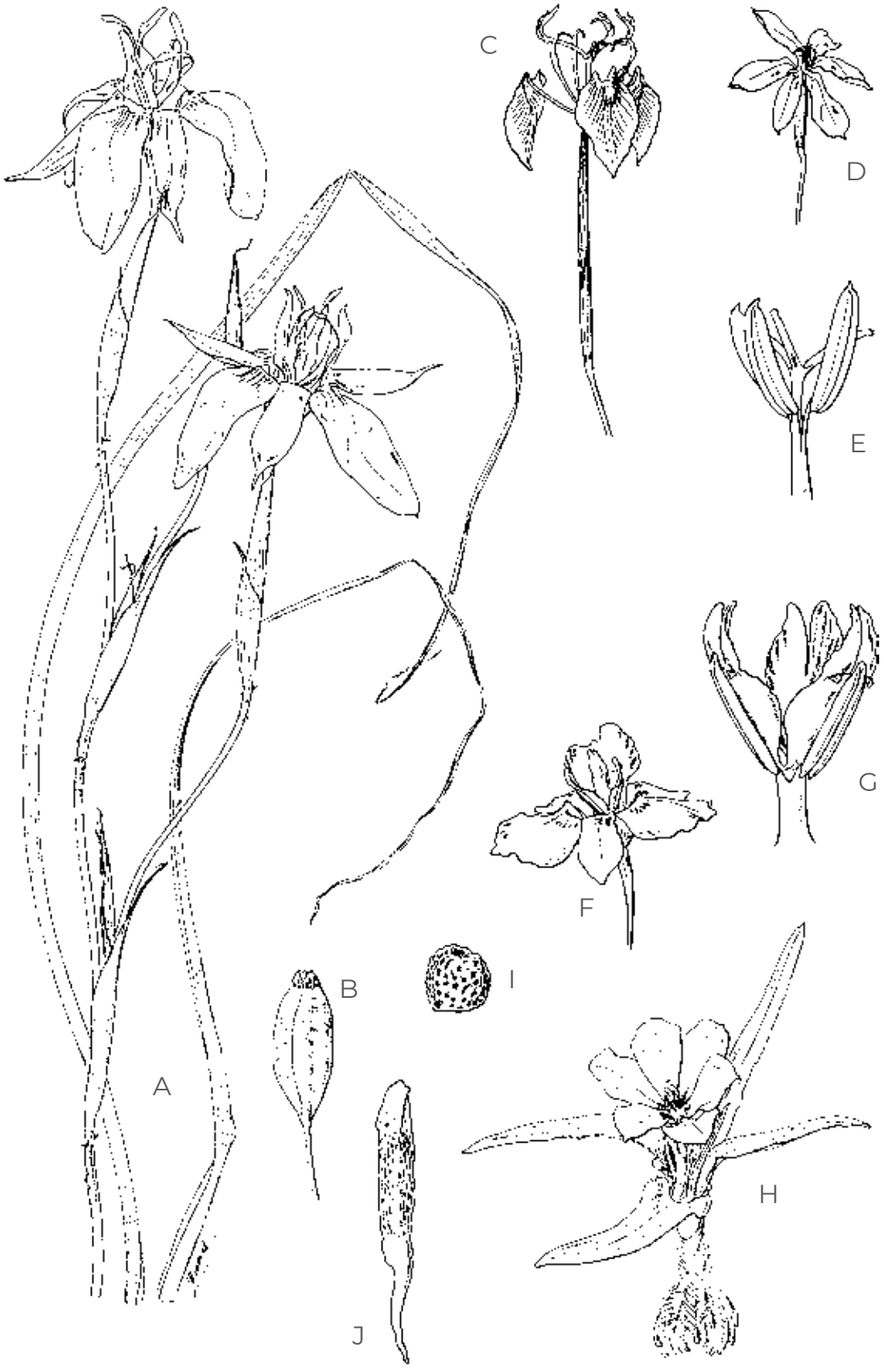
Leaf number is variable, ranging from several (e.g. *Moraea ramosissima*) to a single foliage leaf, with other foliar organs represented by large, often dry, bract-like leaves sheathing the stem. Leaves are occasionally finely hairy, notably in *M. villosa* and its close allies. The nodes and upper internodes of the stem are sticky and viscid in subg. *Visciramosae*. Molecular studies (Goldblatt et al., 2013) using both plastid and nuclear gene sequences confirm that *Moraea* is monophyletic and that *Ferraria* is its closest relative. The infrageneric classification used here, which includes 11 subgenera, is based on the phylogeny obtained from the molecular study.

Pollination is diverse and directly related to flower structure. Species with *Iris*-like flowers are pollinated by bees foraging for nectar produced from small nectaries at the bases of the outer tepals. Species with anthers displayed prominently above the tepals are pollinated by pollen-collecting female bees. Other species are pollinated by hopliine beetles (notably the *Moraea villosa* group) and a few have been shown to be pollinated mainly by mud wasps.

Largely sub-Saharan African, *Moraea* is centred in western southern Africa where it is most diverse but several species of subg. *Grandiflorae* and a few species of subg. *Polyanthes* occur in tropical Africa. Two species of the otherwise southern African sect. *Gynandriris* occur in the Mediterranean area and Middle East.

Key to subgenera

1a Style branches petaloid with fringed, feathery crests; stigmatic surfaces at tips of apically divergent style branches; foliage leaves usually 2 . . . . . Subg. 1. *Plumarieae* (only 1. *M. lugubris*)
1b Style branches not as above, often petaloid with paired entire crests above stigmatic lobes or crests reduced but never fringed, or style branches filiform; foliage leaves solitary to several:
2a Stem branched and sticky at or below nodes; rhipidial spathes unequal and acute or ± subequal and subobtuse, then often torn apically; foliage leaves 2 to several. . . . . Subg. 2. *Visciramosae*
2b Stem branched or not, not sticky at or below nodes; rhipidial spathes subequal or unequal, acute to attenuate; foliage leaves solitary to several:
3a Plants acaulescent with 2 or more leaves crowded at ground level (rarely shortly above ground) and style branches not filiform; leaves hardly differing from rhipidial spathes:
4a Flowers with tepals united below in a perianth tube; style with ± vestigial branches, entire or fringed and stigmatic distally. . . . . Subg. 5. *Galaxia*



MORAEA. M. vespertina: A, flowering stem and leaves; B, capsule. ***M. regalis***: C, flower. ***M. simplex***: D, flower; E, detail of stamens and style. ***M. cantharophila***: F, flower; G, details of stamens and style. ***M. melanops***: H, flowering plant. ***M. ciliata***: I, seed. ***M. cooperi***: J, seed.

4b Flowers with tepals free to base, borne on a hollow, contractile stalk retracting during capsule maturation; style with well-developed, petaloid branches with paired, petaloid crests. . . . . Subg. 7. *Acaules*
3b Plants usually caulescent with leaves solitary to several, sometimes crowded near stem apex, sometimes acaulescent but style branches various, sometimes filiform; leaves differing from inflorescence spathes:
5a Corm tunics dark brown, initially unbroken, later splitting irregularly, sometimes ultimately fibrous; rhipidial spathes blunt or truncate to obtuse, outer spathe often diverging apically; flowers pale yellow to ± beige (rarely brown) usually with dark venation:
6a Foliage leaf solitary, inserted above ground; blade channelled below, terete or narrowly linear distally; plants unbranched and with single rhipidium with outer spathe always sheathing; ovary triangular to prominently 3-winged. . . . . Subg. 6 *Monocephalae*
6b Foliage leaves two or more, lowermost basal or leaves clustered at first aerial node; blades channelled or terete distally; plants usually branched with multiple rhipidia and outer spathe often free and diverging distally; ovary round in section . . . . . Subg. 3. *Umbellatae*
5b Corm tunics light to dark brown, usually coarsely to finely fibrous; rhipidial spathes acute to attenuate with outer spathe always sheathing; flowers variously coloured:
7a Plants with 2 or more foliage leaves and flowers fugaceous; flowers usually yellow (rarely red, salmon-pink or, if blue, then plants dwarf, < 50 mm high at flowering); flowers mostly with well-developed style branches with crests or, if style branches reduced, then flowers tiny with subequal tepals . . . . . Subg. 4. *Moraea*
7b Plants with 1 or more foliage leaves and flowers either fugaceous or long-lasting; flowers various colours: flowers with style branches well developed or reduced, with short or lacking crests or filiform:
8a Flowers always long-lived; style branches usually well-developed with short to long crests (if crests lacking, inner and outer tepals spreading); inner tepals often reduced, with limbs either 3-lobed or linear, or limbs lacking and inner tepal cusp-like or absent . . . . . Subg. 10. *Vieusseuxia*
8b Flowers fugaceous or long-lived; style branches well developed with paired crests or branches narrow and crests vestigial or lacking; inner tepals with well-developed entire limbs:
9a Flowers always fugaceous; perianth mostly blue to violet or white or sometimes yellow but then style branches filiform, paired or single and ascending to horizontal . . . . . Subg. 8. *Polyanthes*
9b Flowers long-lasting or fugaceous; perianth variously coloured, rarely blue to violet but then style branches well-developed:
10a Flowers mostly long-lasting; style branches well-developed inner tepal limbs erect or suberect to spreading; foliage leaves always solitary (or lacking at anthesis). . . . . Subg. 9. *Grandiflorae*
10b Flowers long-lived or fugaceous; style branches variously reduced, usually narrower than subtending anthers and with crests weakly developed or vestigial; inner tepals mostly similar in orientation to outer tepals, with limbs spreading to half reflexed, usually with nectar guides; foliage leaves several to solitary . . . . . Subg. 11. *Homeria*

Subg. 2. *Visciramosae*

1a Foliage leaves 3 or more; rhipidial spathes acute, unequal with outer ± half as long as inner:
2a Flowers white or pale blue; outer tepals 40–45 mm long; foliage leaves 4 to 6 . . . . . 2. *M. vespertina*
2b Flowers dull yellow to beige or light brown; outer tepals 22–33 mm long; foliage leaves 3(4):
3a Tepal claws forming a wide cup and limbs half reflexed . . . . . 3. *M. bubalina*
3b Tepal claws suberect forming a narrow cup and limbs fully reflexed. . . . . 4. *M. striata*
1b Foliage leaves 2; rhipidial spathes subacute to obtuse, often lacerate at tips, subequal or outer slightly shorter than inner:
4a Style branches filiform, extending between stamens; tepals with short erect claws ± 2 mm long . . . . . 10. *M. simplex*
4b Style branches flattened, opposite anthers and appressed to them; tepals with longer ascending claws:
5a Style branches shorter than anthers; style branches with crests vestigial or absent. . . . . 9. *M. elsiae*
5b Style branches ± as long as anthers; style branches with short to long crests:
6a Flowers relatively large with outer tepals 23–31 mm long; style branches with crests 6–12(–15) mm long; inner rhipidial spathe 25–40 mm long. . . . . 5. *M. bituminosa*
6b Flowers fairly small with outer tepals mostly < 23 mm long (rarely up to 30 mm); style branches with crests (1.5)2.0–6.0(–10.0) mm long; inner rhipidial spathe 15–30 mm long:
7a Flowers white, sweetly scented; tepals spreading to half reflexed. . . . . 7. *M. viscaria*
7b Flowers yellow, slate blue, or white (occ. flushed pink), usually not scented; tepals usually fully reflexed (or half reflexed):
8a Flowers yellow, brown, rarely white or flushed pink; outer tepals 12–18(25) mm long with claws ± half or less than half as long as limbs. . . . . 6. *M. inconspicua*
8b Flowers slate blue; outer tepals ± 18 mm long with claws slightly longer than limbs. . . . . 8. *M. saldanhensis*

Subg. 3. *Umbellatae*

1a Stem subterranean; leaves and rhipidia clustered at ground level:
2a Tepals unequal, outer larger and with nectar guides at limb bases; style branches well developed with prominent crests . . . . . 16. *M. longiflora*
2b Tepals subequal, outer ± as long as inner and both with nectar guides at limb bases; style branches divided almost to base into paired filiform arms, thus lacking crests. . . . . 20. *M. singularis*

1b Stem aerial; either lowermost leaf inserted at ground level or all leaves and branches clustered at ground level but then rhipidia stalked:
3a Foliage leaves clustered at stem apex well above ground (leaves not basal):
4a Style branches filiform and extended between stamens, lacking crests . . . . . 19. *M. nana*
4b Style branches flattened, appressed to opposed anther, with or without prominent crests:
5a Style branches bearing prominent crests 10–12 mm long; filaments united in column 8–10 mm long . . . . . 14. *M. intermedia*
5b Style branches without crests; filaments in column 5–7 mm long, united or free distally:
6a Plants 150–450 mm high; outer tepals 19–27 × 9–12 mm; inner rhipidial spathes 30–40 mm long 17. *M. umbellata*
6b Plants 90–150 mm high; outer tepals 15–24 × 6–10 mm; inner rhipidial spathe 20–35 mm long 18. *M. maximiliani*
3b At least 1 foliage leaf or all leaves clustered at ground level:
7a Branches (when present) produced at ground level . . . . . 13. *M. margaretae*
7b Branches produced above ground level:
8a Branches crowded at stem apex; tepals free. . . . . 11. *M. linderi*
8b Branches borne along stem, not crowded above:
9a Tepals free to base; inner tepals present . . . . . 12. *M. orthrosantha*
9b Tepals united in short tube; inner tepals lacking . . . . . 15. *M. cooperi*

Subg. 4. *Moraea*

1a Plants dwarf, rarely exceeding 50 mm at flowering; flowers blue-violet . . . . . 29. *M. nubigena*
1b Pants rarely less that 100 mm high; flowers yellow, brownish, red or salmon-pink:
2a Filaments as long as or longer than tepal claws; anthers displayed above outer tepal limbs; pollen red:
3a Lowermost leaves inserted well above ground and clustered together at or shortly above first aerial node; inner tepal claws ± 5 mm long and limbs spreading . . . . . 22. *M. indecora*
3b Lowermost leaves basal, not crowded together; inner tepal claws 10–12 mm long and limbs ascending to erect . . . . . 27. *M. garipensis*
2b Filaments shorter than tepal claws; anthers partly to entirely concealed by subtending tepal claw; pollen yellow to white, blue or red:
4a Style branches reduced, concealed by anthers and lacking crests . . . . . 24. *M. vlokii*
4b Style branches well developed, broader than anthers and bearing prominent crests:
5a Plants 0.5–1.2 m high; bearing numerous small cormlets at base of corm and in lowermost leaf axils . . . . . 26. *M. ramosissima*
5b Plants usually < 0.5 m high; without basal or axillary cormlets:
6a Outer spathes $^{2}/_{3}$ to nearly as long as inner and margins free to base or almost so; pollen usually blue . . . . . 21. *M. vegeta*
6b Outer spathes ± half as long as inner and margins united in lower $^{1}/_{3}$ or more; pollen white to yellow or red:
7a Stem sparsely hairy to velvety; leaves and spathes velvety to glabrous . . . . . 28. *M. papilionacea*
7b Stem smooth; leaves and spathes glabrous:
8a Foliage leaves (1)2 or 3; outer tepals mostly 12–24 mm long . . . . . 23. *M. gawleri*
8b Foliage leaves several (at least 4); outer tepals mostly 25–28 mm long . . . . . 25. *M. namaquamontana*

Subg. 5. *Galaxia*

1a Style branches short, margins deeply fringed:
2a Corm tunics entire (not fibrous), pith-like to ± cartilaginous; foliage leaves terete in upper half . . . . . 46. *M. angulata*
2b Corm tunics fibrous, foliage leaves bifacial or unifacial, sometimes terete in upper half:
3a Filaments free in upper $^{2}/_{3}$; tepals yellow below fading to white in upper half . . . . . 39. *M. luteoalba*
3b Filaments free and diverging in upper $^{1}/_{3}$ or united entirely; tepals yellow, sometimes with darker cup edged with dark markings or white with yellow cup then with filaments united:
4a Flowers white with yellow centre; filaments entirely united. . . . . 43. *M. albiflora*
4a Flowers yellow; filaments free distally for ± 1 mm or fully united:
5a Leaves narrow, linear, ± unifacial or ± terete distally; margins smooth or sparsely and obscurely ciliate:
6a Perianth tube 10–24 mm long; tepals (11–)15–19 mm long; style usually exceeding anthers . . . 44. *M. fugacissima*
6b Perianth tube 5–10 mm long; tepals 10–15 mm long; style dividing opposite anther apices . . . . . 45. *M. stagnalis*
5b Leaves oblong to ± ovate; leaf margins ciliate to minutely velvety or smooth:
7a Flowers with deeper yellow cup edged with dark markings. . . . . 42. *M. vuvuzela*
7b Flowers uniformly yellow:
8a Perianth tube 4.5–10.0 mm long; tepals 6–10 mm long. . . . . 41. *M. pilifolia*
8b Perianth tube mostly 10–25 mm long; tepals 16–30 mm long:
9a Tepals 16–20 mm long; anthers 2–3 mm long. . . . . 40. *M. galaxia*
9b Tepals 22–30 mm long; anthers 4–5 mm long. . . . . 38. *M. kamisensis*
1b Style branches with entire margins; flowers often pink to purple, or red, white or yellow:
10a Flowers predominantly white or yellow sometimes with brown markings in midline of tepals (rarely orange):
11a Flowers yellow, sometimes with brown markings in midline of tepals (rarely orange); tepals 18–28 mm long . . . . . 31. *M. citrina*

11b Flowers white with yellow cup; tepals 10–12 mm long . . . . . 34. *M. minima*
10b Flowers pink or purple to red, with pale or dark purple centre:
12a Flowers small, perianth tube 8–10 mm long; tepals 10–15 mm long:
13a Leaves narrow, shallowly channelled to plane, uniformly green; tepals 10–12 mm long . . . . . 30. *M. kamiesmontana*
13b Leaves terete, green with translucent adaxial line; tepals ± 15 mm long . . . . . 37. *M. fenestralis*
12b Flowers larger, perianth tube (10–)12–30 mm long; tepals 14–25 mm long:
14a Flowers with dark purple centre:
15a Tepals spreading from base, 18–25 mm long; filaments 4.0–6.5 mm long, united in lower $^{2}/_{3}$; style dividing opposite apex of filaments . . . . . 33. *M. barnardiella*
15b Tepals ascending but not cupped, ± 16 mm long; filaments ± 3 mm long, free or united in lower half; style dividing ± 1 mm beyond anther apices . . . . . 32. *M. melanops*
14b Flowers with yellow centre:
16a Leaves with ± straight margins; style dividing opposite anthers apices. . . . . 36. *M. variabilis*
16b Leaves with undulate margins; style dividing well above anthers . . . . . 35. *M. versicolor*

Subg. 6. *Monocephalae*

1a Filaments joined at least 2 mm and up to half their length; stems usually with (1)2 sheathing leaves . . . . . 48. *M. anomala*
1b Filaments joined at the base for up to 2 mm; stems usually with 1(2) sheathing leaf:
2a Leaf linear-folded, trailing; flowers relatively small with outer tepals 20–24 mm long; anthers 5–6 mm long . . . . . 50. *M. vallisavium*
2b Leaf terete, ± stiffly erect; flowers usually larger with outer tepals 30–50 mm long; anthers 7–10 mm long:
3a Nectar guides clear yellow, circled with darker pigment; style crests slightly longer than style branches 47. *M. angusta*
3b Nectar guides consisting of lines of dark dots on deep yellow background; style crests slightly shorter than style branches . . . . . 49. *M. neglecta*

Subg. 7. *Acaules*

1a Stem extending well above ground with leaves clustered at first aerial node . . . . . 55. *M. longipes*
1b Stem subterranean with leaves borne at ground level:
2a Plants usually with multiple flower clusters (rhipidia), sometimes growing in tufts; leaves 5 or more, ± falcate or spreading horizontally; flowers white with yellow nectar guides at base of outer tepal limbs and usually a violet to purple mark near top of inner tepal claws or base of limbs; filaments ± 6 mm, united in lower half; corm tunics dark and coarsely fibrous; leaves glabrous or rarely ciliate on margins:
3a Leaves tapering from broad base to slender acute apex, mostly 30–50 mm long, laxly twisted with acute apex; floral bracts not evident, retained within spathes; outer tepals 18–22 mm long . . . . . 51. *M. falcifolia*
3b Leaves oblong, up to 20 mm, straight with obtuse apex; floral bracts extending above leaves as dry white-membranous threads; outer tepals ± 14 mm long . . . . . 52. *M. filamentosa*
2b Plants usually growing singly with solitary flower cluster (sometimes 2 or 3 in *M. ciliata*); leaves (not including sheathing inner spathe of rhipidium) mostly 3 or 4(6), suberect or falcate, sometimes twisted; flowers predominantly blue, mauve, pink, red, yellow or white, with yellow nectar guides, inner tepals usually without markings; filaments 3–18 mm long, united only basally or for up to half their length; corm tunics pale, fibrous (sometimes coarsely so) or consisting of layers of spongy tissue:
4a Outer tepals 40–60 mm long with claws 25–40 mm long, ± twice as long as limbs; filaments 12–18 mm long, united in lower half; flowers predominantly yellow, sometimes with white inner tepals. . . . . 57. *M. macronyx*
4b Outer tepals 18–25 mm long with claws 9–18 mm long, ± as long as or shorter than limbs; filaments 3–10 mm long and united basally for $^{1}/_{5}$–$^{1}/_{2}$ their length; flowers blue to violet, white, yellow, pink or red:
5a Style branches 4–5 mm long, with broadly triangular crests, 8–10 × 4–5 mm at base, ± twice as long as style branches; filaments 3–4 mm long; flowers yellow, red, purple or violet. . . . . 56. *M. tricolor*
5b Style branches 6–16 mm long with lanceolate to narrowly wedge-shaped or ± linear crests, 7–15 × 2–3 mm at base; filaments 4–10 mm long; flowers blue to mauve, white, yellow or pink to dull red:
6a Leaves twisted distally with margins thickened, strongly undulate to crisped and usually smooth; flowers pale yellow or with white inner tepals; seeds small, angular-prismatic, 1.3–1.5 × 1.0–1.3 mm. . . . . 54. *M. flava*
6b Leaves usually ± straight to falcate and often partly hairy (rarely twisted distally and ciliate) with margins straight, undulate or lightly crisped, sometimes thickened and ciliate to long hairy; flowers blue, deep yellow often brown outside, or white rarely with pink flush; seeds (where known) relatively large, softly angular to ± globose, 1.4–2.5 mm diam.. . . . . 53. *M. ciliata*

Subg. 8. *Polyanthes*

1a Flowers with filiform style branches, either simple or forked to base into paired filiform arms extending between anthers; both inner and outer tepals usually with contrasting markings:
2a Style branches simple, filiform, extending between anthers; tepals predominantly blue to violet:
3a Foliage leaf channelled, 5–7 mm wide, margins thickened . . . . . 111. *M. marginata*
3b Foliage leaf terete, without margins:
4a Leaf straight, hollow, ± 3 mm diam., ± as long as stem . . . . . 112. *M. fistulosa*

4b Leaf falcate, and somewhat twisted, not hollow, ± 1 mm diam., longer than stem, often trialing distally . . . . . 111. *M. monticola*
2b Style branches with paired filiform arms; flowers yellow or blue to violet:
5a Perianth blue to violet:
6a Stem 80–100 mm high, weakly flexuose; foliage leaf solitary; stem 1- or 2-branched; plants of southern Namibia . . . . . 71. *M. hexaglottis*
6b Stem 200–450 mm high, straight; foliage leaves 2 or more; stem usually with 1 to 4 primary branches each with (1)4 to 6 sessile lateral flower clusters at upper nodes; plants of interior Western Cape . . . . . 109. *M. pearsonii*
5b Perianth yellow to beige:
7a Tepals united basally in a perianth tube:
8a Perianth tube (3–)4–9 mm long; ovary entirely included. . . . . 82. *M. virgata*
8b Perianth tube 1.5–2.0 mm long; upper part of ovary sometimes emerging from spathes:
9a Leaf margins straight; plants with several to many sessile lateral rhipidia; anther 6–7 mm long . . . 81. *M. brevituba*
9b Leaf margins undulate (sometimes crisped); plants unbranched or with 1 or 2 shortly stalked lateral rhipidia; anthers ± 3 mm long. . . . . 77. *M. thermarum*
7b Tepals free to base:
10a Lateral rhipidia stalked; leaves comparatively broad and short, up to 11 mm wide, spreading and twisted, with margins undulate and often crisped . . . . . 76. *M. namaquana*
10b Lateral rhipidia sessile, spicately arranged on the main or primary branches:
11a Capsules narrowly ellipsoid to cylindric-trigonous, rarely > 3 mm at widest; plants of open and dry habitats . . . . . 78. *M. lewisiae*
11b Capsules obovoid to club-shaped, truncate above; 4–8 mm at the widest point; plants of moist habitats, stream sides and seeps:
12a Capsules 12–16(–23) mm long and 6–8 mm wide; inner spathe of lateral rhipidia usually shorter than outer and concealed by the sheathing bract leaves . . . . . 79. *M. longifolia*
12b Capsules 6–10(–12) mm long and ± 4 mm wide; inner spathe of the lateral rhipidia usually longer than outer and not concealed. . . . . 80. *M. riparia*
1b Flowers with flattened style branches appressed to opposed anthers, with or without obvious crests:
13a Ovary subsessile and perianth raised above spathes on sterile tubular extension of ovary AND style branches broad, petaloid and bearing prominent crests; rhipidial spathes translucent between veins:
14a Foliage leaves 2; leaf blades ± helically coiled or rarely laxly twisted, with median band of translucent tissue . . . . . 87. *M. pritzeliana*
14b Foliage leaves 1 or 2; leaf blades linear straight or laxly twisted, usually channelled, uniformly green:
15a Flowers small, outer tepals 12–18 mm long; anthers 2.5–4.0 mm long . . . . . 84. *M. setifolia*
15b Flowers moderate-sized, outer tepals (17–)19–30 mm long; anthers (4–)5–8 mm long:
16a Flowers white; inner tepal limbs erect . . . . . 85. *M. cedarmontana*
16b Flowers blue to blue-mauve or violet; inner tepal limbs half reflexed:
17a Foliage leaves 2; flowers crepuscular, opening after 17:00 . . . . . 89. *M. hesperantha*
17b Foliage leaves usually solitary or 2; flowers diurnal, collapsing in late afternoon:
18a Plants of summer-rainfall southern Africa; tepals blue-mauve mottled darker with age; outer tepals 17–28 mm long. . . . . 86. *M. simulans*
18b Plants of western winter-rainfall southern Africa; tepals blue-mauve to violet, not mottled darker with age; outer tepals 21–30 mm long:
19a Claws of outer tepals 11–12 mm long; tepals pale blue to blue-mauve . . . . . 83. *M. australis*
19b Claws of outer tepals 7–8 mm long; tepals blue-violet. . . . . 88. *M. contorta*
13b Ovary subsessile or on long pedicels with or without beaked ovary AND style branches reduced or broad, petaloid and bearing crests; rhipidial spathes not translucent between veins:
20a Foliage leaves 2 or more:
21a Style branches with prominent, erect paired crests; outer tepals with nectar guides at bases of limbs:
22a Ovary and capsules included in rhipidial spathes:
23a Lower or all foliage leaves ± basal, with blades twisted or coiled:
24a Inner tepals spathulate with limbs erect; leaves twisted or coiled and narrowly channelled. . . 58. *M. serpentina*
24b Inner tepals ± obovate, with limbs of both whorls half-reflexed:
25a Leaves 2 or 3, with blades terete and helically coiled. . . . . 59. *M. tortilis*
25b Leaves 2, with blades channelled or terete but not coiled:
26a Foliage leaves terete, < 1 mm diam., straight, possibly trailing distally; outer tepals ± 18 × 8 mm . . . . . 61. *M. teretifolia*
26b Foliage leaves channelled, shorter than stem with margins undulate (crisped); outer tepals 25–30 × 10 mm . . . . . 60. *M. geminifolia*
23b Leaves inserted well above ground, ± opposed at first aerial node:
27a Stems and leaves fairly sturdy, stem mostly 2–4 mm diam.; flowers moderate-sized to large, outer tepals 30–50 mm long; capsules mostly 12–30 mm long . . . . . 72. *M. fugax*
27b Stems and leaves ± filiform, stem rarely > 1 mm diam.; flowers moderate-sized, outer tepals 20–33 mm long; capsules 9–13(–15) mm long. . . . . 74. *M. filicaulis*
22b Ovary and capsules exserted from rhipidial spathes:
28a Outer tepals 16–30 mm long; inner rhipidial spathes 20–45 mm long:
29a Foliage leaves 2(3); inner rhipidial spathes mostly 30–45 mm long; plants of northern Namibia and Botswana . . . . . 92. *M. carsonii*

29b Foliage leaves (2)3 or 4; inner rhipidial spathes 20–40(–45) mm long; plants of southern Western and Eastern Cape . . . . . 90. *M. bipartita*
28b Outer tepals 36–60 mm long; inner rhipidial spathes 40–60 mm long:
30a Ovary veined with red (not southern Cape populations); outer tepals 36–55 mm long; capsules 9–16 mm long, erect . . . . . 91. *M. polystachya*
30b Ovary uniformly green; outer tepals 45–60 mm long; capsules 16–20 mm long, often nodding . 93. *M. venenata*
21b Style branches reduced, as wide as or narrower than anthers, with crests vestigial or lacking; nectar guides present at bases of limbs of both tepal whorls:
31a Plants acaulescent or almost so; tepals united basally in a tube 5–6 mm long . . . . . .68. *M. graniticola*
31b Plants with well-developed aerial stem; tepals free to base:
32a Style dividing at top of filament column and diverging from base . . . . . 95. *M. polyanthos*
32b Style dividing at or above middle of anthers, hardly diverging:
33a Foliage leaves several (at least 4); leaf blades 20–40 mm wide; style branches 2–6 mm long . . . . .94. *M. speciosa*
33b Foliage leaves 2 or 3; leaf blades narrow, 2–5 mm wide; style branches ± 1 mm long:
34a Ovary veined with red; tepals ± 30–36 mm long; anthers 5.5–6.6 mm long, contiguous; style dividing opposite anther apices and overtopping them . . . . . 96. *M. deserticola*
34b Ovary uniformly green; tepals ± 22 mm long; anthers 4–5 mm long, exceeding style, branches ± 1 mm long . . . . . 97. *M. tanquana*
20b Foliage leaf solitary (sometimes absent at flowering), remaining leaves entirely sheathing stem:
35a Plants of eastern southern Africa:
36a Foliage leaf absent or dry at flowering time (or new leaf emergent), the blade terete without a longitudinal groove:
37a Style branches reduced, narrow, lacking crests . . . . . .101. *M. thomsonii*
37b Style branches not reduced, always bearing crests:
38a Flowers pale lilac to blue-mauve; outer tepals 18–20 mm long . . . . . .99. *M. stricta*
38b Flowers violet; outer tepals 12–15 mm long . . . . . 101. *M. alpina*
36b Foliage leaf present at flowering time, the blade channelled, sometimes margins tightly inrolled, seeming terete but with narrow longitudinal adaxial groove:
39a Leaf inserted at base or shortly above ground. . . . . 98. *M. elliotii*
39b Leaf inserted well above ground often at base of first branches; branches often short, somewhat crowded above first aerial node:
40a Inner rhipidial spathes 34–40 mm long; capsules globose, ± 5 mm diam.; outer tepals 25–30 mm long . . . . . .103. *M. inclinata*
40b Inner rhipidial spathes 25–35 mm long; capsules club-shaped up to 10 mm long; outer tepals 15–20 mm long . . . . . .102. *M. natalensis*
35b Plants of western, winter-rainfall southern Africa:
41a Style branches bearing prominent, erect paired crests; only outer tepals bearing nectar guides at bases of limbs:
42a Leaf inserted well above ground, often at base of first branches; branches often short, somewhat crowded above first aerial node:
43a Spathes short, 20–35(–40) mm long; capsules 10–12 mm long; branches many on extended stem . . . . . 73. *M. gracilenta* (see also 74. *M. filicaulis* above)
43b Spathes longer, (35–)40–65 mm long; capsules 15–28(–40) mm long:
44a Plants usually acaulescent and unbranched, rarely 1- or 2-branched; capsules 18–36 mm long; flowers white or blue to mauve or violet; outer tepals 20–40 mm long . . . . . .75. *M. macrocarpa*
44b Plants with aerial stem, several to many branched, branches often crowded; capsules 12–30 mm long; flowers white, blue or yellow, outer tepals 30–50 mm long . . . . . 72. *M. fugax*
42b Leaf inserted at ground level, plants branched or not:
45a Ovary and capsules exserted; rhipidial spathes green, sometimes dry toward tips:
46a Flowers small, outer tepals 14–17 × 4.5–6.0 mm; outer tepals reflexed up to 30º; inner rhipidial spathes 22–32 mm long . . . . . .105. *M. exiliflora*
46b Flowers moderate in size, outer tepals 20–30 mm long; outer tepals reflexed 45º or more; inner rhipidial spathes 33–60 mm long. . . . . .104. *M. lazulina*
45b Ovary and capsules included; rhipidial spathes partly dry, with broad membranous margins:
47a Foliage leaf terete, straight below, loosely to tightly coiled in distal $^1/_3$; flowers white to creamy white . . . . . .65. *M. acocksii*
47b Foliage leaf or leaves dorsiventral, channelled at least below, often twisted distally; flowers white, yellow or blue to blue-mauve (lilac):
48a Plants small, up to 150 mm high; outer tepals 22–28 mm long; outer tepal claws ± 8–10 mm long, thus ± half as long as limbs . . . . . 66. *M. quartzicola*
48b Plants usually exceeding 200 mm; outer tepals 26–40 mm long; outer tepal claws ± as long as limbs:
49a Filaments ± 15 mm long and anthers 3–4 mm long (< $^1/_3$ as long as filaments); outer tepals ± 30 × ± 8 mm. . . . . 67. *M. macgregoriorum*
49b Filaments 10–14 mm long and anthers 5–9 mm long (± $^1/_2$ to > $^1/_2$ as long as filaments); outer tepals 26–47 × 10–22 mm:
50a Foliage leaf narrowly channelled (sometimes appearing ± terete but with narrow adaxial groove), the margins straight; flowers blue-mauve or white . . . . . .63. *M. namibensis*
50b Foliage leaf twisted or straight, the margins straight or undulate to partly crisped; flowers pale or deep yellow, white or pale blue-mauve:

51a Leaf usually trailing almost from base, margins undulate to crisped; flowers usually yellow . . . . . 64. *M. bolusii*
51b Leaf falcate, thus erect in lower half, almost straight to undulate; flowers pale blue-mauve or white, rarely pale, watery yellow. . . . . 62. *M. saxicola*
41b Style branches reduced, mostly as wide as or narrower than anthers, with crests vestigial or lacking; inner and outer tepals usually bearing nectar guides at bases of limbs:
52a Ovary extended above as a sterile tube; leaves terete:
53a Leaf ± 3 mm diam., interior hollow and pithy, rigidly erect; tubular upper part of ovary ± 1 mm long . . . . . .69. *M. rigidifolia*
53b Leaf ± 1 mm diam., straight or loosely coiled helically; tubular upper part of ovary 7–10 mm long . . . . . .70. *M. herrei*
52b Ovary without sterile tubular extension above; leaves channelled (sometimes with narrow longitudinal groove) or terete:
54a Plants with 2 to 4 branches, all stalked; capsules ellipsoid-obovoid. . . . . .106. *M. crispa*
54b Plants with 1 or 2 stalked primary branches from base but bearing sessile lateral rhipidia above; capsules globose or spindle-shaped:
55a Capsules globose, 2–4 mm diam., membranous and semi-transparent, fragmenting irregularly; flowering December to March . . . . . 108. *M. pseudospicata*
55b Capsules ± spindle-shaped with a short sterile beak; flowering October to November. . . . . .107. *M. verecunda*

Subg. 9. *Grandiflorae*

1a Plants with single sheathing leaf; flowers yellow . . . . . .125. *M. unibracteata*
1b Plants with 2 to several sheathing leaves, usually overlapping one above; flowers yellow, white or pink or blue:
2a Leaves with narrow adaxial groove or appearing terete with margins tightly inrolled; flowers yellow:
3a Cataphylls decaying brown, entire or irregularly broken, ribbed . . . . . 124. *M. hiemalis*
3b Cataphylls decaying into firm, dark brown vertical fibres:
4a Flowers deep yellow; outer tepals 40–50 mm long; inner tepal limbs erect. . . . . 119. *M. galpinii*
4a Flowers pale yellow to almost white; outer tepals 55–65 mm long; inner tepal limbs erect to spreading . . . . . 118. *M. robusta*
2b Leaves plane to widely channelled; flowers yellow, white or pink or blue:
5a Flowers blue or pink then often with style crests darker pink:
6a Flowers blue to violet; filaments shorter than anthers. . . . . .121. *M. ardesiaca*
6a Flowers pink often with darker pink style crests; filaments longer than anthers . . . . . .122. *M. carnea*
5b Flowers yellow or white with style crests the same colour as the tepals or with dark purple markings:
7a Cataphylls forming a pale straw-coloured fibrous network distally:
8a Plants usually solitary; flowers deep yellow with orange nectar guides. . . . . 117. *M. reticulata*
8a Plants growing in clumps; flowers pale watery yellow with small, white to pale yellow nectar guides . . . . . 116. *M. alticola*
7b Cataphylls pale to brown, entire or frayed or torn at apex or decaying irregularly:
9a Style crests with dark purple-brown blotch at bases:
10a Plants growing mostly along steams and drainage lines, usually in clumps . . . . . .115. *M. huttonii*
10b Plants of open grassland, usually solitary . . . . . 123. *M. graminicola*
9a Style crests uniformly coloured:
11b Plants relatively small, up to 450 mm high, mostly solitary:
12a Leaf 5–6 mm wide; outer tepals 35–50 mm long. . . . . .120. *M. muddii*
12b Leaf mostly 8–25 mm wide; outer tepals 60–75 mm long . . . . . 123. *M. graminicola*
11b Plants tall, usually > 500 mm high, usually growing in clumps:
13a Leaves ± flat to widely channelled, deep green; flowers often with large orange nectar guide . . . . . 113. *M. spathulata*
13b Leaves with semi-circular channel, glaucous-green; flowers with small yellow nectar guide . . . . . 114. *M. moggii*

Subg. 10. *Vieusseuxia*

A. Species of summer-rainfall eastern southern Africa (Limpopo to Eastern Cape near East London):

1a Inner tepals reduced to short cusps (sometimes minutely divided at tips):
2a Flowers relatively large, pale yellow to creamy white; outer tepals 30–35 mm long; flowering in summer January to March . . . . . 149. *M. albicuspa*
2b Flowers small, white to pale mauve with purple style crests; outer tepals 20–27 mm long; flowering in late spring mostly October to November. . . . . 151. *M. modesta*
1b Inner and outer tepal claws subequal but limbs 3-lobed:
3a Inner tepal lobes unequal, inner lobe at least twice as long as short, rounded lateral lobes:
4a Foliage leaf dry at flowering or emergent; blade terete; flowers white to pale blue . . . . . 150. *M. marionae*
4b Foliage leaf present at flowering; blade channelled; flowers brown and creamy beige . . . . . .147. *M. trifida*
3b Inner tepal lobes ± equal, inner lobe slightly narrower than lateral lobes:
5a Flowers purple; outer tepals 25–30 mm long. . . . . .148. *M. dracomontana*

5b Flowers white to creamy white to pale mauve; outer tepals 18–30 mm long:
6a Outer tepals 27–30 mm long and velvety or scabrid outside; filaments 10–12 mm long. . . . . 152. *M. pubiflora*
6b Outer tepals 18–28 mm long and glabrous or sparsely puberulous outside; filaments 4–7 mm long:
7a Outer tepal limbs oblanceolate and half reflexed, with claws 9–11 mm long; stamens 11–12 mm long . . . . . 153. *M. brevistyla*
7b Outer tepal limbs broadly ovate to orbicular and spreading, with claws 7–9 mm long; stamens ± 8.5 mm long. . . . . 154. *M. vigilans*

B. Species of winter-rainfall western southern Africa (Richtersveld to Grahamstown):

1a Plants with 2 or more foliage leaves (but see 160. *M. tripetala*); filaments united in lower $^{2}/_{3}$ or entirely:
2a Foliage leaves only 2, blades narrow, up to 1 mm wide with narrow adaxial groove, distally twisted to coiled . . . . 134. *M. helicoidea*
2b Foliage leaves 3 or more, blades 3–10 mm wide, widely channelled, straight to slightly twisted but never coiled 133. *M. fergusoniae*
1b Plants with solitary foliage leaf; filaments variously united or free to base or almost so:
3a Inner tepals with well-developed, lanceolate to ovate or ellipsoid limbs mostly as long as or longer than claws (but see *M. tulbaghensis*); stems and foliage leaves glabrous:
4a Filaments united only near base; flowers yellow. . . . . 126. *M. thomasiae*
4b Filaments united in a smooth slender column, sometimes free in upper $^{1}/_{3}$; flowers variously coloured but not yellow:
5a Tepal claws < $^{1}/_{3}$ as long as limbs and ± spreading; markings on tepals similar on inner and outer tepals:
6b Flowers orange or greenish cream-coloured with brown centre; pollen orange. . . . . 131. *M. insolens*
6a Flowers blue to mauve or dark purple with white or yellow nectar guides on inner and outer tepals; pollen yellow:
7a Flowers purple with yellow nectar guides; outer tepals 15–17 mm long . . . . . 132. *M. worcesterensis*
7b Flowers pale blue to mauve with white nectar guides; outer tepals 17–20 mm long . . . . . 167. *M. amissa*
5b Tepal claws ± half as long as to longer than limbs and ascending to ± erect; markings only on outer tepal limbs:
8a Inner tepal limbs erect and usually curving inward distally:
9a Flowers pale pink to almost white flushed pink outside. . . . . 128. *M. barkerae*
9b Flowers violet to blue:
10a Inner tepals 18–20 mm long. . . . . 127. *M. incurva*
10b Inner tepals 6–10 mm long. . . . . 138. *M. algoensis*
8b Inner tepal limbs spreading:
11a Flowers dark maroon, sometimes with creamy yellow highlights (rarely largely creamy yellow), foul smelling; outer tepal claws longer than limbs . . . . . 129. *M. lurida*
11b Flowers white to creamy yellow, usually odourless; outer tepal claws ± as long as limbs:
12a Outer tepals 25–30 mm long; inner tepals 18–25 mm long . . . . . 130. *M. cantharophila*
12b Outer tepals 19–21 mm long; inner tepals ± 14 mm long . . . . . 145. *M. deltoidea*
3b Inner tepals with reduced limbs either 3-lobed or linear-filiform or lacking and claws reduced to filiform cusps sometimes 3-forked at apex, sometimes absent; stem and abaxial leaf surface glabrous, velvety or hairy:
13a Inner tepals with limbs linear-filiform (sometimes slightly wider near limb bases or rarely forming obscure rounded lobes up to 2 mm long) or lacking and claws reduced to filiform cusps or absent entirely:
14a Filaments united in lower $^{1}/_{3}$–$^{2}/_{3}$:
15a Flowers blue or violet, outer tepal limbs with small white nectar guides . . . . . 143. *M. regalis*
15b Flowers white veined and spotted with blue, outer tepal limb with dark purple nectar guides:
16a Inner tepals absent; filaments 8–9 mm long. . . . . 140. *M. barnardii*
16b Inner tepals filiform cusps 13–15 mm long; filaments 12–15 mm long. . . . . 139. *M. longiaristata*
14b Filaments united for < $^{1}/_{3}$ their length or free and flowers predominantly blue to violet or purple (rarely white):
17a Inner tepals 7.5–15.0 mm long, linear throughout or expanded and lobed in middle:
18a Foliage leaf usually shorter than stem, sometimes only half as long, blade distally at most shallowly channelled or ± plane and laxly twisted, mostly 3.5–5.0 mm wide; leaf and/or stem or spathes and sheathing leaves sometimes hairy; inner tepals 7.5–12.5 mm long, often expanded in middle, sometimes into small rounded lobes at base of spreading distal half; ovary 7–8 mm long . . . . . 158. *M. mutila*
18b Foliage leaf as long as or more often exceeding stem, sometimes twice as long; leaf blade narrowly channelled with edges often folded together, 1.5–3.0 mm wide; vegetative parts never hairy; inner tepals 8–15 mm long, linear for entire length, spreading in distal $^{1}/_{3}$–$^{1}/_{2}$; ovary 11–15 mm long. . . . . 159. *M. cuspidata*
17b Inner tepals (1–)2–6 mm long or occasionally absent, either 3-lobed in upper $^{1}/_{3}$ or reduced to hair-like or lanceolate to linear cusps, acute and usually widest at base:
19a Axil of foliage leaf bearing several dark-coloured cormlets breaking through leaf sheath; plants never forming mature capsules or seeds; anthers pale blue and pollen blue or white to yellow; plants restricted to Western Cape West Coast near Saldanha on limestone pavement or calcareous sands . . . . . 162. *M. hainebachiana*
19b Axil of foliage leaf rarely with a solitary cormlet enclosed in sheath or without cormlets; anthers and pollen orange-red or white (rarely yellow); plants always forming mature capsules and fertile seeds; plants widespread from the Western Cape coast and Western Karoo on various soils:
20a Filaments usually united for 0.5–1.5 mm (rarely free); plants not forming colonies, occasionally a single cormlet present in axil of foliage leaf; leaves narrowly channelled and edges often closely appressed; stems and abaxial leaf surface glabrous:
21a Ovary narrowly ellipsoid, mostly 4–9 mm long; capsules ellipsoid, 8–14 mm long; foliage leaf (or leaves) usually as long as or longer than stem; axillary cormlets absent; pollen usually orange-red, occasionally white; plants of slopes and flats . . . . . 160. *M. tripetala*

21b Ovary linear-cylindric, 10–13 mm long; capsules ± cylindric (15–)20–24 mm long; foliage leaf often shorter than stem, sometimes half as long; bearing a single cormlet in axil of foliage leaf; pollen white; plants of seasonal wetlands ..... 161. *M. ogamana*
20b Filaments ± free or united basally for up to 0.4 mm; plants usually forming colonies due to vegetative reproduction by axillary cormlets and/or two new cormlets replacing parent corm; leaves widely channelled, often ± plane distally; plants sometimes velvety on stems and abaxial surface of leaves:
22a Outer tepal limbs (9–)11–18 × 10–14 mm, always as long as or longer than wide; anthers 4.5–7.0(–8.0) mm long and up to one and a half times as long as filaments; corm tunics usually of hard, coarse, light brown (occasionally dark brown) fibres ..... 163. *M. amabilis*
22b Outer tepal limbs 15–20(–23) × 15–20 mm, often ± as long as wide; anthers 8–11 mm long and ± twice as long as filaments; corm tunics usually of soft, fine (rarely medium-textured), light to dark brown fibres ..... 164. *M. grandis*
13b Inner tepals 3-lobed distally with central lobe longest and acute, outer lobes short and obtuse:
23a Stems velvety and abaxial (outer) leaf surface shortly hairy to velvety; inner tepals 3-lobed with innermost lobe laxly spreading at least 3× as long as lateral lobes:
24a Anthers exceeding style branches and often exceeding crests; style crests very short, 0.5–2.0 mm long:
25a Flowers blue to mauve; style crests 0.5 mm long, ± as long as stigmatic lobes and appressed to them; pollen ± white to pale yellow ..... 172. *M. gigandra*
25b Flowers orange to red or rarely white; style crests 1–2 mm long, exceeding stigmatic lobes; pollen orange ..... 169. *M. tulbaghensis*
24b Anthers not exceeding style branches, usually reaching to just below stigmatic lobes; style crests short, 2–8 mm long:
26a Outer tepals claws yellow with or without dark spotting, shortly hairy or glabrous:
27a Outer tepals 28–40 mm long, nectar guides on limbs prominent, semi-circular, dark purple, dark turquoise or navy blue, sometimes edged with thin yellow line; anthers 6–10 mm long ..... 168. *M. villosa*
27b Outer tepals 22–28 mm long, nectar guides on limbs small, yellow sometimes edged with dark spots or consisting of small dark spots; anthers 5–6 mm long ..... 166. *M. caeca*
26b Outer tepals claws not yellow, densely covered with long, blackish hairs:
28a Outer tepal limbs orbicular, as wide as or wider than long ..... 170. *M. calcicola*
28b Outer tepal limbs oblong to obovate, longer than wide ..... 171. *M. loubseri*
23b Stems glabrous but abaxial (outer) leaf surface glabrous or shortly hairy; inner tepals 3-lobed with innermost lobe spreading, erect or coiled inward, mostly 2× as long as lateral lobes, sometimes longer:
29a Flowers dark maroon, sometimes with white to creamy yellow highlights; outer tepal limbs shorter than claws ..... 129. *M. lurida*
29b Flowers variously coloured but never maroon; outer tepal limbs as long as or longer than claws:
30a Leaves hairy on abaxial surface or at least margins visibly short- to long-ciliate:
31a Flowers shades of blue; leaves velvety on abaxial surface or only ciliate on margins ..... 141. *M. debilis*
31b Flowers dull white, tepals red-brown on reverse; leaves glabrous with margins long-ciliate ..... 137. *M. atropunctata*
30b Leaves glabrous including margins:
32a Central lobe of inner tepals spreading, at least 3× as long as lateral lobes:
33a Outer tepal limbs lanceolate, longer than wide ..... 156. *M. petricola*
33b Outer tepal limbs ± orbicular, ± as wide as long:
34a Outer tepals 30–35 mm long, limbs white with dark blue to turquiose markings at base; style brances 7–8 mm long ..... 165. *M. aristata*
34b Outer tepals 22–28 mm long, limbs mauve-lilac or pink (rarely almost white) with small yellow or dark markings at base; style brances ± 5 mm long ..... 166. *M. caeca*
32b Central lobe of inner tepals upright or curved inward and mostly up to 2× as long as lateral lobes:
35a Flowers predominantly blue to purple:
36a Inner tepals ± 4 mm long, < half as long as outer tepal claws; outer tepal claws 8–10 mm long, with a pair or shallowly raised marginal teeth shortly below apex ..... 157. *M. helmei*
36b Inner tepal > 6 mm long, as long as or longer than outer tepal claws; outer tepal claws not toothed:
37a Outer tepals 24–28 mm long ..... 138. *M. algoensis*
37b Outer tepals 12–23 mm long:
38a Filaments 3.5–4.0 mm long, united in lower half ..... 155. *M. decipiens*
38b Filaments 4–6 mm long, united almost to apex ..... 135. *M. unguiculata*
35b Flowers white to yellow, creamy green, beige or pink:
39a Outer tepal limbs 20–33 mm long, orbicular, ± as wide as to wider than long
40a Flowers yellow; filaments 3–5 mm long. ..... 146. *M. bellendenii*
40b Flowers white to creamy white (rarely pale watery yellow); filaments 4–7 mm long .... 144. *M. tricuspidata*
39b Outer tepals limbs 8–22 mm long, ovate to lanceolate, longer than wide:
41a Outer tepals 12–20(–22) mm long; outer tepal claws densely velvety ..... 135. *M. unguiculata*
41b Outer tepals (20–)22–40 mm long; outer tepal claws hairless or velvety:
42a Flowers creamy white, yellow-green or ± beige; outer tepal claws hairless; plants of Namaqualand, Northern Cape. ..... 136. *M. rivulicola*
42b Flowers pale pink; outer tepal claws densely velvety; plants of Little Karoo, Western Cape ..... 142. *M. lilacina*

Subg. 11. *Homeria*

1a Foliage leaves 2 or more, uppermost leaves green and usually free distally or sometimes entirely sheathing:
2a Flowers with distinct style crests 2–3 mm long, clearly extending beyond the stigma lobes, and either erect or incurved:
3a Anthers 2–5 mm long:
4a Tepal claws 7–10 mm long; anthers ± 5 mm long. . . . . 182. *M. flexicaulis*
4b Tepal claws obsolete or up to 2 mm long; anthers 2–3 mm long:
5a Tepals spreading from base; outer rhipidial spathe entirely sheathing . . . . . 180. *M. schlechteri*
5b Tepal claws ± 2 mm long, appressed to filament column with limbs outspread; outer inflorescence spathe free in upper part and arching outward . . . . . 181. *M. knersvlaktensis*
3b Anthers 6–10 mm long; tepal claws erect, forming a cup enclosing at least lower half of filaments, or stamens entirely within cup:
6a Style and stamens entirely included in floral cup; plants 700–1 000 mm tall . . . . . 183. *M. cedarmonticola*
6b Only lower $^{2}/_{3}$ of filament column included in floral cup; plants to mostly 200–250 mm tall . . . . . 195. *M. serratostyla*
2b Flowers without distinct style crests (and style branches often not markedly flattened):
7a Filament column ± cylindric; anthers erect or divergent:
8a Plants 350–750 mm tall; tepals 30–40 mm long; anthers 4.5–8.0 mm long, diverging from base. . . 185. *M. ochroleuca*
8b Plants up to 300 mm tall; tepals 15–24 mm long; anthers 2.0–3.5 mm long, erect or barely diverging:
9a Ovary ± 4 mm long; filament column 6 mm long . . . . . 207. *M. fenestrata*
9b Ovary 10–12 mm long; filament column 7–9 mm . . . . . 204. *M. karooica*
7b Filament column with a bulbous base; anthers ± erect and contiguous, usually concealing style branches:
10a Tepals reflexed at maturity; flowers nodding to pendent. . . . . 203. *M. pendula*
10b Tepals spreading or slightly cupped; flowers upright:
11a Stem minutely scabrid; leaves 2–4 mm wide, laxly coiled in loose spiral in upper half . . . . . 201. *M. aspera*
11b Stem smooth; leaves 5–10 mm wide, ± straight. . . . . 202. *M. miniata*
1b Foliage leaf solitary, other leaves entirely sheathing and bract-like, ± attenuate with dry tips:
12a Filaments free, diverging; style branches sessile . . . . . 193. *M. radians*
12b Filaments united entirely or free and diverging in distal 1–2 mm; style present, dividing shortly above apex of filament column or opposite base to middle of anthers:
13a Foliage leaf ± basal, often sheathing lower half of stem; stem ± straight, not flexed outward above leaf sheath:
14a Tepal claws ± $^{1}/_{3}$–$^{1}/_{2}$ as long as limbs, forming a narrow or wide cup; filaments and sometimes lower part or all of anthers included in cup:
15a Floral cup relatively narrow; enclosing filaments:
16a Ovary 15–24 mm long; capsules mostly 25–40 mm long. . . . . 178. *M. britteniae*
16b Ovary 8–12 mm long; capsules < 20 mm long:
17a Stem usually bearing cormlets at aerial nodes; flowering August to November; capsules 17–20 mm long, usually at least partly included in spathes. . . . . 194. *M. bulbillifera*
17b Stem never bearing cormlets at aerial nodes; flowering April to June; capsules 8–15 mm long, well exserted from spathes. . . . . 184. *M. autumnalis*
15b Floral cup wide and basin-like, not enclosing filaments:
18a Tepals pandurate-spathulate, widest in upper $^{1}/_{3}$; filaments 7–8 mm long; anthers 8–13 mm long, usually not reaching the top of the style branches; ovary 18 mm long. . . . . 191. *M. comptonii*
18b Tepals oblong-lanceolate, widest in middle or lower $^{1}/_{3}$; filaments 5–6 mm long; anthers 8–10 mm long, usually exceeding the style branches; ovary 12–14 mm. . . . . 192. *M. elegans*
14b Tepal claws < $^{1}/_{3}$ as long as limbs, ascending to suberect, including or clasping base of filament column:
19a Anthers not or barely exceeding style branches; outer tepals 30–43 mm long. . . . . 173. *M. cookii*
19b Anthers exceeding style branches, these reaching to about middle of anthers; outer tepals 18–34 mm long:
20a Flowers nodding to pendent; tepal limbs fully reflexed . . . . . 177. *M. reflexa*
20b Flowers upright; tepals spreading to slightly reflexed:
21a Leaves relatively broad, (5–)7–15 mm wide, and clasping lower part of stem:
22a Style crests present, ± 2 mm long:
23a Tepals, mostly 18–25 × 5–10 mm; leaves 5–15 mm wide. . . . . 174. *M. pallida*
23b Tepals oblong obovate, mostly 27–34 × 11–17 mm; leaves 15–35 mm wide . . . . . 176. *M. marlothii*
22b Style crests lacking:
24a Flowers usually pink; tepal claws ± 2 mm long and clasping bulbous base of filament column . . . 205. *M. bifida*
24b Flower pale yellow; tepal claws ± 8 mm long and diverging not clasping hardly swollen base of filament column . . . . . 206. *M. fragrans*
21b Leaves narrow, 2–4 mm wide, clasping lower part of stem or not:
25a Plants 350–450 mm tall; tepals 25–27 mm long; style crests ± 1.5 mm long. . . . . 175. *M. doleritica*
25b Plants 150–300 mm tall; tepals 18–24 mm long; style crests absent . . . . . 204. *M. karooica*
13b Foliage leaf inserted some distance above ground, never sheathing stem for significant distance; stem flexed outward above sheath of foliage leaf:
26a Tepal claws $^{1}/_{2}$–$^{2}/_{3}$ as long as limbs, forming a narrow or wide cup; filaments and sometimes all or part of anthers included in cup:
27a Tepal claws 9–15 mm long ± erect; claws forming a narrow tubular cup including the filaments and anthers:
28a Style dividing at or above apex of filament column, always below middle of anthers; style branches erect or diverging; tepal claws 9–15 mm long forming a narrow tubular cup including the filaments and anthers:
29a Filament column 4–5 mm long; leaf fairly short, seldom over 200 mm long, usually straight, the apex swollen and acute. . . . . 188. *M. pyrophila*

29b Filament column 6–7 mm long; leaf long, bent and trailing, seldom < 250 mm long, apex often dry at flowering. . . . . 187. *M. collina*
28b Style dividing at or above middle of anthers, sometimes barely divided; style branches erect:
30a Ovary usually partly or entirely enclosed in the spathes, the capsules often enclosed; style branches well developed, 2–3 mm long, barely or not reaching apex of anthers . . . . . 190. *M. minor*
30b Ovary usually exserted from the spathes, the capsules exserted; style branches very short, 1–2 mm long or not developed. . . . . 189. *M. longistyla*
27b Tepal claws widely diverging; claws forming a wide basin-like cup including filaments:
31a Outer tepals 28–33 mm long, with claws 13–16 mm long; anthers 5–11 mm long:
32a Ovary 17–20 mm long; capsules 25–55 mm long . . . . . 186. *M. flaccida*
32b Ovary 13–16 mm long; capsules 20–40 mm long . . . . . 185. *M. ochroleuca*
31b Outer tepals 16–26 mm long, with claws 5–10 mm; anthers 3–4 mm long:
33a Tepals 16–24 mm long with claws 5–6 mm long . . . . . 199. *M. flavescens*
33a Tepals 25–27 mm long with claws 9–10 mm long:
34a Style branches diverging, 3–4 mm long, with acute crests ± 1 mm long; anthers shortly exceeding style branches . . . . . 196. *M. patens*
34b Style branches suberect (to slightly diverging), ± 2.5 mm long, without crests; anthers not reaching tips of style branches . . . . . 198. *M. vallisbelli*
26b Tepal claws < 1/3 as long as limbs, often < 1/4 as long; filaments partly exserted from cup, or prominently displayed:
35a Outer tepals 10–12 mm long; anthers ± 2 mm long . . . . . 200. *M. demissa*
35b Outer tepals 20–28 mm long; anthers ± 3–5 mm long:
36a Style branches with short, acute crests ± 1 mm long; anthers diverging 3–5 mm long:
37a Tepals 20–25 mm long; filaments ± 5 mm long, free in upper 1 mm; flowers pale ivory-yellow. . . 179. *M. eburnea*
37b Tepals 25–28 mm long; filaments completely united in column 5–6 mm long; flowers bright yellow . . . . . 197. *M. louisabolusiae*
36b Style branches lacking crests, hidden by coherent anthers ± 3 mm long:
38a Tepals pale yellow with green markings at bases of tepals limbs; filament column ± 6 mm long, minutely pubescent in lower half . . . . . 208. *M. fuscomontana*
38b Tepals pink salmon with pink to red makings at bases of limbs; filament column 6–8 mm long, prominently long-papillate in lower 2/3 . . . . . 209. *M. brachygyne*

Subg. 1. **Plumarieae**

Subg. **Plumarieae** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 36 (2013). Type: *M. lugubris* (Salisb.) Goldblatt

Plants with branched stems. *Foliage leaves* several, channelled. *Flowers* fugaceous, blue; tepals subequal but outer larger and with nectar guides, limbs laxly spreading; filaments united in lower half; style branches diverging at tips and stigmatic apically, crests plumose. *Capsules* ± globose. *Basic chromosome number x* = 10.

1. **Moraea lugubris** *(Salisb.) Goldblatt* in Annals of the Missouri Botanical Garden 63: 18 (1976a); Goldblatt: 66 (1986a). *Ferraria lugubris* Salisb.: 42 (1796), as a new name for *Iris plumaria* Thunb.: no. 16 (1782b), illegitimate superfluous name for *M. iriopetala* L.f., *M. juncea L.*, *M. vegeta* L. *M. plumaria* Ker Gawl.: 240 (1804a). *Vieusseuxia plumaria* Eckl.: 14 (1827). Type: South Africa, [Western Cape], below Devil's Peak, Cape Town, *Thunberg s.n.* [UPS–THUNB 1153, lecto. Designated by Goldblatt: 706 (1976a)].

Moraea mira Klatt: 202 (1885). Type: South Africa, [Western Cape], slopes of Caledon Swartberg near the Baths, *Templemann sub MacOwan 2162* (K, S, syn.).

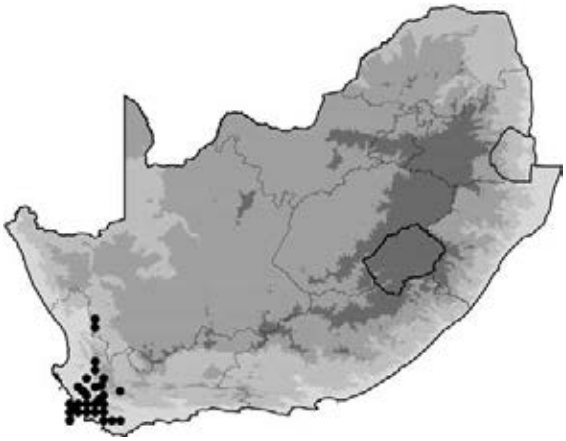
[*Vieusseuxia geniculata* Eckl.: 12 (1827), invalid name without description.]

Plants 60–160 mm high. *Corm* ± globose, up to 20 mm diam., corm body enclosed in large basket-like, ± woody tunics, with cormlets produced round the base. *Stem* 2 internodes long, flexuose, usually 2- to 4-branched, branches arising from same aerial internode. *Foliage leaves* 2 or 3, linear, channelled, lowermost basal, upper inserted well above ground. *Rhipidial spathes* pale green, sometimes with brown apices; inner 30–50 mm long, outer seldom > half as long as inner. *Flowers* fugaceous, blue to violet, outer tepal limbs with yellow nectar guides at bases; outer tepals 16–18 mm long, claws ± 5 mm long, reflexed to ± 45°; inner tepals ± as long but narrower, similarly reflexed. *Filaments* ± 6 mm long, united in lower 1/2, free above; anthers ± 3 mm long, long-apiculate; pollen usually red. *Ovary* narrowly ovoid, 2–3 mm long, usually exserted; style branches plane, bearing stigmatic areas at lateral tips, with single prominent crest and feathery outgrowths from distal surface. *Capsules* ± globose, 6–8 mm long. *Seeds* angular prismatic. *Chromosome number* 2*n* = 20. *Flowering time*: mainly August and September.

Distribution and ecology: restricted to the southern African winter-rainfall zone, extending from the Bokkeveld Mtns in Northern Cape, South Africa, in the north to the Cape Peninsula and Caledon District in Western Cape

in the south; usually in wet sites in sandy ground or outcrops of Cape Sandstone at low to middle elevations, especially common after fire.

Diagnosis: *Moraea lugubris* is immediately recognised by the small, violet to pale blue flower with feathery or fringed style crests, unique in *Moraea* and reminiscent of the related genus *Ferraria*. The species also recalls *Ferraria* in the stigmatic surfaces located at the lateral tips of style branches. Both floral morphology and molecular phylogenetic studies place *M. lugubris* close to the base of phylogenetic trees, in some it is retrieved as sister to the remaining species of *Moraea*. The corm is of the *Moraea* type, thus consisting of a single internode with an apical bud and enclosed by well-developed tunics. The tunics of coarse fibres loosely enclosing the corm body are, however, unique in the genus.



Distribution of ***Moraea lugubris***.

Subg. 2. **Visciramosae**

Subg. **Visciramosae** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 7 (1976b). Type: *M. bituminosa* (L.f.) Ker Gawl.

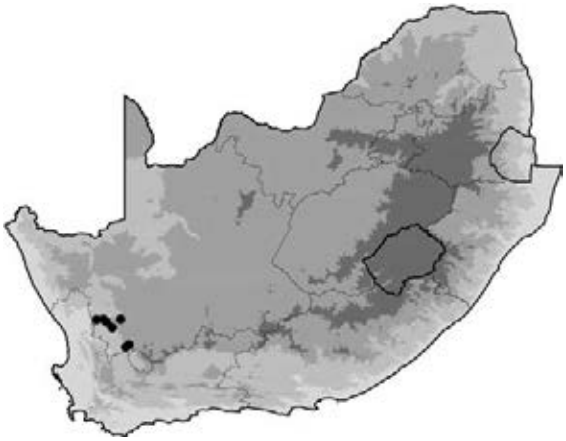
Plants with branched stems, sticky on and below nodes; corm tunics ± woody, sticky on adaxial surface. *Stem* branched, bearing cauline sheathing leaves. *Foliage leaves* several or 2, channelled. *Rhipidial spathes* acute or obtuse to truncate, outer entirely sheathing. *Flowers* fugaceous, variously coloured; tepals subequal and all with nectar guides or outer larger and with nectar guides, limbs spreading to reflexed; filaments united in lower half or free but contiguous; style branches broad with abaxial stigmatic lobe bearing a forked or entire appendage in centre, style crests paired and prominent or style branches reduced, lacking crests, then flattened or filiform. *Capsules* ± globose. *Basic chromosome number x* = 10.

Sect. 1. **Multifoliae** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 36 (2013). Type: *Moraea vespertina* Goldblatt & J.C.Manning

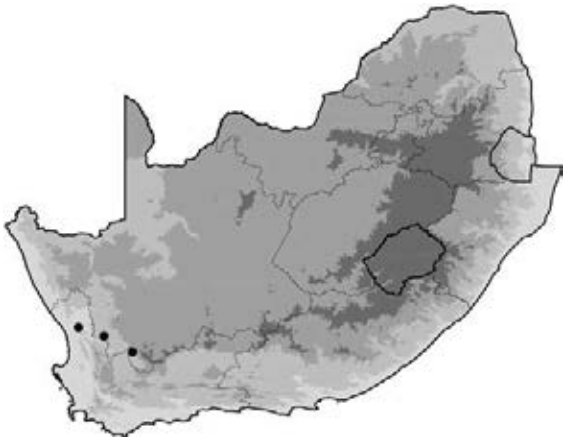
Foliage leaves several. *Rhipidial spathes* ± acute, inner exceeding outer. *Flowers* white, pale blue or predominantly buff-brown; style branches and crests moderately or well developed.

2. **Moraea vespertina** *Goldblatt & J.C.Manning* in Novon 10: 14 (2000a). Type: South Africa, Northern Cape, Calvinia District, rocky hills east of Nieuwoudtville, 31 Oct. 1996, *Goldblatt & Manning 10580* (NBG, holo.; K, MO, PRE, iso.).

Plants 0.7–1.1 m high. *Corm* globose, 15–25 mm diam.; tunics of coarse, red-brown fibres. *Stem* slightly flexuose, sticky below nodes for half an internode, bearing entirely sheathing leaves 40–65 mm long, green below, dry and brown above, tips dry, attenuate, with 1 or 2 lateral branches at upper 3 or 4 nodes, branches parallel to stem below, flexed outward above sheathing leaf. *Foliage leaves* usually 4 to 6 in 2 ranks, lower 3 to 5 basal, channelled, arching outward, mostly 5–8 mm wide, uppermost cauline, shorter than basal. *Rhipidial spathes* dull green, becoming ± purplish with age, margins dry and membranous, with dry, brown attenuate tips, inner 40–50 mm long, outer ± half as long. *Flowers* fugaceous, white fading bluish or to pale slate-blue, outer tepal limbs with yellow nectar guide streaked with darker veins at bases, either slightly lemon-scented or a sweet clove scent, tepal claws arching upward and forming a cup enclosing filaments and anther bases; outer tepals 40–45 × 15–20 mm, claws arcuate, erect above, 10–12(–16) mm long, with large basal nectary, limbs lanceolate, often ± attenuate, spreading horizontally or dipping up to 45° below horizontal; inner tepals 36–42 × 8–15 mm. *Filaments* 7–10 or ± 12 mm long, free but parallel and connivent below, forming a slender column, diverging in upper 1.5 mm; anthers 6–8 mm long, ovate, white; pollen white. *Ovary* exserted, narrowly club-shaped, ± 10 mm long; style branches 7–10 × 8–9 mm, ascending, stigma bilobed with sterile acute appendage between lobes, crests ± linear, erect, 15–20 mm long. *Capsules* narrowly ovoid to oblong, 18–25 mm long. *Seeds* angular, angles ± ridged to winged, ± 4–5 × 3 mm, dark brown. *Flowering time*: October to mid-November in the Calvinia District; opening 16:00–16:30 and wilting ± 19:30–20:00; September in the Tanqua Karoo population, opening 17:00–17:30.



Distribution of ***Moraea vespertina***.



Distribution of ***Moraea bubalina***.

Distribution and ecology: endemic to the western Karoo in Northern Cape, South Africa, extending from the western edge of the Bokkeveld Plateau to Calvinia and locally in the northeastern Tanqua Karoo to the south; in heavy red clay soil in low outcrops of dolerite, sites that are poorly drained and remain waterlogged for most of the growing season, sometimes even until flowering time in October and November.

Diagnosis: distinguished by the tall stature and relatively large white or pale blue flowers, the outer tepals 40–45 mm long, and the well-developed style branches and style crests, *Moraea vespertina* is also distinctive in subg. *Visciramosae* in having 4 to 6 foliage leaves, a characteristic shared in the subgenus with *M. bubalina* and *M. striata*, the three species constituting sect. *Multifoliae*. The remaining species of subg. *Visciramosae* have two foliage leaves and comprise sect. *Visciramosae.*

The populations in the Calvinia area have white flowers, sometimes flushed blue on fading and bloom late October to November whereas plants from the Tanqua Basin have a slate-blue perianth, slightly larger flowers and bloom in September (possibly into October). The flowers last a few hours from late afternoon to early evening and are pollinated by settling moths.

3. **Moraea bubalina** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 733 (1976a); Goldblatt: 28 (1986a). Type: South Africa, [Western Cape], Vanrhynsdorp, Farm Zandkraal, *Barker 5667* (NBG, holo.).

Plants (250–)400–700 mm high. *Corm* 15–20 mm diam.; tunics dark brown, inner layers unbroken, outer becoming partly fibrous, sticky inside. *Stem* usually several-branched from upper nodes, sticky below nodes, with cauline sheathing leaves 25–60 mm long, green below, dry and brown above, tips dry, acute-attenuate; with up to 3 branches per node, branches parallel to stem below, flexed outward above sheathing leaf. *Foliage leaves* usually 3, lower 2 basal, channelled, arching, becoming trailing and broken distally. *Rhipidial spathes* green, apices acute, dry and brown, inner 25–40 mm long, outer $^{1}/_{2}$–$^{2}/_{3}$ as long. *Flowers* fugaceous, buff-coloured to light brown with yellow, crescent-shaped nectar guides at bases of outer and inner tepal limbs, claws darkly striped, tepal claws forming a wide cup ± 10 mm deep, limbs reflexed to ± 35°; outer tepals 22–33 × 7–9 mm, claws slightly shorter than limbs, inner tepals shorter, up to 20–28 mm long. *Filaments* 8–12 mm long, free but parallel and contiguous in lower $^{3}/_{4}$, diverging distally; anthers 4–7 mm long, brown; pollen light brown. *Ovary* ovoid, 5–7 mm long; style branches 6–7 mm long, diverging, stigma bilobed with sterile, erect appendage between lobes, crests erect, 3–6 mm long. *Capsules* and *seeds* not known. *Chromosome number* 2*n* = 20. *Flowering time*: September to October, flowers opening 15:30–16:00 and fading at dusk.

Distribution and ecology: mainly from the Western Karoo of South Africa and evidently rare, extending from Loeriesfontein in Northern Cape in the north to Lambert's Bay in the south and inland to the southern end of the Bokkeveld Plateau in Western Cape; mainly on shale, gravel flats and slopes.

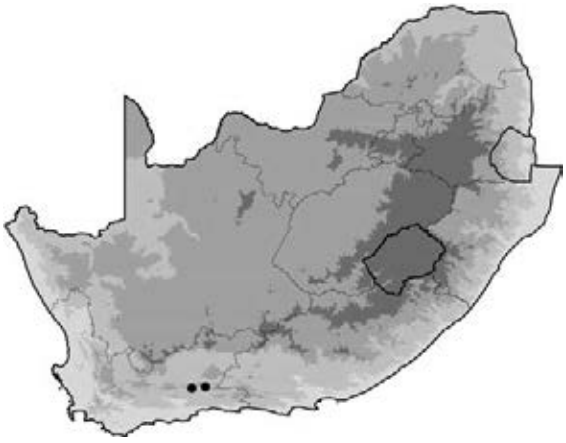
Diagnosis: *Moraea bubalina* is distinct in subg. *Visciramosae* in having more than two leaves and acute rhipidial spathes, features it shares with *M. striata* and *M. vespertina* but it differs from these species in the buff-coloured to brown perianth with spreading claws forming a wide cup, the subequal tepals all bearing nectar guides, and the relatively short style branches and crests.

4. **Moraea striata** *Goldblatt & J.C.Manning* in Bothalia 43: 153 (2013). Type: South Africa, Western Cape, Rust en Vrede, road from gate to waterfall, dry clay slope, 8 Oct. 2012, *Goldblatt & Porter 13858* (NBG, holo.; MO, iso.).

Plants 450–600 mm high. *Corm* including tunics 20–25 mm diam., with several large cormlets around base; tunics brown, sticky internally, accumulating as coarse matted fibres forming a collar around base. *Stem* 2- to

5-branched from upper nodes, sticky below nodes; branches short, arching outward above sheathing leaf, erect distally, with cauline sheathing leaves 30–40 mm long, acute to obtuse or truncate. *Foliage leaves* 3, all ± basal, linear, falcate, often trailing distally, channelled, V-shaped in cross section with pronounced keel, 4–5 mm wide when opened flat. *Rhipidial spathes* grey-green, becoming dry distally, acute-attenuate, inner 30–40 mm long, inner ± ½ as long. *Flowers* fugaceous, dull khaki-coloured, tepal limbs fully reflexed, with several longitudinal dark brown-grey lines for entire length, outer tepal limbs with pale yellow nectar guides at bases, fully reflexed, with clear dull yellow nectar guides at bases, claws darkly lined; outer tepals 25–30 × 10–11 mm, claws ± 7 mm long, with dark basal nectary; inner tepals 22–25 × ± 8 mm. *Filaments* ± 10 mm long, free but contiguous in lower 6 mm, diverging in distal 4 mm; anthers ± 4 mm long, buff-yellow, shortly exceeding stigmatic lobes; pollen orange-red. *Ovary* ± cylindric, 5–6 mm long; style branches ± 6 × 5 mm, crests erect, broadly wedge-shaped, 6–7 mm long, outer margins lightly serrated, with broad, entire petaloid stigmatic appendage ± 4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: October, probably also November; opening ± 14:00–14:30, collapsing at sunset.

Distribution and ecology: evidently a local endemic of the southern foothills of the Great Swartberg near Oudtshoorn in Western Cape, South Africa; on clay flats and slopes.



Distribution of ***Moraea striata***.

Diagnosis: *Moraea striata* stands out in subg. *Visciramosae* in having three foliage leaves and acute rhipidial spathes, features it shares with *M. bubalina* and *M. vespertina* but it differs from these species in the dull khaki-coloured flowers with several longitudinal dark brown-grey lines along their entire length. The tepal limbs have pale yellow nectar guides at the base and are fully reflexed. The ascending tepal claws form a narrow cup enclosing the lower half of the filaments and the anthers are displayed well above the claws. *Moraea inconspicua* has similarly coloured, but smaller flowers with suberect tepal claws and usually fully reflexed limbs.

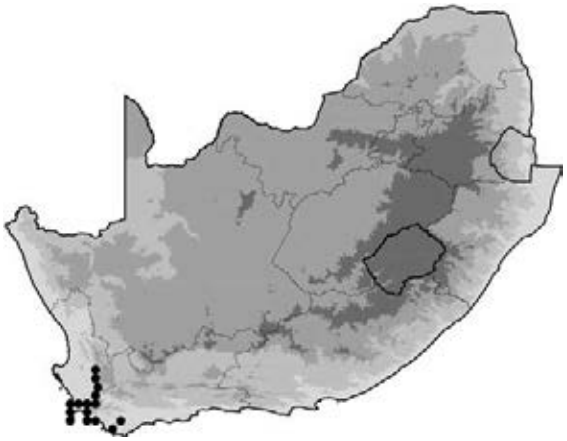
Sect. 2. **Visciramosae** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 36 (2013). Type: *Moraea bituminosa* (L.f.) Ker Gawl.

Foliage leaves 2. *Rhipidial spathes* ± subacute to obtuse or truncate and often dry-tipped and lacerate, inner hardly longer than outer. *Flowers* yellow, blue or brown, occasionally white; style branches and crests moderately well developed or reduced and without crests (in *M. simplex* filiform and extending between the stamens).

5. **Moraea bituminosa** *(L.f.) Ker Gawl.* in König & Sims, Annals of Botany 1: 240 (1804a); Goldblatt: 30 (1976b); Goldblatt: 30 (1986a). *Iris bituminosa* L.f.: 98 (1782). *Vieusseuxia bituminosa* (L.f.) Eckl.: 14 (1827). *M. viscaria* var. *bituminosa* (L.f.) Baker: 15 (1896). Type: South Africa, [Western Cape], 'prope Bergrivier, Vierentwintigrivieren et alibi', *Thunberg s.n.* [UPS–THUNB 1114, lecto., designated by Goldblatt: 732 (1976a)].

Plants 250–500 mm high, flexuously branched. *Corm* 15–20 mm diam.; tunics dark brown, ± woody or becoming fibrous, sticky-bituminous on inner surfaces. *Stems* with up to 3 branches at most aerial nodes, viscous below nodes, with cauline entirely sheathing leaves ± obtuse to truncate. *Foliage laves* 2, lower basal, upper inserted at lowest aerial node, linear, falcate to trailing, occasionally loosely coiled. *Rhipidial spathes* green, becoming dry and conspicuously veined with age, apices acute to obtuse, brown, occasionally lacerated, 25–40 mm long, subequal or outer only slightly shorter. *Flowers* fugaceous, usually pale to deep yellow with outer tepal limbs with darker yellow nectar guides at bases often speckled with black (rarely blue-mauve with white nectar guides), sweetly scented; outer tepals 23–31 × 8–12 mm, claws 5–8 mm long, limbs ± spreading to reflexed up to ± 35°; inner tepals 20–25 mm long, oriented as outer tepals. *Filaments* mostly 6–12 mm long, free but parallel and contiguous in a slender column, or united, diverging in upper 1–2 mm; anthers 4–7 mm long, yellow (rarely dark purple); pollen yellow (rarely red). *Ovary* ovoid, ± 6 mm long, usually at least partly exserted, style branches 4–9 mm long, crests 6–12(–15) mm long, lanceolate to linear, stigmatic appendage ± 1 mm long. *Capsules* ovoid, 10–13 mm long. *Seeds* angular-prismatic. *Chromosome number* 2*n* = 20. *Flowering time*: late September to mid-December; flowers open soon after midday and last until ± sunset but those of the blue-flowered morph open earlier in the day.

Distribution and ecology: fairly widespread in Western Cape, South Africa, from Porterville and Tulbagh south



Distribution of ***Moraea bituminosa***.

to the Cape Peninsula and east to Swellendam and the Bredasdorp Mtns; on stony sandstone derived soils in fynbos vegetation but also on stony clay or granitic gravel in renosterveld.

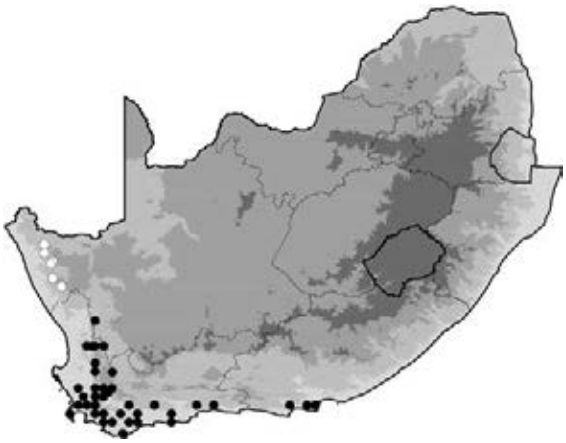
Diagnosis: *Moraea bituminosa* is distinguished from its allies in subg. *Visciramosae* by its relatively large, usually yellow flowers with spreading to half-reflexed tepals with only the outer bearing nectar guides, and by the large, often obtuse spathes, 25–40 mm long. Confusion between *M. bituminosa* and *M. bubalina* is possible as the latter has equally large tepals and spathes, but the spathes in *M. bubalina* are acute with the outer spathe half to two-thirds as long as the inner (subequal in *M. bituminosa*). In addition, *M. bubalina*, from dry areas in the Western Karoo and Clanwilliam District, has dull buff- to khaki-coloured flowers, the tepal claws forming a wide cup, and relatively short style crests only 2–3 mm long. Currently included in *M. bituminosa*, plants from the Tulbagh Valley and Jonkershoek have larger flowers than are typical of the species and a blue-mauve perianth with white nectar guides. The taxonomic status of these plants remains to be established.

6. **Moraea inconspicua** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 737 (1976a); Goldblatt: 36 (1986a). Type: South Africa, [Western Cape], Wilderness, *Van Niekerk 181* (BOL, holo.; PRE, iso.).

Plants 200–450 mm high. *Corm* 15–20 mm diam.; tunics brown, ± woody or becoming fibrous, sticky-bituminous on inner surfaces, often persisting with cataphylls to form a collar around base. *Stem* with up to 3 branches at most aerial nodes, viscous below nodes, with cauline sheathing leaves, ± obtuse or truncate. *Foliage leaves* 2, linear, either channelled and falcate to trailing or coiled with plane surface, 2–3 mm wide. *Rhipidial spathes* acute to ± obtuse, becoming dry above, often becoming lacerated, inner 15–30 mm long, outer slightly shorter. *Flowers* fugaceous, yellow, creamy pink, white or brown, outer tepal limbs with yellow nectar guides at bases; outer tepals 12–18(25) × 5–7 mm, usually reflexed ± 90° (sometimes less), claws 4–8 mm long, $^{1}/_{2}$–$^{2}/_{3}$ as long as limbs, scented of vanilla; inner tepals narrower, usually slightly shorter than outer, limbs similarly reflexed. *Filaments* 3.5–8.0 mm long, free but contiguous or united in lower part; anthers 2–4 mm long; pollen yellow or orange-red. *Ovary* ± 3 mm long, included or exserted, style branches 3–6 mm long, crests (1.5–)3.0–10.0 mm long. *Capsules* broadly ovoid-globose, (6–)7–10 mm long. *Chromosome number* 2*n* = 20. *Flowering time*: September to December (January).

Distribution and ecology: the most widespread species in subg. *Visciramosae*, extending from northern Namaqualand in Northern Cape through Western Cape to Port Elizabeth in Eastern Cape, South Africa, thus almost throughout the winter-rainfall area; on a variety of soils, usually in dry, exposed habitats, sometimes in granite outcrops.

Diagnosis: with the smallest flowers in subg. *Visciramosae, Moraea inconspicua* is distinguished by its flowers with fully reflexed tepals, the outer mostly 12–18 mm long (rarely up to 25 mm), the limb at least twice as long as the claw. In addition the rhipidial spathes are short, usually less than 28 mm long and sometimes only 18 mm. Flower colour is variable, mostly yellow or partly to completely brown, but white-flowered morphs occur in the Biedouw Valley near Clanwilliam and on the Agulhas Plain near Elim, the latter with the smallest flowers recorded in the species. In Namaqualand flowers are sometimes ivory-coloured or pink, but also yellow or brown as elsewhere. The foliage leaves are usually straight and erect below but often trailing distally, and have channelled blades, but plants from Namaqualand have distinctive spirally coiled leaves with a plane surface and on this basis have been segregated as subsp. *namaquensis*. Populations from the northern Cederberg and Biedouw Valley have unusually large flowers for the species, the outer tepals up to 25 mm long, thus matching those of closely allied *M. bituminosa*. The narrow leaves, short style crests and almost fully reflexed tepal limbs conform to *M. inconspicua*.



Distribution of ***Moraea inconspicua*** subsp. ***inconspicua***, ●; subsp. ***namaquensis***, ○.

Superficially similar *Moraea viscaria*, is a white-flowered species with spreading tepals 15–23 mm long, a strong floral odour, and relatively well-developed style crests up to 6 mm long, half as long to ± as long as the style branches. *Moraea saldanhensis* may also be confused with *M. inconspicua* but has slate-blue flowers with the tepal claws as long as to slightly longer than the limbs, the latter usually reflexed to ± 45°.

Key to subspecies

1a Leaves channelled, falcate to trailing; outer tepals 12–18(–25) mm long; filaments 3.5–6.0 mm long; plants from Bokkeveld Mtns to Port Elizabeth . . . . . 6a. subsp. *inconspicua*

1b Leaves plane, coiled; outer tepals 15–18 mm long; filaments 6–8 mm long; plants from Namaqualand. . . . . 6b. subsp. *namaquensis*

6a. subsp. **inconspicua**

Foliage leaves linear, channelled, falcate to trailing. *Rhipidia* with inner spathes 15–26 mm long. *Flowers* mostly yellow to brown, occasionally white; outer tepals 12–18(25) mm long, claws 4–6 mm long. *Filaments* 3.5–6.0 mm long; anthers 1.5–3.3 mm long; pollen usually yellow (red when perianth white). *Style crests* 1.5–10.0 mm long. *Flowering time*: mostly October to December (January).

Distribution and ecology: widespread in the winter-rainfall zone, from the Bokkeveld Mtns to Port Elizabeth; mostly on sandy or stony ground.

6b. subsp. **namaquensis** *Goldblatt & J.C.Manning* in Bothalia 42: 212 (2012a). Type: Northern Cape, Springbok, SE of Driekoppie farmhouse, 3 Oct. 1981, *Van Berkel 439* (NBG, holo.; MO, iso.)

Foliage leaves coiled, surface plane. *Rhipidia* with inner spathes mostly 19–28 mm long. *Flowers* ivory-coloured, creamy yellow, creamy pink, pale yellow or brown; tepals usually reflexed to lie vertically, outer 15–18 mm long, claws 5–7 mm long. *Filaments* 6–8 mm long; anthers 3–4 mm long; pollen usually red. *Style crests* 3–4 mm long. *Flowering time*: mid-September to late November.

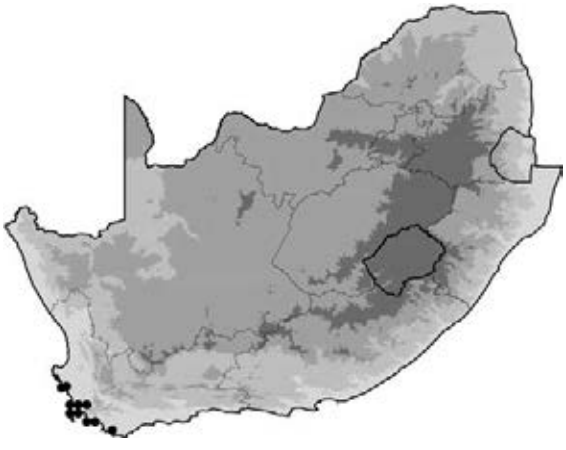
Distribution and ecology: restricted to the higher-lying edge of the western escarpment in Namaqualand, between Steinkopf and the Kamiesberg; growing in gritty, granite-derived ground.

Diagnosis: subsp. *namaquensis* is distinguished from typical subsp. *inconspicua* by the coiled leaves with flat blades up to 3 mm wide. Other vegetative and floral features differ only quantitatively, with considerable overlap but on average subsp. *namaquensis* has slightly larger rhipidial spathes and floral features than subsp. *inconspicua*. In subsp. *namaquensis* the outer rhipidial spathes are 19–28 mm long, outer tepals 15–18 mm long, and anthers 3–4 mm long compared with rhipidial spathes 15–26 mm long, outer tepals 12–15 mm long and anthers 1.5–3.3 mm long in subsp. *inconspicua*.

7. **Moraea viscaria** *(L.f.) Ker Gawl.* in König & Sims, Annals of Botany 1: 240 (1804a), name misapplied to *M. inconspicua*. *Iris viscaria* L.f.: 98 (1782); Goldblatt: 735 (1976a); Goldblatt: 34 (1986a). *Vieusseuxia viscaria* (L.f.) Eckl.: 12 (1827). Type: South Africa, Cape, 'Lospers farm,' near Saldanha, *Thunberg s.n.* (UPS–THUNB 1200, holo.).

Moraea odorata G.J.Lewis: 53 (1941). Type: South Africa, [Western Cape], Cape Town, Rondebosch Common, *Barnard s.n.* (BOL[*20341*], holo.; PRE, SAM, iso.).

Plants 200–450 mm high. *Corm* 15–20 mm diam., bearing numerous small cormlets at base; tunics brown, ± woody or becoming fibrous, sticky-bituminous on inner surfaces. *Stem* usually with 2 or 3 branches at most aerial nodes, viscous below nodes, bearing cauline sheathing leaves obtuse to truncate. *Foliage leaves* 2, linear, channelled, falcate to trailing, 2–4 mm wide. *Rhipidial spathes* green, becoming dry above, acute to obtuse, 18–24 mm long, prominently veined when dry, outer usually slightly shorter. *Flowers* fugaceous, white, sometimes flushed brown to purple outside, outer tepal limbs with small pale yellow nectar guides at bases, sweetly scented; outer tepals 15–23 × ± 8 mm, ± spreading (or limbs slightly reflexed), claws ascending, 5–8 mm long; inner tepals 14–20 mm long, oriented as outer tepals. *Filaments* 5–6 mm long, parallel and contiguous in a slender column, diverging near apices; anthers 4–5 mm long, acuminate; light brown; pollen light brown to red. *Ovary* ± 5 mm long, ± ovoid, exserted, style branches ± 5 mm long, crests mostly as long to slightly longer, occasionally reduced to ± 1 mm. *Capsules* broadly ovoid, 7–10 mm long. *Seeds* angled. *Chromosome number* 2*n* = 20. *Flowering time*: late September to October in the Saldanha area, elsewhere November to December; flowers open ± 16:00 and fade soon after nightfall.



Distribution of ***Moraea viscaria***.

Distribution and ecology: coastal Western Cape, South Africa, extending from the vicinity of Saldanha Bay in the north to Cape Agulhas in the southeast; on sandy flats at low elevations.

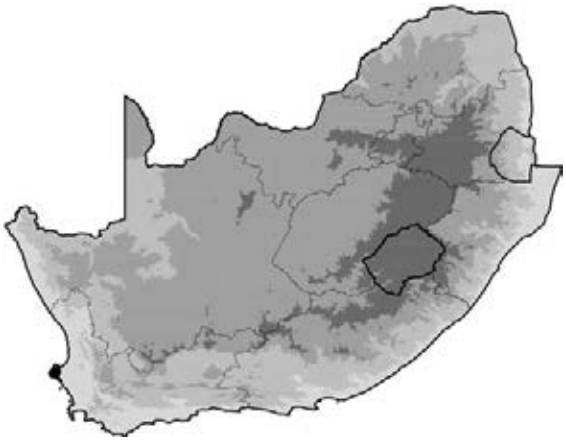
Diagnosis: a relatively short species, 200–400 mm tall, characterised by its white flowers with laxly spreading tepals marked with nectar guides only on the outer tepal limbs, a strong, rich floral scent, and well-developed style crests. Confusion is perhaps possible with *Moraea inconspicua* but that species has a smaller flower, occasionally with white tepals but more often yellow to brown or creamy pink, with the tepal limbs always sharply reflexed, at least to 45° and more often to ± 90°.

8. **Moraea saldanhensis** *Goldblatt & J.C.Manning* in Bothalia 42: 210 (2012a). Type: Western Cape, Vredenburg, rocky coastal sandveld near Jacobsbaai at Mauritzbaai, 20 Oct. 2011, *Manning 3310* (NBG, holo.; MO, iso.).

Plants 150–350 mm high. *Corm* obconic-subglobose, 25–40 mm diam., bearing numerous small cormlets at base; tunics brown, outer layers becoming fibrous, with strong vertical ribs joined by fine fibres. *Stem* sticky below nodes, usually branching at all nodes, with 2, rarely 3, branches per node, with cauline sheathing leaves up to 28 mm long, dry and brown in distal 5–6 mm, ± truncate or subacute. *Foliage leaves* 2, lowermost up to 40 × 4–6 mm (opened flat), inserted below ground, linear, channelled, longest, initially suberect, trailing above, upper leaf somewhat shorter. *Rhipidial spathes* subacute to ± truncate, purple near tips, aging dry and brown, inner 22–25 mm long, outer $^{1}/_{2}$–$^{2}/_{3}$ as long. *Flowers* fugaceous, slate blue-grey to purple, outer tepals coppery pink outside and limbs with off white nectar guides minutely speckled with blue dots at bases, claws whitish, minutely speckled grey-blue; outer tepals ± 18 × 5.5–7.0 mm, initially spreading, later half reflexed often recurving distally, claws ± 10 mm long, thus slightly exceeding limbs, suberect; inner tepals up to 14 × 3 mm, oblanceolate, limbs spreading horizontally or later half reflexed. *Filaments* ± 8 mm long, free but closely cohering in smooth, cylindric column ± 6.5 mm long, diverging near apex; anthers 3–4 mm long, dark purple; pollen orange-red. *Ovary* ± 8 mm long, usually included; style branches ± 6 × 2 mm, sharply diverging and extended horizontally, white, flushed purple distally; stigma lobe transverse, with prominent stigmatic appendage ± 2 mm long, acute or apex forked, crests arching upward, 4–5 mm long, purple. *Capsules* and *seeds* unknown. *Flowering time*: late September to November; flowers opening ± 9:45 and collapse ± 17:00.

Distribution and ecology: a local endemic of the Atlantic Coast of Western Cape, South Africa, between Jacobsbaai and Vredenburg; in sandy ground among granite rocks.

Diagnosis: *Moraea saldanhensis* has relatively small, slate-blue flowers, the outer tepals ± 18 mm long with

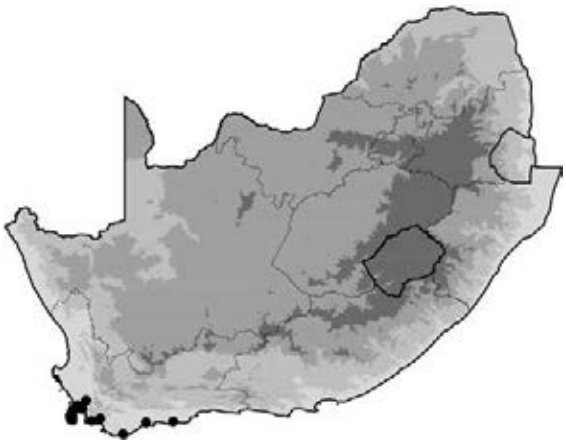


Distribution of ***Moraea saldanhensis***.

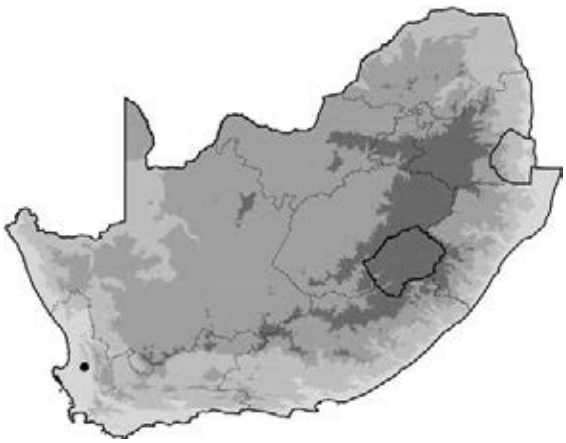
spreading and ultimately half reflexed limbs ± 8 mm long thus shorter than the claws ± 10 mm long. It is most easily confused with *M. inconspicua* which has similarly small flowers (outer tepals 12–18 mm long), usually yellow to brown, occasionally white to cream-coloured, but the tepal limbs are almost always fully reflexed and somewhat to twice as long as the upright claws. *Moraea saldanhensis* also has a slightly longer filament column, ± 6.5 mm long (vs 3.5–6.0 mm in southern populations of *M. inconspicua*), orange-red pollen and the ovary is included whereas in *M. inconspicua* the ovary is usually exserted and the pollen is typically yellow, although populations with red pollen are known, notably among the Namaqualand populations, segregated as subsp. *namaquensis*.

9. **Moraea elsiae** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 18 (1976b), as a new name for *Homeria simulans* Baker: 529 (1896) [not *M. simulans* Baker (1892)]; Goldblatt: 32 (1986a). Type: South Africa, [Western Cape], sandy places near Kenilworth, *H. Bolus 7931* (BOL, lecto., designated by Goldblatt: 739 (1976a); K, MO, isolecto.).

Plants 20–40 mm high. *Corm* mostly 20–35 mm diam.; tunics brown, ± woody or becoming fibrous, sticky-bituminous on inner surfaces, persisting with cataphylls as a collar around base. *Stem* with up to 3 branches at most aerial nodes, viscous below nodes, with cauline sheathing leaves, ± obtuse to truncate. *Foliage leaves* 2, linear, channelled, falcate to trailing, 3–5 mm wide. *Rhipidial spathes* green, dry above, usually ± obtuse, often becoming lacerated, inner 19–30 mm long, outer slightly shorter. *Flowers* fugaceous, yellow, rarely white, flushed brown outside, with darker yellow nectar guide specked with black at bases of all tepal limbs, limbs reflexed to ± 45°; outer tepals 15–22 × 5–9 mm, claws ± 5.5 mm long, inner slightly smaller, 14–19 × 4 mm. *Filaments* 4–7 mm long, free but parallel and contiguous below, diverging near apices; anthers 2.5–4.0 mm long, yellow; pollen yellow. *Ovary* 5–6 mm long, ovoid; style branches 3–4 mm long, overtopped by anthers, bilobed,



Distribution of ***Moraea elsiae***.



Distribution of ***Moraea simplex***.

crests vestigial, shorter than stigma lobes. *Capsules* ovoid, up to 10 mm long. *Seeds* unknown, *Chromosome number* 2*n* = 20. *Flowering time*: November to December (January).

Distribution and ecology: endemic to Western Cape, South Africa, from the Cape Peninsula and vicinity east to the Potberg and Still Bay; usually on sandy or loamy flats, typically in sites waterlogged during the winter months.

Diagnosis: although vegetatively typical of subg. *Visciramosae, Moraea elsiae* is immediately recognised by the flowers with subequal tepals, all with nectar guides at the bases of the limbs, and the reduced style branches with vestigial crests overtopped by the anthers. Flowers of *M. elsiae* are usually yellow but white-flowered plants have been recoded at Kleinmond and near Elim, the latter with flowers slightly smaller than elsewhere.

10. **Moraea simplex** *Goldblatt & J.C.Manning* in Novon 14: 294 (2004). Type: Western Cape, 21 km N of Piketberg, 18 Sept. 2002, *Goldblatt & Porter 12231* (NBG, holo.; MO, PRE, iso.).

Plants 280–400 mm high. *Corm* ovoid, ± 10 mm diam.; tunics of coarse, light brown fibres, with collar of ± fine fibres around base. *Stem* lightly flexuose, sticky below nodes for half internode length, cauline sheathing leaves 24–35 mm long, green, becoming dry and light brown above, ± acute; bearing 2 or 3 short branches at upper 3 or 4 nodes, lowermost sometimes also branched. *Foliage leaves* usually 2, lowermost inserted below ground, upper inserted at first aerial node, blades channelled, ± 2 mm wide, exceeding stem, arching outward or trailing distally. *Rhipidial spathes* green, with dry, brown tips, 18–22 mm long, inner slightly shorter than outer. *Flowers* fugaceous, pale creamy yellow, outer tepal limbs with pale yellow mark at bases, unscented, tepal claws ascending, forming a cup enclosing filament bases; tepals with limbs initially spreading later reflexed to ± 30°, outer 18–20 × 7.5–8.5 mm, claws ± 2 mm long, ± erect, limbs ovate, obtuse; inner slightly shorter, ± 18 × 7 mm. *Filaments* ± 5 mm long, free but parallel and connivent below forming slender column, diverging in upper 1 mm; anthers ± 3 mm long, erect, contiguous, white; pollen white. *Ovary* narrowly ovoid, ± 3 mm long, exserted; style dividing shortly below base of anthers into 3 filiform arms, each stigmatic apically and extended between filaments, ± 4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: in mid- to late September, probably into mid-October; opening ± 14:00 and wilting shortly after nightfall.

Distribution and ecology: known only from a single site at the eastern foot of the Piketberg Mtns in Western Cape, South Africa; in stony loamy clay, flowering after a fire the previous summer.

Diagnosis: the growth habit, corm tunics, characteristic branching with sticky internodes, and the free but parallel and coherent filaments all place *Moraea simplex* firmly in subg. *Visciramosae* but its simple filiform, apically stigmatic style branches extending outward between the top of the filaments, and short, suberect tepals claws ± 2 mm long are unique in the subgenus and remarkable in *Moraea*, in which just two species of subg. *Polyanthes* have similar style branches. Vegetatively, *M. simplex* may be mistaken for the common and widespread *M. inconspicua* in both habit and the short rhipidial spathes, but the flowers of *M. inconspicua*, although small, conform to the conventional type in the genus in their flattened style branches bearing paired erect, style crests.

Subg. 3. **Umbellatae**

Subg. **Umbellatae** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 36 (2013). Type: *Moraea margaretae* Goldblatt

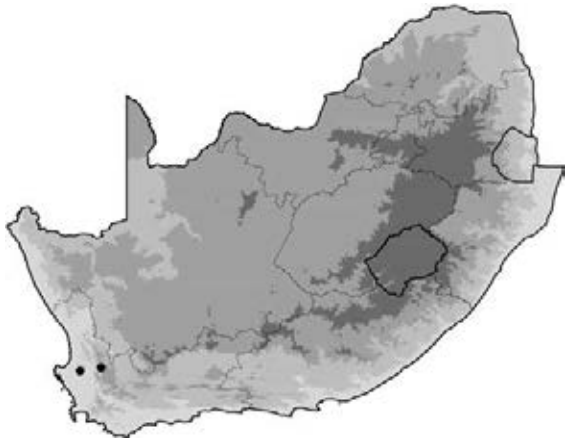
Plants with branched stems, sometimes acaulescent, branches and leaves sometimes clustered at first aerial node or remote from one another; corm tunics dark brown, initially unbroken, later splitting irregularly, sometimes ultimately fibrous. *Leaves* several or solitary. *Rhipidial spathes* blunt or truncate, with outer spathe often diverging apically. *Flowers* fugaceous, pale yellow to ± beige (rarely pale pink) with dark venation, sometimes with perianth tube; stamens united in lower half; style branches well developed or reduced and lacking crests (in *M. nana* with paired filiform arms extended horizontally). *Capsules* ± club-shaped. *Basic chromosome number x* = 10.

11. **Moraea linderi** *Goldblatt* Annals of the Missouri Botanical Garden 69: 352 (1982); Goldblatt: 58 (1986a). Type: South Africa, [Western Cape], Piketberg Mtn, Moutonshoek, *Linder 638* (MO, holo.).

Plants 350–450 mm high. *Corm* 15–18 mm diam., bearing numerous pale cormlets at base; tunics brown, initially unbroken, breaking from below into sections, ultimately becoming fibrous. *Stem* branching well above ground, flexed above insertion of second leaf, 2- to 4-branched. *Leaves* 3, lowermost basal, suberect to ± falcate, terete but with narrow adaxial groove, exceeding stem, other leaves inserted well above ground, shorter than basal, channelled, up to 4 mm wide. *Rhipidial spathes* green with brown tips, truncate to acute, inner 35–40 mm long, slightly shorter or longer than outer, diverging in upper half. *Flowers* fugaceous, pale yellow, outer tepal limbs with darker yellow nectar guides at bases; outer tepals ± 35 mm long, claw ± 15 mm long, ascending, limb spreading to slightly reflexed; inner tepals ± 25 × 4 mm, spreading when fully expanded. *Filaments* 6–8 mm long, united in lower ± 1 mm (or evidently free), diverging above; anthers ± 6 mm long; pollen yellow. *Ovary* ± 7 mm long, club-shaped; style branches 10–12 × ± 3 mm, crests prominent ± 10 mm long. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 30, i.e. triploid [diploids probably also present in the population]. *Flowering time*: December.

Distribution and ecology: known only from two sites in Western Cape, South Africa, one in the Piketberg Mtns and the other in the Cold Bokkeveld; in seasonally moist sites near streams or seeps in sandy soils, flowering well only after fire. The type locality on the Piketberg is now inundated by a dam.

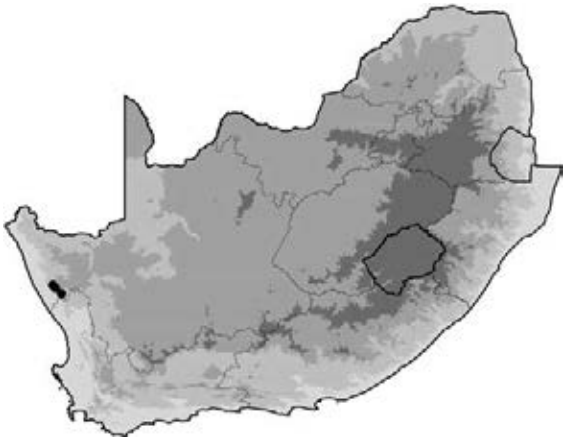
Diagnosis: an unusual species, *Moraea linderi* has the brown, woody, initially entire corm tunics and outer rhipidial spathes free distally, that characterise subg. *Umbellatae* but stands out in having a well-developed basal leaf (leaves in the subgenus are often inserted well above ground) and filaments united for ± 1 mm (± one sixth of their length). The flowers have well-developed style branches and prominent crests ± 10 mm long.



Distribution of ***Moraea linderi***.

12. **Moraea orthrosantha** *Goldblatt & J.C.Manning* in Bothalia 44: 18 (2014a). Type: South Africa, Northern Cape, 15.5 km N of Garies, sandy slopes at 2 110 ft [± 645 m], 10 Oct. 2013, *Goldblatt & Porter 13990* (NBG, holo.; K, MO, PRE, iso.).

Plants up to 350 mm high. *Corm* 8–11 mm diam.; tunics brown, ± woody, inner layers entire, outer splitting from base. *Stem* mostly 3 or 4(5) internodes long, with 1 or 2 branches at each node, branches slightly flexed above sheath of subtending leaf. *Leaves* 3 to 5, lowermost longest, inserted 10–20 mm above ground, linear, channelled, ± straight or loosely twisted, up to 450 mm long, upper leaves progressively shorter, none entirely sheathing. *Rhipidial spathes*: inner 35–40 mm long, ± truncate, apex brown, somewhat lacerated, outer $^{1}/_{2}$–$^{2}/_{3}$ as long, with acute, brown apex. *Flowers* buff-yellow, lightly brown-veined, outer tepals darkly veined abaxially, limbs with deep yellow nectar guides at bases edged brown, spreading slightly below horizontal, inner tepals with reddish brown spot at bases of limbs, similarly spreading, outer tepals 30–32 mm long, limbs 20–22 × 10–12 mm, claws ± 10 mm long, inner tepals oblanceolate, ± 22 × 5–6 mm. *Filaments* 8–9 mm long, united in lower 5–6 mm, diverging distally; anthers dark purple, 3.5–5.0 mm long; pollen red. *Ovary* exserted, oblong-elliptic, 5–6 mm long; style branches ± 10 mm long, crests 10–14 mm long, erect, narrowly wedge-shaped. *Capsules* narrowly obovoid, 9–11 mm long. *Seeds* softly angular, ± 1 mm long, with rugulo-reticulate surface, light yellow-brown. *Flowering time*: late September to late October; flowers opening ± 7:00 and collapsing ± 12:00.



Distribution of ***Moraea orthrosantha***.

Distribution and ecology: known only from a small area north of Garies in Northern Cape, South Africa, in the higher country south of Garagams; apparently restricted locally to wetter sites in granite-derived sand or stony ground. Plants in trampled or drier situations are much smaller than normal.

Diagnosis: one of few species of subg. *Umbellatae* with leaves basal and cauline rather than crowded at the first aerial node, *Moraea orthrosantha* has a flower typical of the genus, with well-developed style branches and crests and nectar guides only on the outer tepals. The flowers are dull yellow with conspicuous dark veins and closely resemble those of *M. margaretae*. As the specific epithet suggests, flowers open soon after sunrise and collapse about noon (Greek, *orthros* = morning, *anthos* = flower). The flowers of most species of subg. *Umbellatae* open in the mid- to late morning and wilt and collapse in the late afternoon, and only a few other examples of morning flowering phenology are known in *Moraea*, notably in *M. vlokii* and three Namaqualand species of subg. *Homeria*, *M. flexicaulis, M. knersvlaktensis* and *M. schlechteri*. Records for *M. margaretae*, with which *M. orthrosantha* is most easily confused, indicate flowers open midmorning and collapse toward sunset.

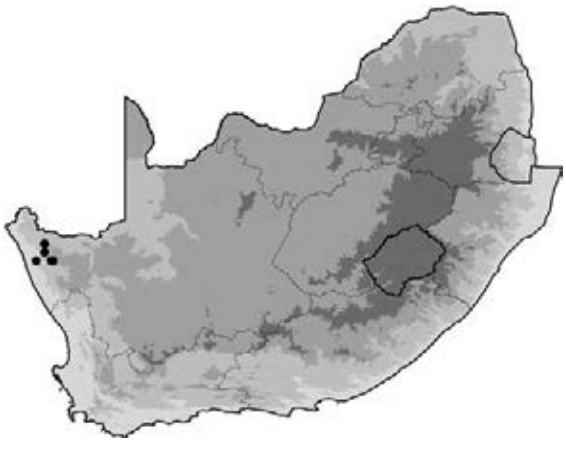
13. **Moraea margaretae** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 19 (1976b); Goldblatt: 60 (1986a). Type: South Africa, [Northern Cape], Namaqualand, pipeline track SW of Nababeep, *Goldblatt 628* (BOL, holo.; K, MO, PRE, S, iso.).

Plants up to 150 mm high. *Corm* 5–7 mm diam.; tunics brown, inner layers ± woody and entire, outer becoming coarsely fibrous. *Stem* with 1 long above-ground internode, usually 1- or 2-branched from close to ground level. *Leaves* usually 3, linear, all inserted at ground level, channelled below, terete and often twisted to coiled distally. *Rhipidial spathes* green, leathery, with dark brown tips, acute or lacerated tips; inner 30–45 mm long, often lacerated at apex, outer ± $^{2}/_{3}$ as long, acute, entirely sheathing. *Flowers* fugaceous, pale buff-yellow, finely veined with brown, flushed brown outside, outer tepal limbs with deep yellow nectar guides at bases edged with brown, rarely inner tepals with a small brown spot at limb bases; tepals lanceolate, with laxly spreading to half reflexed limbs, outer 20–30 mm long, claws 5–8 mm long, suberect; inner tepals ± 20 mm long, initially erect, limbs later half-reflexed. *Filaments* ± 5 mm long, united in lower 3–4 mm; anthers 4–5 mm, dull purple; pollen red. *Ovary* ± cylindric, 5–6 mm long, usually ultimately exserted; style branches 7 mm long, stigma lobe transverse, crests erect, lanceolate, 6–10 mm long. *Capsules* and *seeds* unknown. *Chromosome number* $2n = 40$. *Flowering time*: September; flowers open midmorning and collapse near sunset.

Distribution and ecology: restricted to northern Namaqualand in Northern Cape, South Africa, from Steinkopf in the north to the escarpment west of Springbok near Spektakel Pass in the south; in coarse, granite-derived gravel, sometimes near streams or seeps.

Diagnosis: *Moraea margaretae* has the brown, ± woody corm tunics, leathery rhipidial spathes with brown tips and flowers with finely brown-veined yellow tepals characteristic of subg. *Umbellatae*, and is distinguished in the subgenus by its habit and flowers with well-developed style branches and prominent style crests. The leaves and branches (when present) are crowded close to ground level and the aerial stem and branches comprise a single internode. The species is tetraploid, $2n = 40$ (two populations counted), one of the few exclusively polyploid species known in *Moraea*.

Moraea margaretae seems to be most closely related to *M. orthrosantha* of central Namaqualand but this species has aerial stems of three or four internodes, with two or three branches at the aerial nodes. The flowers of the two are similar in size and colour but those of *M. margaretae* have shorter filaments ± 5 mm long vs. filaments 8–9 mm long in *M. orthrosantha*. Both species have red anthers and pollen. Hybrids between *M. margaretae* and *M. intermedia* occur at a site west of Springbok.

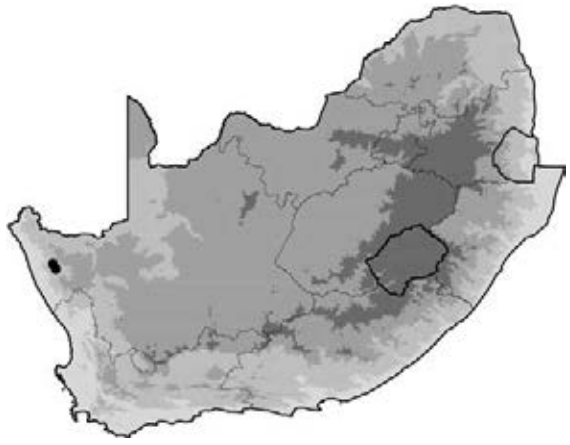


Distribution of ***Moraea margaretae***.

14. **Moraea intermedia** *Goldblatt & J.C.Manning* in Bothalia 40: 147 (2010). Type: Northern Cape, Farm Ghoop (Modderfontein), west of Springbok, granitic gravel slope, 18 Sept. 2009, *Goldblatt, Manning & Porter 13405* (NBG, holo.; K, MO, PRE, iso.).

Plants 150–450 mm high. *Corm* ovoid, 12–15 mm diam., asymmetric with a fibrous downward extension on one side; tunics brown, inner layers unbroken, outer fragmented into vertical sections held together by cross fibres, sometimes ± fibrous with age. *Stem* ± erect, firm, with long basal internode, branched, branches crowded above first aerial node 80–150 mm above ground, main stem sometimes also branched. *Leaves* 2 to 4, inserted above ground, clustered above first aerial node, linear, channelled, lowermost longest, arching to trailing, up to 400 mm long, upper leaves progressively smaller. *Rhipidial spathes* green, acute to ± truncate, turning brown with age, inner 38–45 mm long, outer ± $^{2}/_{3}$ as long, sheathing entirely. *Flowers* fugaceous, pale dull yellow with darker veins, outer tepal limbs with bright yellow, green spotted nectar guides at bases edged brown distally; tepals with limbs spreading, undulate, and claws forming a narrow cup ± 4 mm deep clasping base of filament column, outer tepals 27–30 × 9–12 mm, claws narrow, ± 4 mm long, erect, inner tepals 23–26 × 8–9 mm. *Filaments* 8–10 mm long, united in smooth, cylindric column; anthers 6–8 mm long, overtopping stigma lobe, dark purple; pollen orange-red. *Ovary* ± 8 mm long, included or exserted; style branches ± 6 × 2 mm, narrowly diverging, with terminal, transverse, semi-circular stigma lobes ± 3 mm wide, crests erect, 10–12 mm long. *Capsules* ± cylindric, ± 9 mm long. *Seeds* unknown. *Flowering time*: mid-September to mid-October; flowers open soon after sunrise at ± 7:00 and fade in late afternoon, ± 15:30–16:00.

Distribution and ecology: restricted to the granite hill country of north-central Namaqualand west and southwest of Springbok in Northern Cape, South Africa, and currently known from only two sites; in open, granitic sandy ground.



Distribution of ***Moraea intermedia***.

Diagnosis: the asymmetric corm with brown, ± woody corm tunics, relatively blunt, brown-tipped rhipidial spathes, and yellow, darkly veined tepals place *Moraea intermedia* in subg. *Umbellatae*. The long basal internode with leaves clustered at the first aerial node recalls *M. nana* of the subgenus, but the flowers have typical *Moraea*-like style branches with terminal, transverse stigma lobes and prominent, paired petaloid style crests. Unlike the typical *Moraea* flower, however, all six tepals of *M. intermedia* have short claws clasping the base of the filament column, the claws all bearing basal nectaries, and the limbs each have a nectar guide at the base. Other *Moraea*-type flowers have inner tepals lacking both nectaries and nectar guides. The similarly marked inner and outer tepals recall the *Homeria*-type flower as found in subg. *Umbellatae* in *M. maximiliani* and *M. umbellata*, whereas *M. cooperi, M. linderi*, *M. longiflora* and *M. margaretae* have more-or-less typical *Moraea*-type flowers. The remaining member of the alliance, *M. nana*, has spreading, subequal tepals with short claws clasping the base of the filament column but the style branches are reduced to paired filiform arms extending between the anthers.

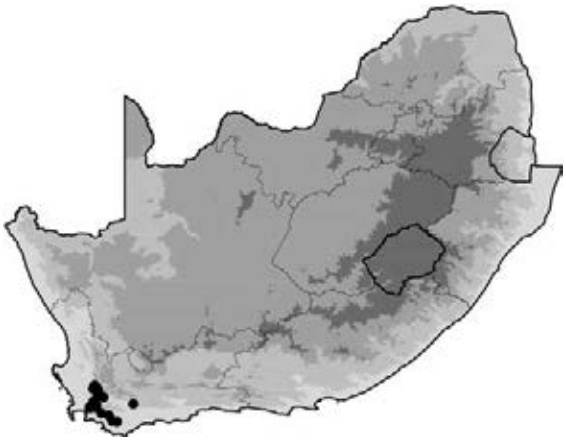
At the type locality, *Moraea intermedia* is parapatric with the closely related *M. margaretae*, which favours somewhat wetter sites, and a range of hybrids between the two species occurs there.

15. **Moraea cooperi** *Baker,* Handbook of the Irideae: 54 (1892); Goldblatt: 729 (1976a); Goldblatt: 102 (1986a). Type: South Africa, Cape, Worcester, *Cooper 1661* [K, lecto., designated by Goldblatt: 729 (1976a)].

Moraea stenocarpa Schltr.: 93 (1900). *Gynandriris stenocarpa* (Schltr.) R.C.Foster: 47 (1939). Type: South Africa, [Western Cape], between Bain's Kloof and Ceres Road, *Schlechter 9082* (B, lecto., designated by Goldblatt: 729 (1976a); BOL, GRA, MO, PRE, S, SAM, isolecto.).

Moraea apetala L.Bolus: 385 (1929a). *Gynandriris apetala* (L.Bolus) R.C.Foster: 48 (1939). Type: South Africa, [Western Cape], Stellenbosch Flats, *Duthie 1770* (BOL, holo.; K, iso.).

Plants 150–250 mm high. *Corm* 10–15 mm diam.; tunics of dark brown, coarse fibres. *Stem* flexuose, usually 2- or 3-branched from upper nodes, with cataphylls forming a brown, fibrous collar around base. *Foliage leaves* 2 or 3, lowermost basal and longest, exceeding stem, remaining leaves cauline and progressively smaller, blades linear, channelled, ± 3 mm wide when opened flat; leaves subtending ± bract-like and dry distally not sheathing above. *Rhipidial spathes* green, at anthesis becoming dry and brown distally, attenuate; inner spathe 30–50 mm long, outer ± half as long, entirely sheathing. *Flowers* fugaceous, solitary in spathes, pale



Distribution of ***Moraea cooperi***.

yellow finely veined with dull brown-purple, outer tepal limbs with yellow nectar guides at bases; tepals united in tube ± 10 mm long, limbs laxly spreading, lanceolate, 33–40 × 20 mm, claw ± 10–14 mm long (inner tepals absent). *Filaments* ± 6 mm long, united in lower 1–2 mm; anthers 7–9 mm long, light purple; pollen yellow. *Ovary* 10–12 mm long, included in middle of spathes; style branches 12–15 mm long, crests up to 10 mm long. *Capsules* narrowly ellipsoid, 25–30 mm long. *Seeds* compressed, elongate, winged at opposite ends, ± 4 mm long. *Chromosome number* 2*n* = 20. *Flowering time*: late September and October, occasionally in November at higher elevations; flowers lasting a single day.

Distribution and ecology: local in Western Cape, South Africa, between Tulbagh and Caledon but absent from the Cape Peninsula; usually on well-watered, stony flats and flowering well only after fire. Largely a lowland species, *M. cooperi* has lost much of its range to agriculture and urban development.

Diagnosis: immediately recognised in *Moraea* by the yellow, finely veined flowers and perianth of only three tepals, united basally in a short perianth tube. In addition, the narrowly fusiform ovary is included within the spathes and the compressed seeds are winged at both ends. The relationships of *M. cooperi* remain puzzling and it is provisionally included in subg. *Umbellatae*, with which its brown corm tunics, pale yellow, finely veined tepals and chromosome number, *n* = 10 are consistent. A perianth tube is also found in *M. longiflora* of the subgenus and the two species were placed together in sect. *Tubiflorae* of subg. *Moraea* in earlier studies. Molecular phylogenetic studies do not place *M. cooperi* among other species of subg. *Umbellatae* but show it to be isolated, at least with the plastid DNA loci so far sequenced.

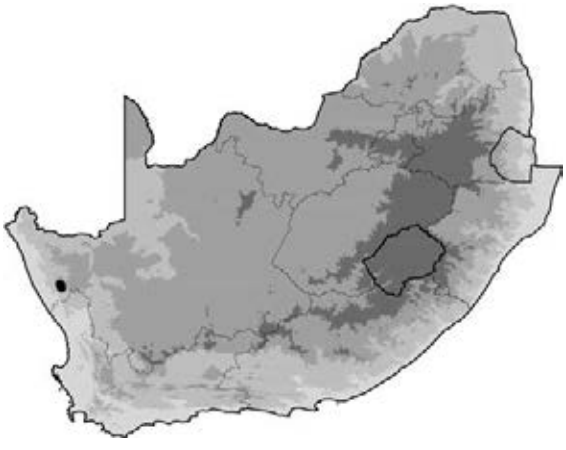
The presence of a floral tube prompted Foster (1939) to transfer both *Moraea cooperi* and *M. longiflora* to *Gynandriris* (now sect. *Gynandriris* of *Moraea*) but the members of sect. *Gynandriris* do not actually have a perianth tube but rather a tubular extension of the ovary and are not closely related to *M. cooperi*.

16. **Moraea longiflora** *Ker Gawl.* in Curtis's Botanical Magazine 19: t. 712 (1804b); Goldblatt: 731 (1976a); Goldblatt: 124 (1986a). *Helixyra flava* Salisb.: 305 (1812), illegitimate superfluous name for *M. longiflora* Ker Gawl. *Helixyra longiflora* (Ker Gawl.) N.E.Br.: 349. (1929b). *Gynandriris longiflora* (Ker Gawl.) R.C.Foster: 40 (1936). Type: South Africa, without precise locality, illustration in Ker Gawl.: t. 712 (1804b).

Plants small, ± 50 mm high. *Corm* spindle-shaped, ± 10 mm diam.; tunics dark brown, very hard, breaking into ± netted fibres. *Stem* subterranean, with 2 to 4 ± sessile branches clustered at ground level, with cataphylls pale, becoming fibrous and forming a collar around base. *Leaves* several, basal longest, 40–60 mm long, linear-filiform, narrowly channelled, rigid, remaining leaves similar but shorter, clustered at ground level. *Rhipidial spathes* green, 25–30 mm long, inner entirely sheathing, outer somewhat leaf-like, sheathing for ± 5 mm, free distally. *Flowers* fugaceous, yellow, outer tepal limbs with yellow-orange nectar guides at bases; tepals united in tube 20–30 mm long, outer 23–30 mm long, claw 7–10 mm long, ascending, limb spreading to laxly reflexed, inner tepals 17–22 mm long, also spreading or becoming reflexed. *Filaments* 5–6 mm long, united in lower $^1/_3$; anthers ± 5 mm long, yellow; pollen yellow. *Ovary* 4–5 mm long, subsessile, included; style branches 10–12 mm long, crests ± 10 mm long. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 20. *Flowering time*: October.

Distribution and ecology: a rare species restricted to the Kamiesberg in Namaqualand, Northern Cape, South Africa; local in moist sandy sites.

Diagnosis: *Moraea longiflora* is distinctive in its acaulescent habit and yellow, long-tubed flowers. The combination of a flower with long perianth tube and underground stem is unique in subg. *Umbellatae* but the brown corm tunics, yellow flowers with brown-veined tepals, and outer rhipidial spathes free and diverging



Distribution of ***Moraea longiflora***.

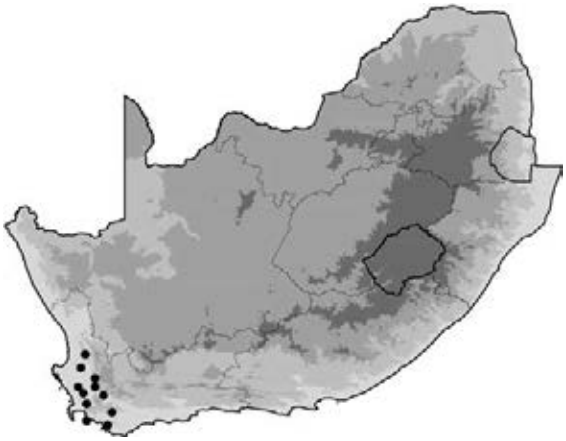
distally, are consistent with this placement. The species bears more than a passing resemblance to *M. cooperi*, also with a perianth tube but with a well-developed aerial stem. Molecular phylogenetic studies place *M. longiflora* closest to *M. margaretae* and *M. intermedia* of subg. *Umbellatae*, but *M. cooperi* is not included in that alliance rendering its relationships uncertain.

17. **Moraea umbellata** *Thunb.*, Dissertatio de *Moraea*: 13 (1787). *Aristea umbellata* (Thunb.) Spreng.: 158 (1824). *Bobartia umbellata* (Thunb.) Ker Gawl.: 31 (1827). *M. edulis* var. *umbellata* (Thunb.) Baker: 21 (1896). *Homeria umbellata* (Thunb.) G.J.Lewis: 86 (1948). *Rheome umbellata* (Thunb.) Goldblatt: 92 (1980a). Type: South Africa, Cape, near Piketberg, *Thunberg s.n.* '*Moraea umbellata* a' [UPS–THUNB 1230, lecto., effectively designated by N.E.Br.: 54 (1928)].

Homeria bobartioides L.Bolus: 12 (1931a). Type: South Africa, [Western Cape], Mulder's Vlei, Stellenbosch distr., *L. Bolus s.n.* (BOL [19085], lecto., K, isolecto).

Plants 150–450 mm high. *Corm* globose-ovoid, up to 20 mm diam., slightly asymmetric with a fibrous downward extension on one side, with many cormlets clustered around base; tunics brown, inner layers unbroken, outer layers becoming partly fibrous, sometimes entirely with age. *Stem* erect, with long, basal internode and branches clustered in umbellate fashion. *Leaves* 2 to 4, inserted well above ground, clustered at bases of branches, lowermost up to 400 mm long, others shorter, channelled, falcate to trailing. *Rhipidial spathes* green with brown tips, ± truncate or lacerate at apex, rarely acute, inner 30–40 mm long, outer ± half to nearly as long, sheathing entirely or free distally. *Flowers* fugaceous, pale yellow flushed brownish outside, bases of all tepal limbs with dull yellow nectar guides at bases, tepal claws forming a windowed cup below enclosing filaments, limbs spreading horizontally, somewhat undulate; outer tepals 19–30 × 9–12 mm, claws narrow, 5–7 mm long; inner 17–28 × 8–10 mm long. *Filaments* 6–7 mm long, united entirely or free and diverging in upper 1.0–1.5 mm, column smooth; anthers 3.0–3.5 mm long, narrowly diverging; pollen yellow. *Ovary* ovoid, 5–7 mm long, exserted or partly(–entirely) included; style branches ± 2 mm long, narrow, appressed to and shorter than anthers, bilobed at tips, lacking crests. *Capsules* and *seeds* unknown. *Chromosome number* $2n = 20$ (or 30). *Flowering time*: late September to November (to early December); flowers opening ± 14:00 or even later, fading by 19:00.

Distribution and ecology: relatively widespread in Western Cape, South Africa, from the Piketberg south to the Cape Peninsula and east to Stormsvlei Kloof west of Riviersonderend; usually in deep rocky sandstone derived soil on flats or level sites in montane areas, most often found in seasonally moist situations.



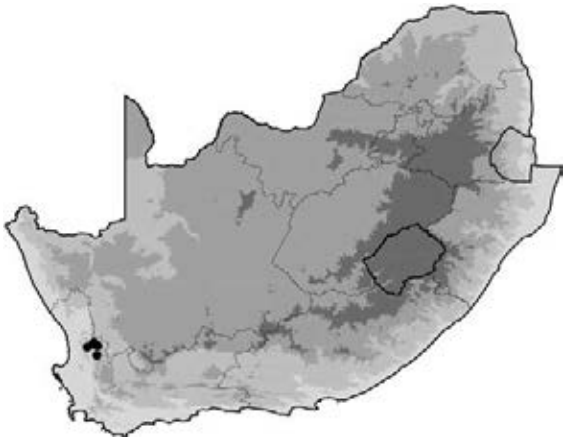
Distribution of ***Moraea umbellata***.

Diagnosis: *Moraea umbellata* has the vegetative morphology typical of subg. *Umbellatae*, viz. a stem comprising a long basal internode, leaves clustered well above ground at the first aerial node where branching occurs, and several subequal branches clustered in semi-umbellate manner. Plants can be robust, reaching as much as 450 mm in height and can often be distinguished by size alone. The flowers are also distinctive with the tepal claws 5–7 mm long and enclosing the filaments, which are either united entirely or free near the apex, and reduced and narrow style branches appressed to but shorter than the anthers and lacking crests. The outer inflorescence spathes may be entirely sheathing or free distally as in several other species of the subgenus. The fugaceous flowers last only a few hours, opening in the late afternoon, fading in early evening and completely collapsed by 19:00.

Individuals of three of four populations so far examined cytologically are triploid, $2n = 30$, hence sexually sterile, and only one diploid population is known, $2n = 20$. It seems likely that many populations of the species are triploid as plants often fail to set seed, and most collections lack developing capsules. Reproduction in the sexually sterile plants is evidently by the numerous tiny cormlets produced around the base of the mother corm.

18. **Moraea maximiliani** *(Schltr.) Goldblatt & J.C.Manning* in Novon 5: 269 (1995). *Homeria maximiliani* Schltr.: 94 (1900). *Rheome maximiliani* (Schltr.) Goldblatt: 92 (1980a). Type: South Africa, [Western Cape], Clanwilliam District, near Hoek, *Schlechter 8700* (B, lecto., designated by Goldblatt: 92 (1980a); BOL, E, G, K, M, MO, P, PRE, S, US, isolecto.).

Plants 90–150 mm high. *Corm* ± globose, 9–12 mm diam., slightly asymmetric with a lateral downward ridge; tunics dark brown, inner layers unbroken, outer of flat sections held together by cross fibres, sometimes becoming ± fibrous with age. *Stem* erect or inclined,



Distribution of ***Moraea maximiliani***.

with long basal aerial internode, leaves and branches crowded at first aerial node, with fibrous cataphylls sometimes accumulating as a collar around base. *Leaves* 2 or 3, inserted well above ground and clustered at first aerial node, lowermost much longer than others, narrowly channelled, linear to filiform, straight to strongly falcate or trailing distally. *Rhipidial spathes* on short to nearly sessile branches, with acute, brown-tipped apices, inner 20–35 mm long, outer $^1/_2$ to ± as long, sheathing below, usually free and diverging distally. *Flowers* fugaceous, pale yellow to beige, tepals veined with dark brown, bases of all tepal limbs with deeper yellow nectar guides edged distally with red-brown; tepals subequal, oblanceolate-pandurate, limbs spreading to laxly reflexed, outer 15–24 × 6–10 mm, claws ascending, ± 6 mm long, inner narrower and slightly shorter than outer. *Filaments* united in smooth, slender column 6–8 mm long; anthers ± erect, contiguous, 2.0–2.5 mm long, yellow; pollen yellow. *Ovary* narrowly top-shaped, 3–6 mm long, usually exserted; style branches short, ± 1 mm long, narrow, forked apically with tips diverging and extending between anthers, without crests. *Capsules* club-shaped to oblong, 6–10 mm long. *Seeds* small, angular-prismatic. *Chromosome number* 2*n* = 20. *Flowering time*: late August to mid-October; opening midmorning and collapsing ± 15:00.

Distribution and ecology: a narrow endemic restricted to the eastern slopes of the Pakhuis Mtns and Biedouw Valley in the Clanwilliam District in Western Cape, South Africa; in sandy, stony ground, sometimes in shallow soil on sandstone pavement.

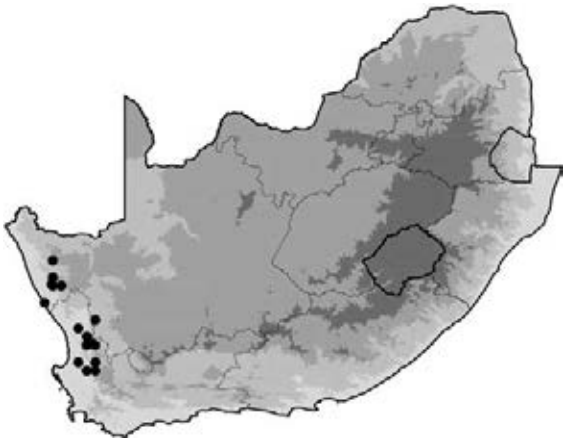
Diagnosis: distinguished by the small, pale yellow flowers with subequal tepals, all with short, ascending claws and small, deeper yellow nectar guides at the bases of the tepals, *Moraea maximiliani* also has short, reduced style branches appressed to the anthers with the stigmatic tips extending between them. The slender, almost filiform leaves are crowded at the top of the elongated based internode. The outer rhipidial spathes clasp the inner only in the lower half and arch outward distally.

19. **Moraea nana** *(L.Bolus) Goldblatt & J.C.Manning* in Novon 5: 269 (1995). *Hexaglottis nana* L.Bolus: 326 (1932a). Type: South Africa, [Western Cape], foot of the Cederberg at Algeria, 25 Sept. 1030, *Weintroub s.n.* (BOL [*19972*], lecto., designated here [not holo. As previously cited]; K, isolecto.).

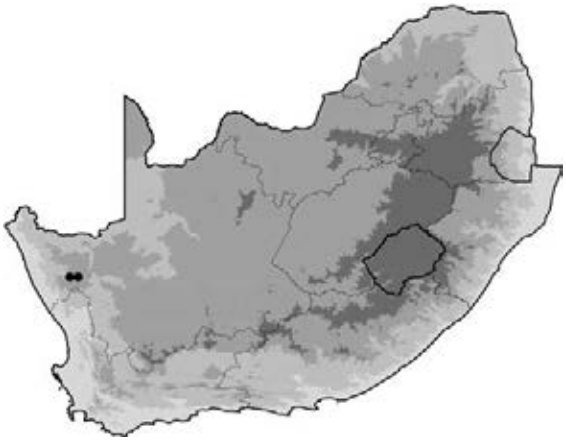
Plants 100–300 mm high. *Corm* globose-ovoid, 10–15 mm diam., slightly asymmetric with a fibrous downward extension on one side; tunics brown, inner layers unbroken, outer layers fragmenting in sections held together by cross fibres or ± fibrous with age. *Stem* consisting of one long aerial internode with leaves and branches clustered close to first aerial node, with ± dry, fibrous cataphylls. *Leaves* 3 or 4, inserted close together at and above first above ground aerial node, lowermost longest, blades leathery, up to 400 mm long, channelled, straight or falcate to trailing. *Rhipidial spathes* green, leathery, 25–40 mm long, apices often dark brown, sometimes truncate or lacerate, outer slightly longer or shorter than inner, usually sheathing below, distally free and recurved. *Flowers* fugaceous, yellow to buff-coloured or salmon-orange, tepals finely veined dark brown, often flushed brown outside, limbs of all or only outer tepals with brighter yellow nectar guides at bases edged brown; outer tepals 19–25 × 10–14 mm, claws narrow, 2–4 mm long, ascending, forming a narrow cup around base of filaments, limbs spreading, ± undulate, inner tepals shorter, up to 10 mm wide. *Filaments* 4–5 mm long, united in lower 1.5–3.0 mm; anthers 4–5 mm long, initially erect and parallel, arching inward after anthesis, yellow; pollen yellow. *Ovary* ± cylindric, 4–6 mm long, exserted or partly (entirely) included in spathes; style branches divided almost to base into two slender ascending arms, ± 5 mm long, extending either side of subtending filament. *Capsules* 6–10 mm long, ± barrel-shaped, 3–4 mm wide. *Seeds* small, angular. *Chromosome number* 2*n* = 20. *Flowering time*: late September to October (to early November); flowers opening usually ± 12:30, fading at dusk; rarely opening ± 8:00 and fading 13:00 (Pakhuis Mtns).

Distribution and ecology: relatively widespread along the Atlantic Coast of South Africa, from the Spektakel Mtns west of Springbok in Namaqualand, Northern Cape, to the Olifants River Valley south of Citrusdal in Western Cape; on stony, sandy ground. The species is probably more common than the record indicates as plants are easily overlooked and little collecting is done in late spring when it flowers.

Diagnosis: flowers of *Moraea nana* are of the *Hexaglottis*-type and closely resemble those of *Moraea* sect. *Hexaglottis* in their spreading, subequal tepals with short erect claws and style branches reduced to paired filiform arms, but the resemblance is convergent and *M. nana* has a vegetative form almost identical to that of some species of subg. *Umbellatae*, with leaves and branches crowded together above the ground. Chromosome number *n* = 10, also matches subg. *Umbellatae*



Distribution of ***Moraea nana***.



Distribution of ***Moraea singularis***.

(subg. *Hexaglottis* has *x* = 6). *Moraea nana* is probably most closely allied to *M. maximiliani* and the two can only be distinguished by examination of the floral parts: *M. maximiliani* has tepal claws ± 6 mm long, entirely united filaments, and short, apically diverging style branches partly hidden by the short erect and contiguous anthers, whereas *M. nana* has shorter tepal claws, 2–4 mm long, filaments free in the upper half, and filiform, spreading style branches extending between the filaments. *Moraea nana* and *M. maximiliani* are interfertile but neither can be crossed with species of sect. *Hexaglottis*.

Flowers typically open after midday, ± 12:30 and collapse after 18:00 but in plants from the Pakhuis area of the northern Cederberg flowers open at ± 8:00 and deliquesce at ± 13:00. Flowers of these populations are slightly smaller than is typical but otherwise do not appear to differ significantly.

20. **Moraea singularis** *Goldblatt & J.C.Manning* in Bothalia 43: 154 (2013). Type: Northern Cape, Kamiesberg, Vaalputs, *NECSA* site, Platbakkies Succulent Karoo, 2 Aug. 2011, *Van Rooyen 2827* (PRU, holo.).

Plant small, acaulescent 30–40 mm high. *Corm* spindle-shaped, ± 10 mm diam., tunics of grey-brown, wiry, reticulate fibres. *Stem* with 1 to 4 sessile branches clustered at ground level. *Leaves* 3, clustered at ground level, lowermost longest, inserted on stem at ground level, falcate, terete, 50–80 mm long, 0.8–1.0 mm diam., upper 2 leaves much shorter, recurved, bifacial, channelled or with short terete blade up to 20 mm long. *Rhipidial spathes* green, 25–30 mm long, outer leaf-like, spreading distally, ± as long as inner. *Flowers* rotate, pale to golden-yellow, limbs of all tepals with brown, spear- or lozenge-shaped nectar guide near bases, tepal claws ascending, forming a cup enclosing base of filament column, limbs spreading, inner usually twisted through 90° distally; tepals united for 2 mm, claws ± 1 mm long, limbs obovate-pandurate, truncate, outer ± 12 × 6 mm, inner slightly smaller. *Filaments* ± 5 mm long, connate in a smooth, cylindric column ± 4 mm long, free and diverging in upper 1 mm; anthers ± 3 mm long, arched, yellow; pollen yellow. *Ovary* cylindric, ± 10 mm long, included; style branches divided almost to base into paired terete arms extending either side of each anther, ± 1.5 mm long, stigmatic at apices, crests reduced, ± 1 mm long. *Capsules* and *seeds* unknown. *Flowering time*: late July to early August.

Distribution and ecology: known from two sites along the eastern foothills of the Kamiesberg massif in central Namaqualand, Northern Cape, South Africa, but possibly with a wider range than is presently known; on gravel flats derived from granite bedrock.

Diagnosis: an acaulescent species, *Moraea singularis* also stands out in the short, terete leaf blades. The yellow flowers, with both inner and outer tepals limbs bearing brown nectar guides, have tepal claws only ± 1 mm long that form a narrow cup including the base of the smooth filament column. The tepal limbs are oblanceolate-pandurate, the inner three slightly smaller than the outer and twisted through 90°. The asymmetric corms with brown corm tunics accord best with subg. *Umbellatae*, as do the outer rhipidial spathes, which sheath the inner only in the lower half and arch outward distally, and also the yellow flowers with darkly veined tepals and brown nectar guides. Unique to the subgenus is the terete blade of the basal leaf, while the upper leaves are channelled entirely or for part of their length and terete distally.

Subg. 4. **Moraea**

Moraea [unranked] *Corymbosae* Baker: 10 (1896), illegitimate superfluous name. Type: *M. juncea* L. = *M. vegeta* L., type of the genus.

Plants with stems usually branched, sometimes repeatedly; corm tunics finely to coarsely fibrous or ± woody. *Foliage leaves* several to (1)2. *Flowers* mostly yellow to buff-brown, occasionally pink to red, or partly white (blue in *M. nubigena*); filaments united in lower half; style branches and crests well developed (reduced in *M. vlokii*). *Capsules* ± globose, exserted. *Basic chromosome number x* = 10.

Sect. 3. **Moraea**

Corms often asymmetric; tunics of pale, coarse or fine fibres. *Foliage leaves* several to (1)2. *Flowers* yellow, sometimes pink to red or brown; filaments partially united; style branches and crests usually well developed (reduced in *M. vlokii*).

21. **Moraea vegeta** *L.*, Species plantarum: 59 (1753); Goldblatt: 693 (1976a); Goldblatt: 54 (1986a). *M. iriopetala* var. *vegeta* (L.) L.f.: 100 (1782). Type: South Africa, without precise locality or collector, illustration in Miller: t. 238 (1758).

Iris tristis L.f.: 97 (1782). *Ferraria tristis* (L.f.) Salisb.: 42 (1796). *Moraea tristis* (L.f.) Ker Gawl.: 241 (1804a). *Vieusseuxia tristis* (L.f.) Eckl.: 11 (1827). Type: South Africa, [Western Cape], below Devil's Peak near Cape Town, *Thunberg s.n.* [UPS–THUNB (1190), lecto., designated by Goldblatt: 693 (1976a)].

Moraea sordescens Jacq.: t. 225 (1795). Type: illustration in Jacq.: t. 225 (1795).

Vieusseuxia graminifolia Eckl.:. 11 (1827). Type: South Africa, Cape, 'Groene Berg,' *Zeyher 1068* (S, lecto.).

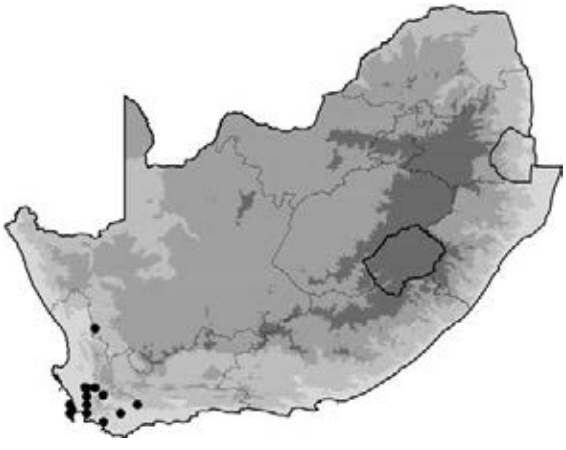
[*Vieusseuxia rivularis* Eckl.: 11 (1827), invalid name without description.]

[*Vieusseuxia juncea* Eckl. ex Steud.: 765 (1841), invalid name without description.]

Plants (100–)150–300 mm high, usually several branched. *Corm* 10–20 mm diam.; tunics of fine, pale fibres. *Stem* several-branched, finely velvety. *Leaves* several, basal and cauline, ± linear, lower exceeding stem, often trailing distally, channelled, glaucous, progressively shorter above. *Rhipidial spathes* green, apices sometimes brown, inner 20–40 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, dull yellow to light brown, flushed with blue or purple, outer tepal limbs with yellow nectar guides at bases; outer tepals 20–25 mm long, limbs up to 18 mm long, lanceolate, weakly reflexed, inner slightly smaller, also weakly reflexed. *Filaments* 5–6 mm long, united in lower $^{1}/_{3}$; anthers 3–4 mm long, blue; pollen yellow or blue. *Ovary* ± ovoid, ± 4 mm long, exserted, style branches 7–8 mm long, crests 7–10 mm long, lanceolate. *Capsules* ± globose, soft walled, showing outline of seeds, pendent when mature, ± 12 × 8 mm. *Seeds* round to angular. *Chromosome number* 2*n* = 20. *Flowering time*: September and October.

Distribution and ecology: extending from Darling to the Cape Peninsula and eastward to Tulbagh and Swellendam in Western Cape, South Africa, with outlying populations in the Koebee Valley well to the north; typically on heavy soils derived from clays or granites and often in shade, in light bush or on forest margins.

Diagnosis: *Moraea vegeta* with its several characteristic glaucous leaves, velvety stem, and somewhat pendulous capsules is not easily confused with related species with similar flowers such as *M. papilionacea* and *M. gawleri* (the latter its closest relative according to molecular data). *Moraea indecora*, restricted to northern Namaqualand, has similar drooping capsules but rather different habit and flowers, and may be immediately related but molecular evidence on the question is lacking. *Moraea vegeta* is one of the few species of the genus that has adapted to human settlement and it is most common, almost weedy, in parts of the Constantia area of the Cape Peninsula where it thrives under the naturalised oaks and pines. *Moraea vegeta* is also one of few species of *Moraea* that is self-compatible and autogamous in the absence of insect-mediated pollen transfer. The dull-coloured and inconspicuous flowers are consistent with this mode of reproduction.



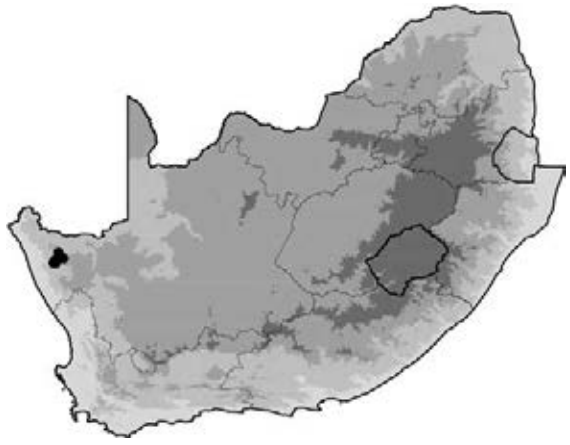
Distribution of ***Moraea vegeta***.

22. **Moraea indecora** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 695 (1976a); Goldblatt: 57 (1986a). Type: South Africa, [Northern Cape], sandy flats, 8 km east of Nababeep, Oct. 1974, *Goldblatt 3053* (MO, holo.; NBG, PRE, S, iso.).

Plants large, 350–600 mm high, with collar of fine fibres around base. *Corm* deep seated, up to 250 mm below ground, compressed-globose, ± 20 mm diam.; tunics of fine fibres. *Stem* leafless for 100–150 mm above ground, several-branched. *Leaves* 3 to 6, inserted well above ground level, lower exceeding stem, linear, channelled, trailing distally, ± 10 mm wide. *Rhipidial spathes* green below, dry and brown distally, attenuate, inner 40–50 mm long, outer ± $^2/_3$ as long. *Flowers* fugaceous, large, yellow, outer tepal limbs with deeper yellow nectar guides edged with light brown at bases; outer tepals 25–40 mm long, limbs lanceolate, ± spreading, claw short, ± 5 mm long; inner tepals 22–35 mm long, spreading. *Filaments* ± 8 mm long, united near base; anthers 8–10 mm long, exceeding stigma lobes; pollen bright red. *Ovary* ovoid, 6–8 mm long, style branches ± 12 mm long, crests 15–20 mm long. *Capsules* subglobose, up to 15 × ± 8 mm diam., showing outline of seeds, ± nodding. *Seeds* ± globose, slightly angled by pressure. *Chromosome number* 2*n* = 16. *Flowering time*: October; flowers opening near midday and fading at sunset.

Distribution and ecology: local in central Namaqualand west and east of Springbok in Northern Cape, South Africa, and known from just four sites and evidently extremely rare; in deep gritty, granitic sand.

Diagnosis: *Moraea indecora* is distinctive in having several foliage leaves, all inserted well above the ground just below the first branch, large yellow flowers with bright red anthers that extend beyond the stigmas, and nodding capsules. The large corms of *M. indecora* are particularly deep seated, buried at least 200 mm below the ground, partly wedged in bed rock. The nodding, soft-walled capsules and fibrous corm tunics recall *M. vegeta*, perhaps its closest ally. The chromosome number of 2*n* = 16 is unusual in subg. *Moraea* (*x* = 10) but at least *M. papilionacea* (*n* = 9 and 8) also departs from that base number.



Distribution of ***Moraea indecora***.

23. **Moraea gawleri** *Spreng.*, Systema vegetabilium 5: 462 (1828), as a new name for *M. crispa* (L.f.) Ker Gawl.: t. 1284 (1810a), illegitimate homonym not Thunb. (1787); Goldblatt: 689 (1976a) ; Goldblatt: 52 (1986a). *Iris crispa* L.f.: 98 (1782). *M. undulata* Ker Gawl.: 43 (1827), illegitimate new name for *M. crispa* (L.f.) Ker Gawl., not *M. undulata* (L.) Thunb. (1787). *Vieusseuxia crispa* (L.f.) Eckl.: 12 (1827). Type: South Africa, [Western Cape], hills near Cape Town, *Thunberg s.n.* (UPS–THUNB 1120, lecto., designated by Goldblatt: 689 (1976a); S, isolecto.).

Moraea decussata Klatt: 367 (1882). Type: South Africa, without precise locality, *Krauss 1447* (V, holo., presumed destroyed, authentic specimens at S).

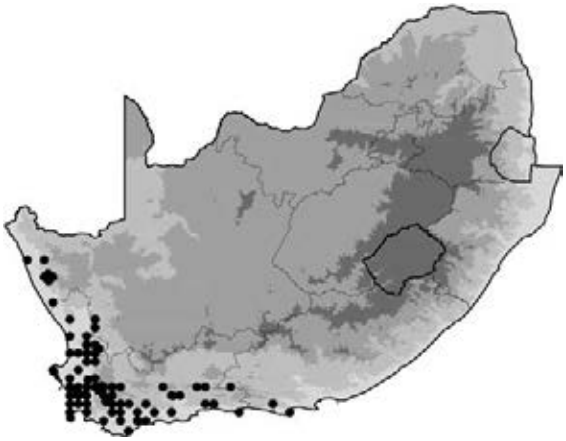
Moraea crispa var. *rectifolia* Baker: 16 (1896). Type: South Africa, [Western Cape], Table Mtn, *H. Bolus 4718* (BOL, syn.).

Moraea sulphurea Baker: t. 7658 (1899). Type: South Africa, without precise locality or collector, illustration in Baker: t. 7658 (1899).

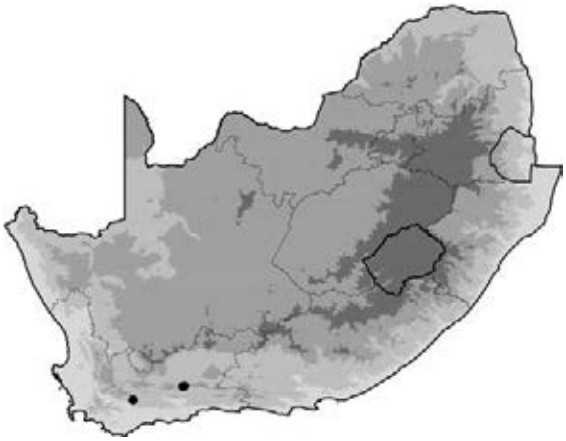
[*Vieusseuxia angustifolia* Eckl.: 12 (1827), invalid name without description.]

Plants 150–450 mm high. *Corm* 5–15 mm diam.; tunics light brown, with coarse, vertically ridged fibres. *Stem* few–several-branched, rarely simple, bearing acute sheathing leaves at upper nodes. *Foliage leaves* (1)2, lower basal, upper inserted from lowest aerial node, linear, ± falcate to weakly coiled, channelled, margins plane, undulate or crisped, mostly 3–6 mm wide. *Rhipidial spathes* green, becoming dry and brown apically, ± acute (attenuate), inner (8–)10–25 mm long, outer ± half as long. *Flowers* fugaceous, yellow, ± white, or pale brick-coloured, or combinations of these colours, outer tepal limbs ± spreading to reflexed to 40°, with yellow nectar guides at bases, often vanilla-scented; outer tepals 12–28 × 5–14 mm, claws slightly < $^1/_2$ as long as limbs, inner tepals 10–20 mm long, similarly oriented. *Filaments* ± 6 mm long, united for ± half their length; anthers 2–3 mm long, red or yellow; pollen red or yellow. *Ovary* narrowly ovoid, 2–3 mm long, style branches 5–8 mm long, mostly held above tepals, crests lanceolate. *Capsules* ± globose to broadly elliptic, 5–10 × 4–5 mm. *Seeds* angular prismatic. *Chromosome number* 2*n* = 20 + 0–6B (*x* = 10). *Flowering time*: July to September, to October in the south; opening midmorning, fading late afternoon.

Distribution and ecology: widespread and sometimes locally common in southwestern South Africa, from Namaqualand in Northern Cape to Humansdorp in Eastern Cape in the east; on clay flats and slopes, usually in renosterveld, occasionally in sandy habitats.



Distribution of ***Moraea gawleri***.



Distribution of ***Moraea vlokii***.

Diagnosis: a relatively small plant, *Moraea gawleri* is most easily recognised by its short rhipidial spathes, the inner seldom more than 20 mm long and the outer about half as long, and the two or rarely solitary foliage leaf, the blades sometimes loosely coiled and the margins undulate to crisped, although plane-margined forms (var. *rectifolia* Baker) occur, often in moister habitats. The small flowers are unexceptional except for their variable colouring, sometimes brick-red, white or yellow or combinations of these colours. Both morphology and molecular studies show the species is closely allied to other members of subg. *Moraea*, in particular *M. vegeta* and *M. vlokii*. This last species is almost identical to *M. gawleri* vegetatively but has flowers with reduced style branches that lack crests, and usually a solitary foliage leaf.

24. **Moraea vlokii** *Goldblatt* in South African Journal of Botany 58: 209 (1992). Type: South Africa, [Western Cape], Swartberg Mts, Gamkaspoort, near road to Grootberg, 18 Oct. 1985, *Vlok 1149* (NBG, holo.; K, MO, PRE, iso.).

Plants 140–330 mm high. *Corm* ± 12 mm diam.; tunics light brown, with coarse, vertically ridged fibres. *Stem* 2- to 6-branched, rarely simple, sheathing leaves at upper nodes ± 10 mm long. *Foliage leaves* 1(2), lower ± basal, upper when present inserted from lowest aerial node, linear, channelled, usually slightly longer than stem, mostly 1.5–2.5 mm wide, margins straight. *Rhipidial spathes* green, becoming dry and brown apically, ± acute, inner ± 10 mm long, outer slightly shorter. *Flowers* fugaceous, yellow, limbs of all tepals with yellow nectar guides at bases, ± spreading to reflexed to 30°, unscented; claws ascending, ± 2.5 mm long, forming a cup enclosing lower half of filaments; outer tepals ± 14 × 9 mm, inner tepals ± 10 × 7 mm. *Filaments* ± 7 mm long, united in a smooth column, diverging in upper 1 mm; anthers ± 2 mm long, yellow; pollen yellow. *Ovary* narrowly obovoid, ± 2 mm long, style branches ± 2 mm long, appressed to and reaching upper $^1/_3$ of anther, forked apically, without crests. *Capsules* ± globose to broadly ovoid, ± 4 mm long. *Seeds* angled. *Chromosome number* $2n = 20$. *Flowering time*: September to mid-October; opening early morning, fading ± 13:00.

Distribution and ecology: known from two sites some 150 km apart in Western Cape, South Africa, one in the Great Swartberg near Gamkaskloof and the other in the Waboomsberg between Montagu and Ouberg Pass (other populations undoubtedly exist but the species is inconspicuous and easily overlooked even in bloom just a few mornings a year); in stony, sandstone ground.

Diagnosis: closely resembling the common and widespread *Moraea gawleri* in all vegetative features, notably the strongly vertically ribbed corm tunics, and short rhipidial spathes with the outer much shorter than the inner, *M. vlokii* usually has a single foliage leaf (occasionally a second much shorter one), always with straight margins, and pale yellow flowers with short tepal claws less than one quarter as long as the limbs, and vestigial style branches shorter than and concealed by the anthers and lacking crests. By contrast, *M. gawleri* has tepal claws only slightly shorter than the limbs and style branches with prominent, petaloid crests. Both species have broadly obovoid to almost globose capsules. Flowers open in early morning and collapse at ± 13:00, whereas those of *M. gawleri* open in mid- to late morning and last through late afternoon.

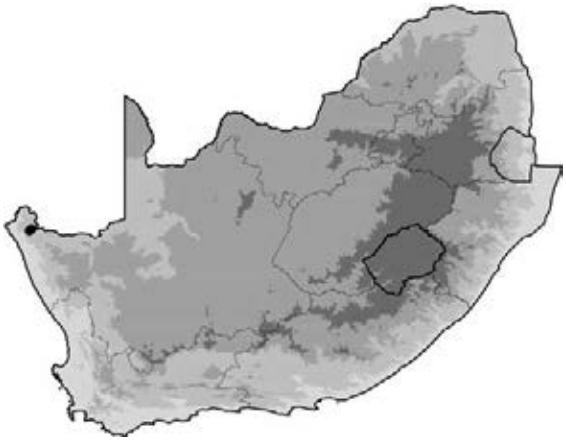
25. **Moraea namaquamontana** *Goldblatt* in Annals of Kirstenbosch Botanic Gardens 14: 50 (1986a). Type: South Africa, [Northern Cape], Richtersveld, Stinkfontein Mtns, *Oliver, Tölken & Venter 627* (PRE, holo.; NBG, iso).

Plants 220–350 mm high. *Corm* 10–14 mm diam.; tunics brown, with coarse, vertically ridged fibres. *Stem* 3- to 6-branched, rarely simple, with short, partly sheathing bracts subtending branches. *Leaves* several (up to 9), mostly basal, ± falcate to trailing, often loosely twisted, widely channelled, 10–16 × 10–15 mm, margins undulate. *Rhipidial spathes* ± acute, inner 22–28 mm long, outer ± $^1/_3$ as long. *Flowers* fugaceous, yellow, ± orange outside, outer tepal limbs ± spreading to reflexed to 40°, with

deep yellow nectar guides at bases; outer tepals 22–28 × ± 12 mm, claws 8–9 mm long, inner tepals 23–25 mm long, similarly oriented. *Filaments* 6–7 mm long, united ± in lower half; anthers ± 4 mm long, red; pollen red. *Ovary* narrowly ovoid, 3.5–4.0 mm long, style branches ± 7 mm long, crests lanceolate, 9–13 mm long. *Capsules* ± globose, 5–7 × ± 5 mm. *Seeds* angular, up to 2 mm long. *Chromosome number* 2*n* = 20. *Flowering time*: September; flowers opening midmorning, fading late afternoon.

Distribution and ecology: exceedingly rare, *Moraea namaquamontana* is known from a few isolated populations in the Richtersveld in Northern Cape, South Africa; evidently on stony slopes.

Diagnosis: with flowers typical of the genus, *Moraea namaquamontana* has moderate-sized, yellow flowers with outer tepals up to 28 mm long and inner up to 25 mm long, both whorls with half reflexed limbs. It stands out particularly in having several, mostly basal, relatively broad leaves, falcate and slightly twisted. The stems usually have one or two branches, these subtended by short, partly sheathing bract-like leaves. The



Distribution of ***Moraea namaquamontana***.

fairly short rhipidial spathes, the outer about one third as long as the inner, recall those of *M. gawleri* and the corms of the two species are similar, having relatively coarse fibres with prominent vertical members.

Sect. 4. **Polyphyllae** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 36 (2013). Type: *M. ramosissima* (L.f.) Ker Gawl.

Plants usually many-branched. *Corm* tunics brown, fragmenting irregularly. *Foliage leaves* several to many, broad and widely channelled. *Flowers* yellow; filaments united in lower half or only at base; style branches and crests well developed.

26. **Moraea ramosissima** *(L.f.) Druce* in Botanical Society Exchange Club of the British Isles 4: 636 (1916); Goldblatt: 687 (1976a); Goldblatt: 46 (1986a). *Iris ramosissima* L.f.: 99 (1782). *Iris ramosa* Thunb.: 18 (1782b), illegitimate superfluous name for *I. ramosissima* L.f. *Moraea ramosa* Ker Gawl.: t. 771 (1804c), illegitimate superfluous name. *Vieusseuxia ramosa* Eckl.: 12 (1827), illegitimate superfluous name. Type: South Africa, [Western Cape], sandy places in the Swartland, *Thunberg s.n.* [UPS–THUNB 1169, lecto., designated by Goldblatt: 687 (1976a)].

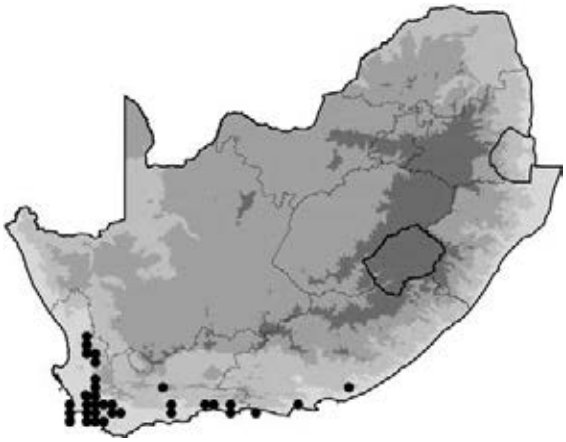
Moraea bulbifera Jacq.: 38, t. 197 (1797). Type: South Africa, without precise locality or collector, illustration in Jacq.: 38, t. 197 (1797).

[*Freuchenia bulbifera* Eckl.: 14 (1827), invalid name without description.]

[*Vieusseuxia freuchenia* Steud.: 765 (1841), invalid name.]

[*Moraea racemosa* Drège ex Baker: 131 (1877), invalid only in synonymy.]

Plants large, 500–1 200 mm. *Corm* 20–30 mm diam., with numerous small cormlets round base, enclosed in a network of hard, spiny roots. *Stem* branched repeatedly from base to apex, bearing green sheathing leaves with margins free to base. *Foliage leaves* many, in 2 ranks, channelled, falcate, up to 300 × 15 mm. *Rhipidial spathes* green with dry, acute to attenuate apices; inner spathe 20–25 mm long, outer much shorter, < 10 mm long. *Flowers* fugaceous, yellow, outer tepal limbs with deeper yellow nectar guides at bases, tepal limbs reflexed 35°–45°; outer tepals ± 30 × 15 mm, inner slightly smaller. *Filaments* 12–15 mm long, free, sometimes contiguous near bases; anthers ± 10 mm long; pollen yellow or red. *Ovary* broadly ovoid, ± 4 mm long, style branches 20–25 mm long, crests narrowly triangular, 15–20 mm long. *Capsules* ± globose, truncate above, ± 6 mm diam.



Distribution of ***Moraea ramosissima***.

Seeds angled. *Chromosome number* 2*n* = 20. *Flowering time*: October to December, typically late blooming; flowers open ± 11:00 and fade in late afternoon.

Distribution and ecology: a widespread species of the Cape Floristic Region of South Africa, extending from the Gifberg Plateau in the north of Western Cape to the Cape Peninsula in the south and to Grahamstown in Eastern Cape in the east; in sandy soils, both on mountains and flats, most often in moist sites, thus near streams or south-facing slopes, flowering only after fire.

Diagnosis: *Moraea ramosissima* is one of the taller species in the genus, plants often exceeding 1 m in height, and exhibits such ancestral features as multiple foliage leaves and an unspecialised yellow flower. Notably the filaments are free or barely united at the base, evidently a derived condition. Peculiar to the species are the hard, spiny roots that enclose the corm and hundreds of cormlets produced around the base. The spiny roots probably have a protective function but they evidently do not prevent massive depredation by baboons and porcupines that uproot large numbers of plants in search of the edible corms. The survival of such populations is assured by the production of cormlets which are shed in large numbers from the base of the main corm and also from the lower aerial nodes. The corm tunics, often decayed at flowering, consist of firm, leathery, brown layers that split from the base.

Its immediate relationships are with the south Namibian and Richtersveld species, *Moraea garipensis*, also relatively tall with multiple leaves but with the filaments united in the lower half and unusually long style branches but short style crests. Molecular study has confirmed their immediate sister relationship.

27. **Moraea garipensis** *Goldblatt* in Annals of Kirstenbosch Botanical Garden 14: 48 (1986a). Type: Namibia, Orange River Valley near Aussenkehr, rock crevices, *Goldblatt 7153* (MO, holo.).

Plants 250–500 mm high. *Corm* 15–20 mm diam.; tunics of brown, leathery layers splitting from base and near apex. *Stem* mostly 2- to 6-branched, rarely simple, bearing acute sheathing leaves at upper nodes. *Foliage leaves* several, lowermost basal, about as long as stem, upper leaves inserted on stem above ground, ± linear, ascending, channelled, 8–10 mm wide, margins straight. *Rhipidial spathes* ± acute or rarely attenuate, inner 25–35 mm long, outer $^{2}/_{3}$ to ± as long. *Flowers* fugaceous, yellow, outer tepal limbs half to almost fully reflexed, with scattered dark spotting at bases; outer tepals ± 36 × 15 mm, claws ± 12 mm long, inner tepals 16–18 × 4–6 mm, suberect. *Filaments* ± 16 mm long, united for ± half their length; anthers ± 8 mm long, red, held above tepal limbs; pollen orange. *Ovary* ± globose, ± 4 mm long, exserted; style branches ± 12 mm long, crests wedge-shaped, ± 5 mm long. *Capsules* broadly obovoid, 8–10 mm long. *Seeds* angular, ± 2 mm long, with loose testa. *Chromosome number* 2*n* = 20. *Flowering time*: July, possibly also August; flowers opening ± 14:00, fading at sunset.



Distribution of ***Moraea garipensis***.

Distribution and ecology: known from two sites, the type locality in southern Namibia and another in the northern Richtersveld of Northern Cape, South Africa; in rock outcrops with corms wedged in rock crevices.

Diagnosis: *Moraea garipensis* is distinguished by its tall stature and normally several-branched stem, and relatively large, yellow, fugaceous flowers, all unique in species from Namibia or the adjacent Richtersveld in Northern Cape. The flowers are also somewhat unusual in having relatively long filaments, ± as long as the outer tepal claws, and the anthers in consequence are presented above the limbs of the outer tepals, where the bright orange pollen is conspicuously displayed. The several leaves and branched stem recall the Cape species, *M. ramosissima,* and molecular phylogenetic studies confirm their immediate relationship.

Provisionally assigned to sect. *Polyphyllae*

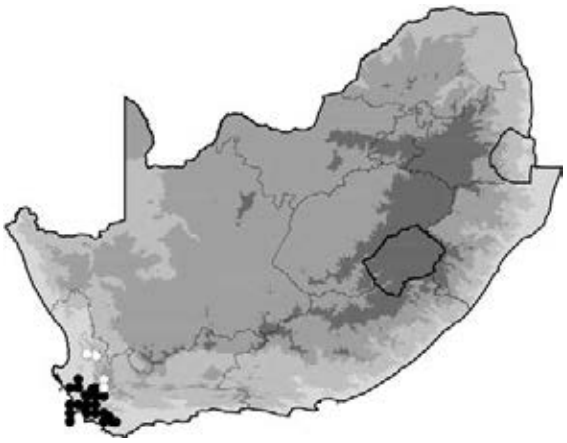
28. **Moraea papilionacea** *(L.f.) Ker Gawl.* in Curtis's Botanical Magazine 20: t. 750 (1804d); Goldblatt: 699 (1976a); Goldblatt: 62 (1986a); Goldblatt *et al*: 73 (2015). *Iris papilionacea* L.f.: 98 (1782). *Xiphion papilionaceum* (L.f.) Schrank: 174 (1822). Type: South Africa, [Western Cape], hills near Cape Town, *Thunberg s.n.* [UPS-THUNB 1145, lecto., designated by Goldblatt: 699 (1976a)].

Plants 60–160 mm high. *Corm* 8–13 mm diam.; tunics of flat, brown, woody sections separated by cross fibres, ultimately decaying into fibrous mass. *Stem* roughly hairy to ± smooth, usually (1)2 internodes long above insertion of basal foliage leaf or leaves, several-branched from base or from upper node (rarely unbranched), basal internode elongating in fruit. *Foliage leaves* 2 to 4, linear to falcate but spreading distally,

sometimes loosely twisted, lowermost ± basal or inserted at first above ground node, channelled below, ± as long or longer than stem, finely to roughly hairy on veins, rarely smooth, occasionally veins prominently thickened, intervein areas ± smooth or papillate, margins undulate, long-ciliate. *Rhipidial spathes* often with dry brown apices or entirely green, acute, usually hairy on veins and margins, inner 24–30 (subsp. *Glabrescens*) or (35–)40–60 (subsp. *Papilionacea*) mm long, outer usually slightly shorter than inner, rarely ± 1/2 as long, sometimes not sheathing distally. *Flowers* fugaceous, yellow or salmon-pink, occasionally yellow with salmon-pink inner tepals and style branches, outer tepal limbs with yellow nectar guides at bases edged green or red, ± spreading, sweetly scented; outer tepals 20–30 × 8–9 mm, claws suberect, inner tepals lanceolate, 19–23 × 10 mm. *Filaments* 3–6 mm long, united in lower 1/3–1/2; anthers 3–5 mm long, dark purple; pollen red or yellow. *Ovary* narrowly obovoid, smooth or finely velvety, 3–6 mm long, exserted; style branches 5–8 mm long, crests lanceolate, 6–7 (subsp. *Glabrescens*) or 10–15 (subsp. *Papilionacea*) mm long. *Capsules* broadly elliptic-oblong, 5–9 × ± 5 mm long. *Seeds* angular, reticulate. *Chromosome number* 2*n* = 18, 16. *Flowering time*: August to late September.

Distribution and ecology: endemic to Western Cape, South Africa, extending from the northern Cederberg to Ceres (subsp. *glabrescens*) and from Porterville south to the Cape Peninsula and east to Caledon and Hermanus (subsp. *papilionacea*); on flats and slopes in clay, clay loam or granitic gravel soils or in peaty sand.

Diagnosis: *Moraea papilionacea* is readily distinguished by the hairy to velvety stems and usually hairy undersides of the leaves with long-ciliate margins, and its fugaceous, yellow or deep salmon-pink flowers, sometimes pink with yellow style branches. Plants have at least two and sometimes three or four foliage leaves, the two longest inserted at the base or at the first above-ground node. The remaining foliage leaves are much shorter, the uppermost subtending the branch or branches at the uppermost aerial node. Plants are typically branched and the stem consists of just two well-developed internodes above the lowermost leaves. Nested among species with the ancestral base for the genus, *x* = 10, *M. papilionacea* is dysploid , with 2*n* = 18 in subsp. *papilionacea* and 2*n* = 16 in subsp. *glabrescens*. Its relationships are uncertain and molecular study has failed to provide a satisfactory placement. It has provisionally been assigned to sect. *Polyphyllae* of subg. *Moraea* although the brown corm tunics appear to better match those of subg. *Umbellatae.*



Distribution of ***Moraea papilionacea*** subsp. ***papilionacea***, ●; subsp. ***glabrescens***, ○.

We do not recognise var. *maythamiae* G.J.Lewis, named for plants with salmon-pink flowers from the Cape Peninsula with subglabrous leaves and flowers opening in the late afternoon. The type form, also from the Cape Peninsula, has yellow flowers opening in late morning. A few populations of subsp. *papilionacea* consist of plants with either yellow or salmon-pink flowers, some with yellow tepals and salmon-pink style branches.

Key to subspecies

1a Flowers larger, often salmon-pink, the outer tepals 25–30 mm long and inner 22–23 mm long . . . . . 28a. subsp. *papilionacea*

1b Flowers smaller, pale yellow, the outer tepals 20–22 mm long and inner 19–20 mm long. . . . . 28b. subsp. *glabrescens*

28a. subsp. **papilionacea**

Moraea pilosa J.C.Wendl.: 42 (1798). Type: unknown.

Iris hirsuta Licht. ex Roem. & Schult.: 478 (1817). *Moraea hirsuta* (Licht. ex Roem. & Schult.) Ker Gawl.: 43 (1827). Type: South Africa, [Western Cape], Tulbagh District, *Lichtenstein s.n.* (location unknown, possibly originally at B, now lost).

Moraea papilionacea var. *maythamiae* G.J.Lewis in Salter *et al.*: 37 (1949). Type: South Africa, [Western Cape], Cape Town, Rondebosch Common, *Salter 8989* (SAM, lecto., designated by Goldblatt: 699 (1976a); BOL, NBG, isolecto.).

[*Vieusseuxia intermedia* Eckl.: 12 (1827), invalid name without description.]

[*Vieusseuxia nervosa* Eckl.: 12 (1827), invalid name without description.]

Plants 100–160 mm high. *Stem* usually roughly hairy, or ± glabrous, usually (1)2 internodes long above insertion of basal foliage leaf or leaves, several-branched from base or from upper node (rarely unbranched), basal internode elongating in fruit. *Foliage leaves* 2 to 4, sometimes loosely twisted, lowermost ± basal, channelled below, ± as long as or longer than stem, finely to roughly hairy on veins or sometimes glabrous, margins undulate, long-ciliate. *Rhipidial spathes* usually hairy on veins and margins, inner (35–)40–60 mm long, outer usually slightly shorter than inner, rarely ± 1/2 as long, sometimes

not sheathing distally. *Flowers* yellow or salmon-pink, occasionally yellow with salmon-pink inner tepals and style branches, outer tepal limbs with yellow nectar guides at bases edged green or red, ± spreading; outer tepals 25–30 × 8–9 mm, inner tepals lanceolate, ± 23 × 10 mm. *Filaments* 4–6 mm long; anthers 3–5 mm long, dark purple; pollen red or yellow. *Ovary* smooth or finely velvety, 5–6 mm long, style branches 6–8 mm long, crests 10–15 mm long. *Capsules* broadly elliptic-oblong, 7–9 × ± 5 mm long. *Chromosome number* 2*n* = 18. *Flowering time*: August to late September.

Distribution and ecology: extending from Porterville south to the Cape Peninsula and east to Caledon and Hermanus; on flats and slopes in clay, clay loam or granitic gravel soils.

Diagnosis: subsp. *papilionacea* is distinguished from subsp. *glabrescens* by the larger flowers, the outer tepals 25–30 mm long and inner 22–23 mm long. The flowers are often salmon-pink whereas those of subsp. *Glabrescens* are consistently yellow.

An unusual morph of subsp. *papilionacea* occurring only in seasonally inundated habitats in the near southwestern corner of Western Cape, has narrow, hairless leaves, 2–3 mm wide, hairless spathes and sparsely hairy stems, recalling those of subsp. *glabrescens* but the flowers are typical of *M. papilionacea*, although consistently salmon-pink as far as known. It is not clear whether these plants merit taxonomic recognition but they are currently regarded as an ecological race.

28b. subsp. **glabrescens** *Goldblatt & J.C.Manning* in Goldblatt et al. in South African Journal of Botany 99: 73 (2015) Type: Western Cape, Cederberg, near top of Cederberg Pass, Driehoeks River Valley, along seeps and streams, 28 Sept. 1981, *Goldblatt 6408* (NBG, holo.; K, MO, iso.).

Plants 60–100 mm high. *Stem* ± inclined, with basal internode extended up to 30 mm above ground, leaves and branches crowded at first aerial node, sparsely hairy or evidently glabrous. *Leaves* 2 or 3, then uppermost much smaller, falcate, lowermost inserted shortly above ground, narrowly channelled, smooth, main veins and margins thickened, abaxially papillate between veins, margins sparsely long-ciliate. *Rhipidial spathes* subacute, glabrous, inner 24–30 mm long, outer ± $^1/_2$ as long. *Flowers* pale yellow, outer tepal limbs with deep yellow nectar guides at bases edged dark brown, scent unknown; outer tepals 20–22 × 9 mm, spreading to weakly reflexed, inner tepals lanceolate, 19–20 × 5 mm, limb spreading. *Filaments* 3–4 mm long; anthers ± 3.5 mm long; pollen yellow. *Ovary* smooth, 3.0–4.5 mm long; style branches ± 5 mm long, crests 6–7 mm long. *Capsules* ovoid, 5–8 × ± 3 mm long. *Chromosome number* 2*n* = 16. *Flowering time*: late September to mid-October.

Distribution and ecology: restricted to middle and higher elevations in the Cederberg and Cold Bokkeveld Mtns as far south as Ceres in Western Cape; on wet, peaty, sandy flats somewhat marshy in winter, flowering for up to three or four years after fire after which their habitat becomes overgrown with taller grasses and restiads.

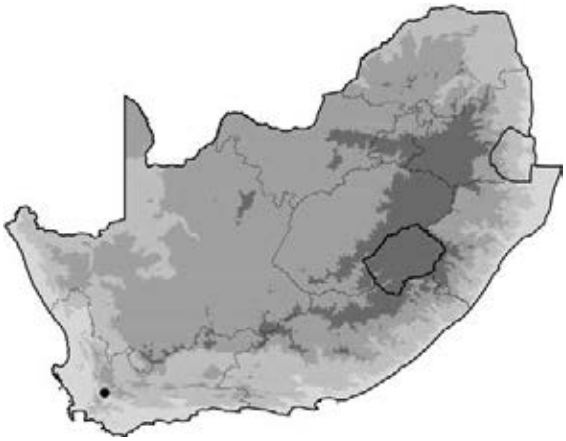
Diagnosis: subsp. *glabrescens* has the same distinctive habit and corms as subsp. *papilionacea* and is recognised by its smaller, consistently pale yellow flowers, the outer tepals 20–22 × 9 mm and the inner 19–20 × 5 mm. Flowers of subsp. *papilionacea* have either yellow or salmon-pink flowers (or sometimes a combination of both colours) with outer tepals 25–30 × 8–9 mm and inner ± 23 × 10 mm. Similarly the rhipidial spathes, style branches, crests and capsules are consistently smaller than those of subsp. *papilionacea*. Both species have villous stems but those of subsp. *glabrescens* are sparsely so, becoming ± smooth with age, whereas typical *M. papilionacea* has prominently hairy stems. Equally significant, the leaves of subsp. *glabrescens* are narrowly channelled, smooth beneath with a pair of veins and the margins prominently thickened and the margins are ciliate. Curiously, the intervein epidermis is minutely papillate on the underside (under 10× magnification), an unusual feature, occasionally weakly developed in subsp. *papilionacea*. Undersides of the leaves of subsp. *papilionacea* are usually prominently hairy on the veins, which are seldom thickened, and the leaf blades are shallowly channelled to ± flat in the distal half, slightly twisted and have undulate margins rather than being channelled throughout. Chromosome number supports the recognition of subsp. *glabrescens* which has a diploid number of 2*n* = 16 while several counts for subsp. *papilionacea* are 2*n* = 18.

29. **Moraea nubigena** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 749 (1976a); Goldblatt: 68 (1986a). Type: South Africa, [Western Cape], Worcester District, near Fonteintjiesberg hut, 1 400 m, Oct. 1976, *Goldblatt 4208* (MO, holo.; K, NBG, PRE, S, iso.).

Plants tiny, 30–50 mm high at anthesis, taller in fruit. *Corm* globose, 8–10 mm diam.; tunics of fine, pale fibres accumulating in a thick mass. *Stem* unbranched, 2 internodes long, middle node bearing a short sheathing, bract-like leaf ± 10 mm long. *Foliage leaf* solitary, inserted at ground level, somewhat succulent, channelled, falcate, 30–40 mm long. *Rhipidial spathes* firm, often flushed red, entirely sheathing; inner spathe 12–14 mm long, outer slightly shorter. *Flowers* fugaceous, blue, outer tepal limbs with small, yellow nectar guides at bases and claws streaked with red transverse marks; outer tepals 10–14 mm long, limbs 6–8 mm long, reflexed to ± 35°; inner tepals 8–10 mm long, limbs also reflexed. *Filaments* ± 3 mm long, united in smooth column in lower $^2/_3$, diverging above; anthers 1.5–2.0 mm long; pollen white. *Ovary* ovoid, ± 2 mm long, style branches broad, 3 mm long, crests erect, ± 2 mm long. *Capsules* subglobose, ± 5 mm diam. *Seeds* unknown. *Chromosome number* 2*n* = 20. *Flowering time*: late September to mid-October.

Distribution and ecology: known only from Fonteintjiesberg at ± 1 400 m in the Brandwacht Mtns near Worcester in Western Cape, South Africa; on wet, moss-covered sandstone pavement close to streams.

Diagnosis: *Moraea nubigena* is immediately recognised by its low stature, no more than 50 mm high when in bloom, an unbranched stem, solitary foliage leaf, and blue, fugaceous flowers. The flower itself is unexceptional and helps little in understanding its relationships. The species was originally assigned to sect. *Polyanthes* (now subg. *Polyanthes*), but its chromosome number $2n = 20$ is inconsistent with that placement. Molecular study places *M. nubigena* in an isolated position but embedded among species with the same chromosome number. It is provisionally placed in sect. *Polyphyllae* of subg. *Moraea*, where it is notable for being the only blue-flowered species of the subgenus.



Distribution of ***Moraea nubigena***.

Subg. 5. **Galaxia**

Subg. **Galaxia** *(Thunb.) Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 37 (2013). *Galaxia* Thunb.: 50 (1782a). *Moraea* sect. *Galaxia* (Thunb.) Goldblatt: 376 (1998). Type: *G. graminea* Thunb., lecto., designated by Phillips: 213 (1951) = *M. fugacissima* (L.f.) Goldblatt

Plants acaulescent at anthesis; corm tunics pale, finely to coarsely fibrous. *Leaves* several, often plane and ± prostrate, narrowly channelled or terete. *Rhipidial spathes* hardly or not at all distinct from leaves, enclosing one flower. *Flowers* fugaceous, sessile, with solid perianth tube, yellow, white, or shades of pink to purple; tepals mostly without narrow claws (not *M. kamiesmontana*); style branches much reduced with crests obscure, stigma lobes entire or irregularly fringed. *Capsules* ± globose. *Basic chromosome number* $x = 9$.

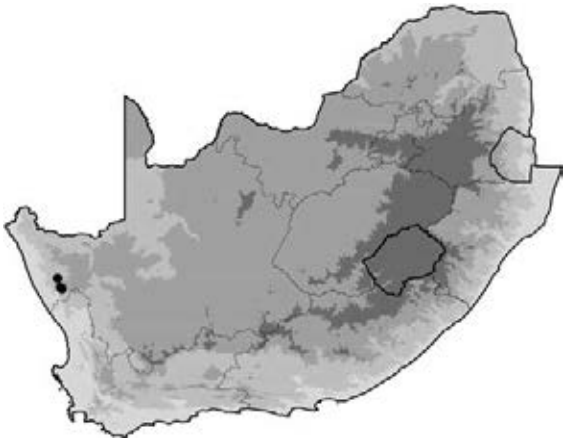
Individual flowers are subtended by two foliar structures, a shorter inner and longer outer one, both with closed sheaths and inserted a short distance below the base of the ovary, i.e., at the base of a pedicel. The flower and these two foliar structures share a short stalk, a branch or peduncle. At the base of the branch there is a scale-like membranous prophyll with two keels.

Ser. **Unguiculatae** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 37 (2013). Type: *Moraea kamiesmontana* (Goldblatt) Goldblatt

Flowers pink with white cup; tepals prominently clawed; filaments partly united; style and stigma lobes undivided.

30. **Moraea kamiesmontana** *(Goldblatt) Goldblatt* in Novon 8: 377 (1998). *Galaxia kamiesmontana* Goldblatt: 1084 (1984b). Type: South Africa, [Northern Cape], Namaqualand, Kamiesberg Mtns, Rooiberg, shallow soil on rock shelves, *Goldblatt 5560* (MO, holo.; K, NBG, PRE, S, WAG, iso.).

Plants tiny, up to 20 mm high when in bloom. *Corm* ovoid, 3–5 mm diam.; tunics of light brown, netted fibres with prominent vertical ribs. *Stem* underground at flowering, reaching up to 50 mm above ground in fruit. *Leaves* 2 to 5, falcate, shallowly channelled to plane, up to 30 × 1 mm, acute, with broad transparent sheathing bases below ground, margins smooth. *Rhipidial spathes* hardly distinct from leaves. *Flowers* fugaceous, bell-shaped, light purple with yellow claws and nectar guides at bases of tepal limbs; perianth tube 5–10 mm long, cylindric; tepals 10–12 mm long, clawed, claws ascending, forming a narrow cup including filament column, limbs extended horizontally, outer up to 5 mm wide, inner up to 4 mm wide. *Filaments* ± 5 mm long, united below in a cylindric column, free and diverging in upper 0.5–1.0 mm, yellow; anthers just < 2 mm long, diverging, yellow.



Distribution of ***Moraea kamiesmontana***.

Ovary oblong-cylindric, ± 3 mm long, style diverging into three lobes at midanther level, stigma lobes shorter than or barely overtopping anthers, margins entire, minutely ciliate, incurving opposite anther, radial margins slightly raised. *Capsules* 6–7 mm long. *Seeds* angular, < 0.5 mm diam. *Chromosome number* 2*n* = 18. *Flowering time*: May and June.

Distribution and ecology: local at higher elevations in the Kamiesberg of central Namaqualand in Northern Cape, South Africa, and currently known only from above 1 200 m elevation on Rooiberg and Sneeukop; in shallow, seasonally waterlogged places on rocky pavement.

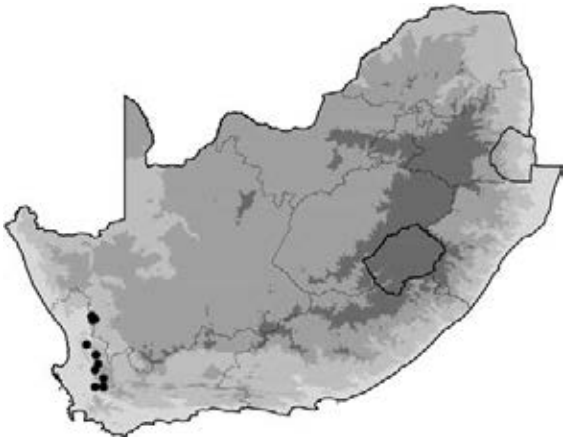
Diagnosis: *Moraea kamiesmontana* stands out in subg. *Galaxia* not only in its particularly small size but in the structure of its flowers. In other species of the subgenus the flowers have flaccid, widely cupped tepals that lack distinct claws, but in *M. kamiesmontana* the ascending tepal claws form a narrow cup enclosing the filaments and the limbs are sharply flexed at right angles to the cup, thus extended horizontally. The chromosome number, 2*n* = 18, is the ancestral number for the subgenus, and we interpret *Moraea kamiesmontana* as a relict species, surviving in specialised, seasonally moist, montane habitats.

Ser. **Eurystigma** *(Goldblatt) Goldblatt* in Novon 8: 377 (1998). *Galaxia* subg. *Eurystigma* Goldblatt: 398 (1979a). *Galaxia* ser. *Eurystigma* (Goldblatt) Goldblatt: 376 (1998). Type: *G. versicolor* Salisb. ex Klatt = *Moraea versicolor* (Salisb. ex Klatt) Goldblatt

Flowers pink to purple or white (yellow or orange in *M. citrina*); filaments united entirely or free and diverging distally; style branches with stigma lobes undivided.

31. **Moraea citrina** *(G.J.Lewis) Goldblatt* in Novon 8: 377 (1998). *Galaxia citrina* G.J.Lewis: 4 (1938); Goldblatt: 405 (1979a). Type: South Africa, [Western Cape], between De Keur and Gydo, *Martin s.n.* (BOL, holo.; NBG, iso.).

Plants up to 50 mm high. *Corm* 8–12 mm diam.; tunics coarsely fibrous with prominent vertical ribs. *Stem* underground at flowering. *Foliage leaves* channelled, lowermost 30–70 mm long, spreading or lowermost prostrate, upper shorter, smooth, glossy, margins hyaline, minutely ciliate. *Rhipidial spathes* not distinct from leaves; with 3 to 5 flowers per plant. *Flowers* fugaceous, ± salver-shaped with tepals cupped below, usually uniformly yellow, sometimes with blackish markings at edge of floral cup, rarely orange-red with yellow centre; perianth tube 13–28 mm long; tepals ± equal, obovate, mostly 18–28 × 9–11 mm. *Filaments* united in a column up to 6 mm long; anthers sessile, 3.5–5.0 mm long, yellow; pollen yellow. *Ovary* ovoid, ± 4 mm long; style straight, dividing above anther tips, stigma lobes entire. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 16, 14, 34. *Flowering time*: mainly August to late September.



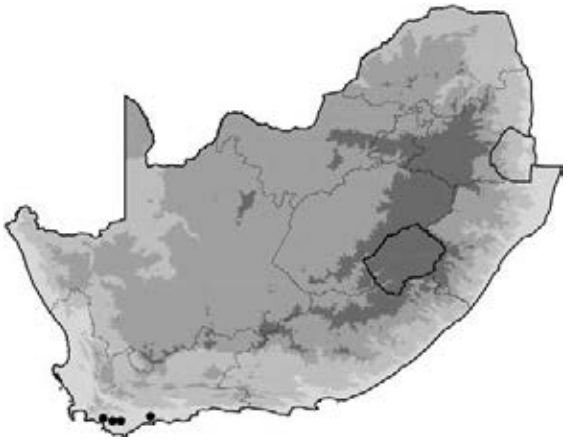
Distribution of ***Moraea citrina***.

Distribution and ecology: extending from the Bokkeveld Mtns in Northern Cape, South Africa, south through the Cederberg to Gydo Pass near Ceres in Western Cape; typically on sandy ground, sometimes on shallow soil over sandstone pavement.

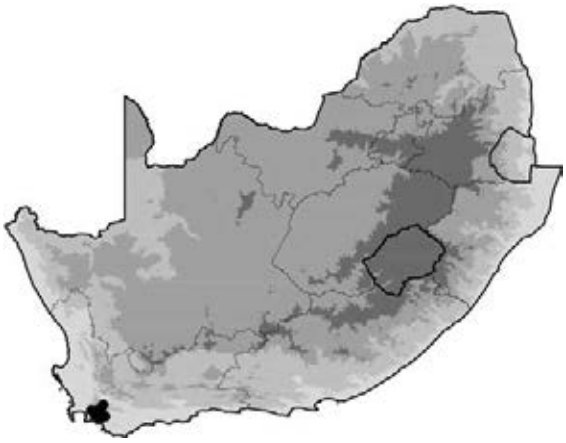
Diagnosis: the only yellow-flowered species of ser. *Eurystigma*, *Moraea citrina* has relatively large flowers with tepals usually 20–28 mm long and rarely wider than 10 mm. The glossy leaves are channelled and have straight margins. It is one of just two species of the series with sessile anthers, the other being *M. versicolor*. Orange-flowered plants are known from the Bokkeveld Mtns at the northern end of its range. Hybrids have been recorded near Ceres between *M. citrina* and *M. variabilis*. These plants have larger flowers in a range of colours, mostly pale orange, not recorded in either species.

32. **Moraea melanops** *Goldblatt & J.C.Manning* in Novon 10: 19 (2000a). Type: South Africa, Western Cape, Bredasdorp District, Fairfield Farm, 18 Aug. 1995, *Goldblatt & Nänni 10249* (NBG, holo.; K, MO, iso.).

Plants acaulescent, up to 40 mm high. *Corm* globose, asymmetric below, 10–15 mm diam.; tunics of cartilaginous layers, with age decaying into fibres arranged in herringbone pattern, or with hard vertical claw-like ribs separated by fine cross fibres, accumulating in a dense mass around base. *Stem* underground at flowering. *Leaves* several, lowermost inserted below ground shortly above corm, others in a basal cluster, ± prostrate, obovate to lanceolate, shallowly channelled, 20–35 × 10–14 mm, slightly undulate, margins occasionally crisped. *Rhipidial spathes* not distinct from leaves; with 2 to 5 flowers per plant. *Flowers* fugaceous, ± salver-shaped with tepals shallowly cupped, light to dark purple, dark purple-black at bases; perianth tube cylindric, 18–27 mm long; tepals subequal, laxly spreading, obovate, ± 16 × 9–10 mm. *Filaments* ± 3 mm long, free or united in lower half, initially erect and contiguous, later diverging, yellow; anthers ± 3 mm long, purple; pollen yellow. *Ovary* oblong-cylindric, ± 4 mm long; style straight,



Distribution of ***Moraea melanops***.



Distribution of ***Moraea barnardiella***.

reaching ± 1 mm beyond anther tips, dividing into three short lobes, initially upright and appressed to one another, later spreading and lying just above anthers. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 16. *Flowering time*: late July to mid-September.

Distribution and ecology: a rare endemic of Western Cape, South Africa, occurring in the Caledon and Bredasdorp Districts, from the southern slopes of Shaw's Mtns to the Potberg; in heavy clay soil in renosterveld, flowering well only in disturbed sites or after fire.

Diagnosis: the purple flower with a dark centre and shallowly cupped tepals recall particularly *Moraea barnardiella*, and it is to that species that *M. melanops* is evidently most closely allied. Vegetatively, they appear to be identical but *M. melanops* has free to partly united filaments diverging distally and the style exceeds the anthers and has fairly narrow branches, whereas *M. barnardiella* has filaments free in the upper $^1/_3$ and strongly diverging above, and the style divides opposite the apex of the filament column, with broader branches than in *M. melanops*.

33. **Moraea barnardiella** *Goldblatt* in Novon 8: 377 (1998), as a new name for *Galaxia barnardii* Goldblatt: 398 (1979a) [not *M. barnardii* L.Bolus (1933)]. Type: South Africa, [Western Cape], Caledon Division, clay slopes between Eseljacht and Queen Anne, *Goldblatt 2499* (MO, holo.; BOL, K, NBG, PRE, S, WAG, iso.).

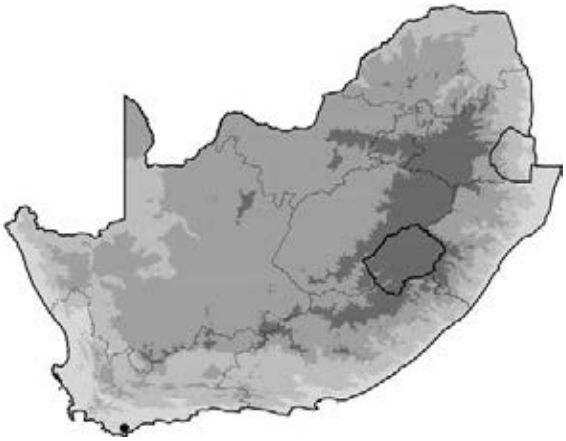
Plants acaulescent, up to 50 mm high, including flowers. *Corm* up to 18 mm diam.; tunics of brown, knotted fibres. *Stem* underground at flowering. *Leaves* lowermost inserted below ground shortly above corm, others in a basal cluster, channelled, 40–60 mm long, margins undulate to slightly crisped, minutely ciliate. *Rhipidial spathes* not distinct from leaves; with 2 to 5 flowers per plant. *Flowers* fugaceous, salver-shaped, purple-pink with dark purple-black centre; perianth tube 15–30 mm long, cylindric, purple-black; tepals spreading from base, broadly obovate, obtuse or bluntly acute, mostly 18–25 mm long, outer 10–14 mm wide, inner tepals slightly narrower. *Filaments* 4.0–6.5 mm long, united below in cylindric column, free and diverging in distal 1–2 mm; anthers 3.0–3.5 mm long, curving upward distally, exceeding style branches, yellow; pollen yellow. *Ovary* ovoid, ± 4 mm long; style dividing opposite apex of filament column, branches short, bearing broad, erect, undulate stigmatic lobes appressed to each other. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 16. *Flowering time*: late August to late September.

Distribution and ecology: restricted to the Caledon District of Western Cape, South Africa, from near Villiersdorp to Caledon; on shale and clay flats and slopes.

Diagnosis: *Moraea barnardiella* is recognised by the purple flowers with a purple-black centre and spreading rather than cupped tepals, and the partly united filaments, free in the distal 1–2 mm. The yellow anthers exceed the unusually broad style branches. *Moraea barnardiella* is vegetatively almost identical to *M. melanops* but the latter has shallowly cupped tepals, free to partly united filaments diverging distally, and the style exceeds the anthers and has fairly narrow branches.

34. **Moraea minima** *Goldblatt* in Novon 8: 377 (1998), as a new name for *Galaxia parva* Goldblatt: 1085 (1984b) [not *M. parva* N.E.Br. (1929)]. Type: South Africa, [Western Cape], Farm Mierkraal, SSW of Bredasdorp, *Goldblatt 6181A* (MO, holo.; K, NBG, PRE, iso.).

Plants solitary, small, 20–30 mm high. *Corm* up to 10 mm diam.; tunics brown, with prominent woody vertical ribs. *Stem* underground, extending 20–40 mm above ground in fruit. *Foliage leaves* 3 or 4, bifacial, ± flat or shallowly channelled, outer ± prostrate, acute and acuminate, undulate, 15–35 × ± 8 mm, margins hyaline, smooth. *Rhipidial spathes* not distinct from leaves; with (1)2 or 3 flowers per plant. *Flowers* fugaceous, bell-shaped, white with yellow centre, tepals with turquoise markings in midlines; perianth tube 7–10 mm long, cylindric; tepals 9–12 × 5–6 mm. *Filaments* 3–4 mm long,



Distribution of ***Moraea minima***.

united below in a cylindric column, free and diverging in upper 0.6–1.5 mm, yellow; anthers 1.5–2.0 mm long, yellow; pollen yellow. *Ovary* ± globose, ovoid, ± 4 mm long; style diverging near anther bases, arms reaching ± middle of anthers, stigma lobes with entire, minutely ciliate margins, lobes separate or ± continuous at edges. *Capsules* and *seeds* not known. *Chromosome number* 2*n* = 12. *Flowering time*: late July to early September.

Distribution and ecology: known only from clay flats at Mierkraal Farm, SSW of Bredasdorp in Western Cape, South Africa; in light loamy clay in coastal renosterveld (recorded just once and critically rare if not extinct).

Diagnosis: with very small, white flowers, *Moraea minima* has nearly prostrate leaves with flat or shallowly channelled blades and style branches with entire stigmatic lobes. The flowers have a perianth tube only 7–10 mm long and tepals 9–12 mm long. Possibly most closely related to *M. melanops* or *M. versicolor*, both of which have larger, pink to purple flowers, *M. minima* differs significantly in having a short style so that the stigma lobes reach only to the middle of the anthers, the pollen thus in direct contact with the stigmas, and the species is self-compatible and, under greenhouse conditions, autogamous. The similarity of the small white flowers of *M. minima* to those of *M. albiflora*, which is also autogamous, is superficial and *M. albiflora* has the fringed style branches typical of ser. *Galaxia*.

Moraea minima has a unique chromosome number in subg. *Galaxia*, a derived diploid number of 2*n* = 12, the lowest number in the genus (base number is *x* = 9 in subg. *Galaxia*). The karyotype is structurally heterozygous and because the species produces ample seed, its embryology will undoubtedly prove to be of unusual interest.

35. **Moraea versicolor** *(Salisb. ex Klatt) Goldblatt* in Novon 8: 377 (1998). *Galaxia versicolor* Salisb. ex Klatt: 783 (1864); Goldblatt: 400 (1979a). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 291, lower right (1792).

Galaxia ovata var. *purpurea* Ker Gawl.: t. 1516 (1812). *Galaxia purpurea* (Ker Gawl.) Klatt: 385 (1882). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 1516 (1812).

Galaxia ovata var. *ecklonii* Baker: 97 (1892). Type: South Africa, [Western Cape], Cape Town, Devil's Peak, *Ecklon 308* (S, lecto., designated by Goldblatt: 401 (1979a); K, MO, PRE, isolecto.).

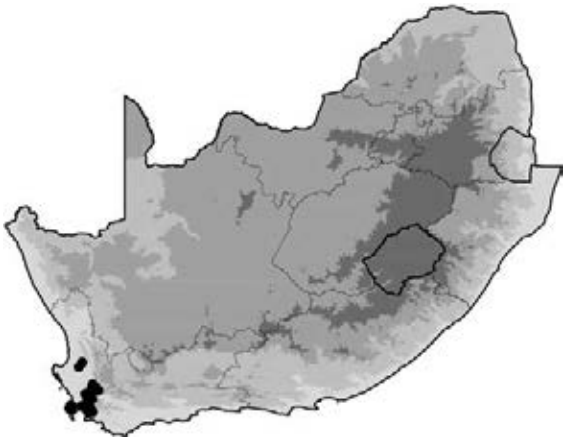
[*Galaxia mucronularis* Salisb.: 315 (1812), invalid name without description.]

[*Galaxia violacea* Eckl.: 17 (1827), invalid name without description.]

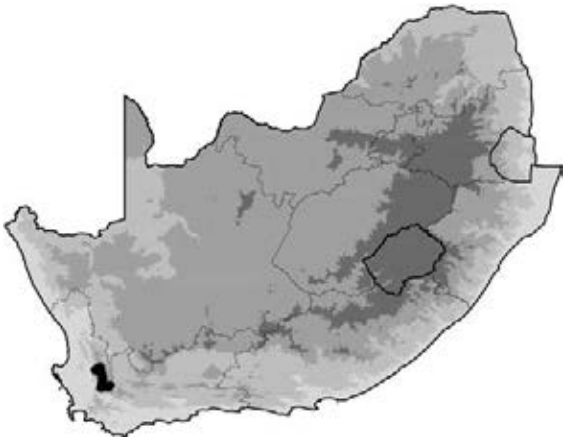
Plants acaulescent, up to 40 mm high. *Corm* ± globose, 10–15 mm diam.; tunics of dark brown, reticulate fibres arranged in herringbone pattern, vertical ribs often thick and woody, often accumulating in a dense mass. *Stem* underground at flowering. *Leaves* in a basal tuft, lowermost inserted below ground shortly above corm, short and inconspicuous, laxly spreading to ± prostrate, lanceolate, widely channelled to flat, 30–50 × 3–6 mm, undulate, margins occasionally crisped, minutely ciliate. *Rhipidial spathes* hardly distinct from leaves, with up to 5 flowers per plant. *Flowers* fugaceous, salver-shaped with tepals cupped in lower half, pink to purple or red, usually yellow in cup with dark pigment at edge of cup and yellow stamens and style OR tepals dark blue to purple in centre and usually with purple-black stamens and style; perianth tube cylindric, (10–)18–27 mm long; tepals subequal, spreading distally, obovate, 14–22 × 7–14 mm. *Filaments* 5–6 mm long, united below in cylindric or bottle-shaped column slightly wider in lower half, free and ascending in distal 1.0–1.5 mm; anthers ± erect, 2.5–4.0 mm long, shorter after dehiscing, yellow or purple; pollen yellow. *Ovary* oblong-cylindric, ± 4 mm long; style straight, dividing 2–3 mm above anther tips into 3 short, spreading stigmatic lobes with undulate margins, yellow. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 16, 14. *Flowering time*: late July to mid-September; flowers open ± 12:30 and collapse ± 16:30.

Distribution and ecology: restricted to the southwestern Western Cape, South Africa, from the Olifants River Mtns and Piketberg inland in the Tulbagh and Breede River Valleys and south to Gordon's Bay and the Cape Peninsula; typically on heavy soils derived from shales or granite.

Diagnosis: *Moraea versicolor* has pink to purple flowers with tepals forming a cup in the lower half, usually with a yellow centre but populations with a blue to violet centre occur locally. The leaves are usually somewhat glaucous and widely channelled and often somewhat twisted, with undulate margins. The filaments are free and diverging in the upper 1.0–1.5 mm and united in the lower part, usually forming a bottle-shaped column wider in the lower half but populations with a cylindric filament column occur in the Breede River Valley. The style divides above the anthers, often exceeding them



Distribution of ***Moraea versicolor***.



Distribution of ***Moraea variabilis***.

by 3–4 mm. *Moraea variabilis* has similarly coloured flowers but glossy, channelled leaves with straight margins, and filaments united entirely or rarely free distally for less than 1 mm, with the style dividing just above the anther tips. The species is variable for chromosome number and most populations have a diploid number of $2n = 16$ but plants from the northern Cape Peninsula and from the Tulbagh Valley have $2n = 14$.

36. **Moraea variabilis** *(G.J.Lewis) Goldblatt* in Novon 8: 377 (1998). *Galaxia variabilis* G.J.Lewis: 6 (1938); Goldblatt: 403 (1979a). Type: South Africa, [Western Cape], between De Keur and Gydo Pass, *Compton & party s.n.* as *Nat. Bot. Gard. 2080/36* (BOL, holo.; NBG, iso.).

Plants acaulescent, up to 40 mm high. *Corm* ± globose, 10–15 mm diam.; tunics of dark brown, netted fibres arranged in herringbone pattern, vertical ribs often thick and woody, often accumulating in a dense mass. *Stem* underground at flowering. *Leaves* in a basal tuft, ± straight, spreading, lowermost often ± prostrate, oblong to lanceolate, channelled to flat, 30–50 × ± 6 mm, margins ± straight, minutely ciliate. *Rhipidial spathes* hardly distinct from leaves, with up to 5 flowers per plant. *Flowers* fugaceous, salver-shaped with tepals cupped in lower halves, usually dark pink-purple with yellow cup and darkly pigmented at edge of cup; perianth tube cylindric, 12–30 mm long; tepals subequal, spreading distally, obovate, 20–35 × 10–13 mm. *Filaments* ± 6 mm long, united in smooth, straight column, rarely free in distal ± 1 mm, usually yellow; anthers sessile (or nearly so), ± erect, 3–4 mm long before splitting, yellow or purple; pollen yellow. *Ovary* oblong-cylindric, ± 4 mm long; style straight, dividing above anther tips into 3 short, spreading stigmatic lobes, margins undulate. *Capsules* and *seeds* unknown. *Chromosome number* $2n = 14$. *Flowering time*: September to mid-October.

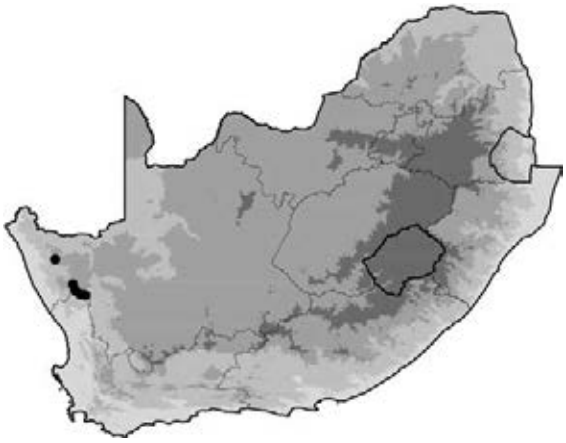
Distribution and ecology: restricted to interior Western Cape, South Africa, from the Cold Bokkeveld near Eland's Kloof southward to Lakenvlei southeast of Ceres in the Warm Bokkeveld; in heavy clay soils.

Diagnosis: with a reddish purple flower with yellow cup, *Moraea variabilis* most resembles *M. versicolor* but differs in the glossy, dark green leaves, channelled with straight margins, filaments usually united entirely or rarely free for less than 1 mm, thus with the anthers sessile or almost so, and the style dividing just above the anther tips. *Moraea versicolor* has the leaves usually glaucous and with wavy margins, the filaments free and diverging in the upper 1.0–1.5 mm, and the style dividing 2–3 mm above the tips of the anthers. The ranges of the two species are complimentary.

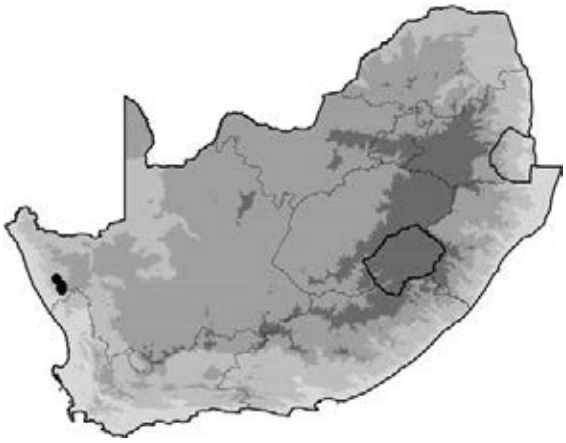
Apparent hybrids with *Moraea citrina* have been recorded at a few sites and have large orange or pink flowers. The variation in flower size and colour among the hybrids suggests that they are interbreeding.

37. **Moraea fenestralis** *(Goldblatt & E.G.H.Oliv.) Goldblatt* in Novon 8: 377 (1998). *Galaxia fenestralis* Goldblatt & E.G.H.Oliv.: 406 (1993). Type: South Africa, [Northern Cape], Namaqualand, Kliprand, valley northwest of Farm Matjiesfontein toward Farm Middelpos, low granite outcrop, 960 m, June 1991, *Oliver 9847* (NBG, holo.; K, MO, PRE, iso.).

Plants up to 25 mm high. *Corm* ± ellipsoid, 6–8 mm diam.; tunics of light brown, netted fibres with prominent vertical ribs. *Stem* underground at flowering. *Leaves* in a basal tuft, 3 or 4, falcate, terete, 10–35 × 0.6–1.0 mm, with transparent adaxial band. *Rhipidial spathes* not distinct from leaves; with 1 to 3 flowers per plant. *Flowers* fugaceous, salver-shaped with tepals slightly cupped, pale pink to lilac or ± white with yellow at bases; perianth tube ± 8 mm long, cylindric; tepals ± 15 mm long, narrowed below into claws ± 6 mm long, inner tepals joined to filament column for ± 2 mm. *Filaments* ± 7 mm long, united below in a cylindric column, free and diverging in upper ± 1 mm; anthers ± 2 mm long, erect, yellow; pollen yellow. *Ovary* ± ovoid, ± 4 mm long; style branches short, dividing into 3 broad, stigmatic lobes at midanther level, margins undulate, entire. *Capsules* ovoid-ellipsoid, ± 6 mm long. *Seeds*



Distribution of ***Moraea fenestralis***.



Distribution of ***Moraea kamisensis***.

globose, 0.6 mm diam., dark brown. *Flowering time*: June and July; opening ± 10:00 and collapsing ± 15:30.

Distribution and ecology: a poorly documented species recorded from the low hills near Kliprand and the interior Kamiesberg to near Okiep in Namaqualand, Northern Cape, South Africa; restricted to exposed granite outcrops.

Diagnosis: one of the smallest species of subg. *Galaxia*, *Moraea fenestralis* has falcate, terete leaves with a transparent band of tissue on the upper (adaxial) surface. Plants bloom early in the season, mostly in June but also July, and the small flowers have tepals ± 15 mm long. An unusual feature of the flowers is that the inner tepals are joined to the filament column for ± 2 mm. The short style branches bear broad stigmatic lobes with entire, undulate margins, the ancestral condition for the subgenus. The relationships of *M. fenestralis* are uncertain but it is assigned here to ser. *Eurystigma* based on DNA sequence data.

Ser. **Galaxia** *(Thunb.) Goldblatt* in Novon 8: 376 (1998). *Galaxia* Thunb.: 50 (1782a). Type: as for subgenus.

Flower yellow or white, filaments united in a column, sometimes free and diverging distally or spreading from base (*M. luteoalba*); style branches with fringed stigma lobes.

38. **Moraea kamisensis** *Goldblatt* in Novon 8: 377 (1998), as a new name for *Galaxia grandiflora* Andrews: t. 164 (1801) [not *M. grandiflora* (Cav.) Pers. (1805)]; Goldblatt: 407 (1979a). Type: South Africa, without precise locality, possibly collected by J. Niven, illustration in Andrews: t. 164 (1801).

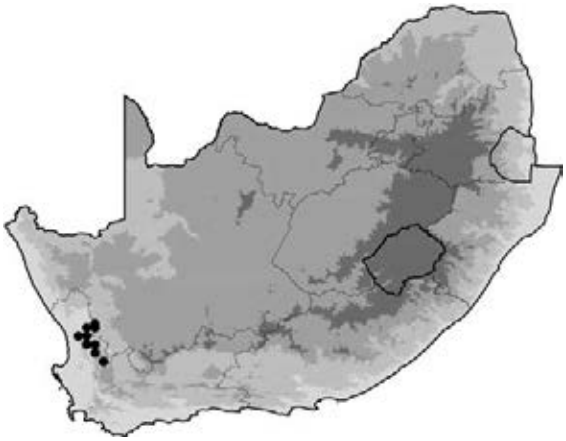
Plants up to 45 mm high, including flowers. *Corm* 6–8 mm diam.; tunics of brown, reticulate fibres. *Stem* underground at flowering. *Foliage leaves* few, not clearly distinguished from rhipidial spathes, inserted at ground level, lower spreading to ± prostrate, oblong, ± plane, obtuse, margins thickened, ± translucent, ciliate. *Rhipidial spathes* not distinct from leaves; with 2 to 5 flowers per plant. *Flowers* fugaceous, salver-shaped with tepals cupped below, yellow; perianth tube 15–25 mm long, cylindric; tepals obovate, 22–30 × 11–15 mm, obtuse, usually apiculate. *Filaments* ± 6 mm long, united in a cylindric column; anthers 4–5 mm long, erect, yellow; pollen yellow. *Ovary* ovoid, ± 5 mm long; style ± 8 mm long, dividing into short, horizontal, deeply fringed stigmatic lobes. *Capsules* and *seeds* unknown. *Chromosome number* $2n = 18$. *Flowering time*: September to early October; flowers opening ± 11:30 and collapsing after 16:00.

Distribution and ecology: restricted to middle elevations of the Kamiesberg in Northern Cape, South Africa; locally common in sandy, granitic gravel, flowering particularly well after fire.

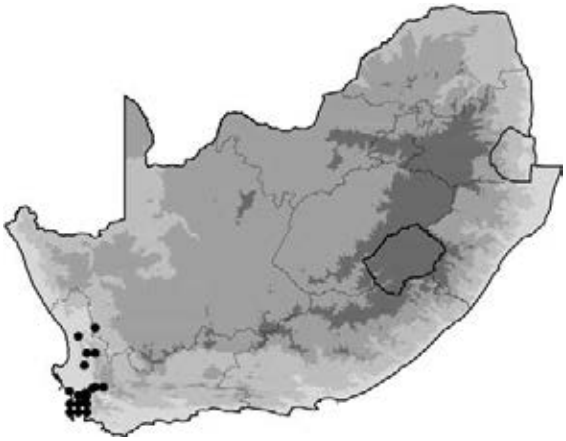
Diagnosis: largest member of ser. *Galaxia*, *Moraea kamisensis* has large yellow flowers, the perianth tube up to 25 mm long and tepals 22–30 mm long. The spreading to nearly prostrate foliage leaves have conspicuously thickened, ± translucent margins (hyaline when dry) that are fairly densely ciliate, similar to those of leaves of *M. galaxia*.

39. **Moraea luteoalba** *(Goldblatt) Goldblatt* in Novon 8: 377 (1998). *Galaxia luteoalba* Goldblatt: 410 (1979a). Type: South Africa, [Western Cape], Pakhuis Pass, *Goldblatt 2205* (MO, holo.; K, NBG, PRE, iso.).

Plants up to 50 mm high, often growing in small clumps. *Corm* 12–16 mm diam.; tunics of fine fibres accumulating in a dense mass. *Stem* underground at flowering. *Foliage leaves* not clearly distinguished from rhipidial spathes, inserted at ground level, ovate, lower 2 prostrate, ovate-oblong, ± plane, 20–40 × up to 6 mm, margins hyaline, densely ciliate. *Rhipidial spathes* not distinct from leaves; with 2 to 5 flowers per plant. *Flowers* fugaceous, ± salver-shaped, usually deep yellow in centre with tepals grading to creamy white distally or uniformly yellow;



Distribution of ***Moraea luteoalba***.



Distribution of ***Moraea galaxia***.

perianth tube cylindric, 7–16 mm long; tepals obovate, ± obtuse, 15–21 × 7–10 mm. *Filaments* 5.5–7.5 mm long, united in lower ± 2 mm, diverging above; anthers 2–3 mm long, yellow; pollen yellow. *Ovary* ovoid, ± 3 mm long; style slender, initially erect, dividing above anther tips, later eccentric, stigma lobes fringed. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 18. *Flowering time*: mid-August to September.

Distribution and ecology: restricted to the Gifberg–Matsikamma Mtns and the Cederberg in Western Cape, South Africa; often on sandstone outcrops, sometimes at the edge of seasonal pools or in moss beds in shallow ground.

Diagnosis: the ovate to oblong, ± prostrate leaves of *Moraea luteoalba* are like those of the more common *M. galaxia* but it has sharply different flowers with tepals deep yellow in the centre typically grading to creamy white distally or sometimes uniformly yellow, and filaments united only in the lower third and diverging distally. *Moraea galaxia* always has uniformly yellow flowers with the filaments united entirely in a bottle-shaped column, with the anthers appressed to the style.

40. **Moraea galaxia** *(L.f.) Goldblatt & J.C.Manning* in Strelitzia 9: 714 (2000b). *Ixia galaxia* L.f.: 93 (1782). Type: South Africa, without precise locality, *Sparrman s.n.* [S, lecto., designated by Goldblatt: 412 (1979a)].

Galaxia ovata Thunb.: 51 (1782a); Goldblatt: 412 (1979a). *Moraea ovalifolia* Goldblatt: 377 (1998), as a new name for *G. ovata* Thunb. (1782a) [not *M. ovata* Thunb. (1800)]. Type: South Africa, [Western Cape], vicinity of Cape Town, *Thunberg s.n.* (UPS-THUNB 15450, lecto., designated by Goldblatt: 412 (1979a); C, S, isolecto.).

Galaxia multiflora Spreng.: 251 (1820). Type: unknown.

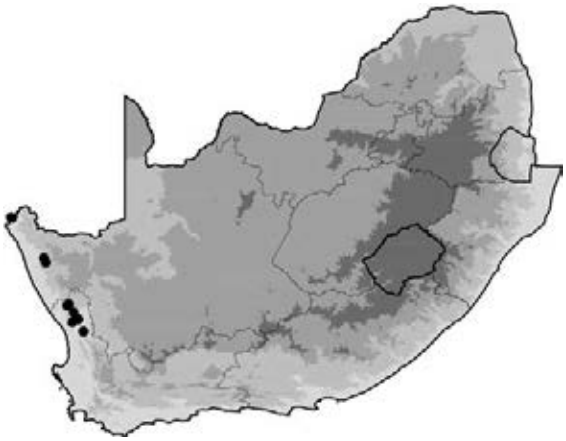
Plants solitary or several in cushion-like tufts. *Corm* ± 10 mm diam.; tunics of brown, netted fibres, sometimes with prominent vertical ridges. *Stem* underground at flowering. *Foliage leaves* prostrate, ± plane, lowermost 20–30 mm long, often slightly undulate, margins thickened, pale, ciliate in a single row or densely ciliate over thickened area. *Rhipidial spathes* not distinct from leaves; with 2 to 5 flowers per plant. *Flowers* fugaceous, salver-shaped with tepals cupped below, uniformly yellow; perianth tube (5–)10–20 mm long, cylindric; tepals ± ovate or obovate, 16–20 × 6–8 mm. *Filaments* united in a column 4–5 mm long, often bottle-shaped, yellow; anthers sessile, 2–3 mm long, erect, yellow; pollen yellow. *Ovary* ovoid, ± 3 mm long; style slender, initially erect, dividing above anther tips, stigma lobes fringed. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 18, 36. *Flowering time*: late July to mid-September; opening after 10:30 and collapsing after 16:00.

Distribution and ecology: relatively widespread in Western Cape, South Africa, from the Cederberg and Piketberg Mtns south to the Cape Peninsula and east to the Caledon District; on sandstone pavement and rock crevices, occasionally in open sandy ground.

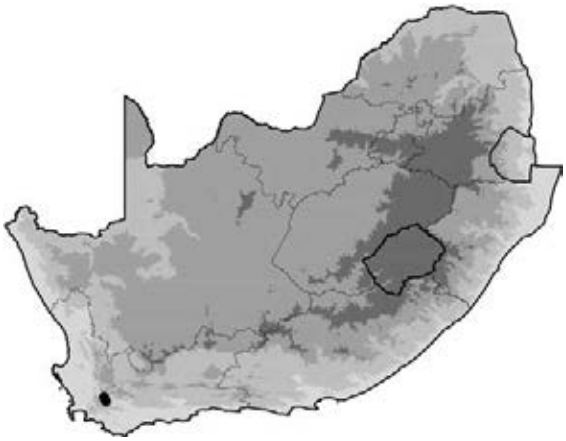
Diagnosis: one of the most common species of subg. *Galaxia*, *Moraea galaxia* has the yellow flowers and fringed style lobes typical of ser. *Galaxia* and is best distinguished by the broad, ± ovate leaves prostate or nearly so and with thickened, usually densely ciliate margins. The filaments are united in a bottle-shaped column with the sessile anthers appressed to the style. Over most of its range *M. galaxia* is tetraploid, 2*n* = 36, but diploid plants, 2*n* = 18 occur in the southeast of its range in the Caledon District.

41. **Moraea pilifolia** *Goldblatt* in Novon 8: 377 (1998), as a new name for *Galaxia ciliata* Pers.: 41 (1805) [not *M. ciliata* (L.f.) Ker Gawl.]. Type: South Africa, without precise locality or collector, illustration in Andrews: t. 94 (1800b).

Plants solitary or several in small tufts, up to 50 mm high. *Corm* 8–12 mm diam.; tunics of fine, netted fibres accumulating with age in a dense mass around base.



Distribution of ***Moraea pilifolia***.



Distribution of ***Moraea vuvuzela***.

Stem underground at flowering. *Foliage leaves* ascending below, recurving distally, oblong, obtuse, shallowly channelled, often slightly undulate, lower, up to 20 × 9 mm, margins thickened, hyaline when dry, densely long-ciliate. *Rhipidial spathes* not distinct from leaves; with 1 to 3 flowers per plant. *Flowers* fugaceous, uniformly yellow, salver-shaped with tepals cupped below; perianth tube cylindric, 4.5–10.0 mm long; tepals subequal, ovate-obovate, 6–10 mm long. *Filaments* united in a cylindric tube 3.5–4.0 mm long; anthers sessile, diverging, 2.5–3.5 mm long, yellow; pollen yellow. *Ovary* ± 2.5 mm long; style dividing opposite anther tips, stigma lobes short, deeply fringed, spreading above anthers. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 18. *Flowering time*: June and July, rarely in early August.

Distribution and ecology: largely a Northern Cape species, extending from near Beauvalon in the Richtersveld and Nababeep in northern Namaqualand to the slopes of the Gifberg in Western Cape, South Africa; usually on clay substrates, often wedged in rock crevices.

Diagnosis: a relatively small plant, *Moraea pilifolia* has pale yellow flowers with a perianth tube up to 10 mm long and tepals 6–10 mm long, otherwise typical of ser. *Galaxia*, thus with united filaments, sessile anthers and short, fringed style branches. The leaves are distinctive in their oblong shape with thickened, densely long-ciliate margins. It most closely resembles *M. galaxia*, which has broader, usually prostrate leaves, the margins with short cilia, and larger flowers with tepals 16–20 mm long.

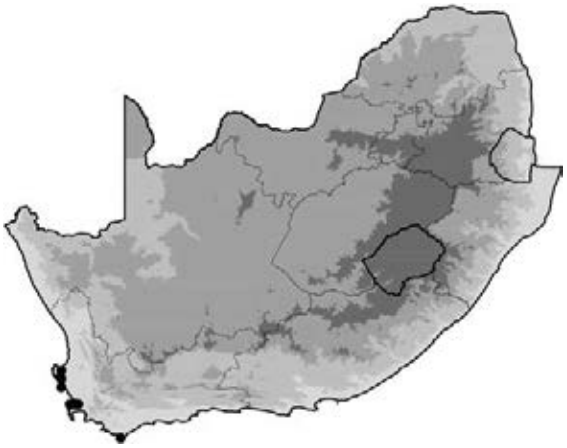
42. **Moraea vuvuzela** *Goldblatt & J.C.Manning* in Bothalia 40: 148 (2010). Type: South Africa, Western Cape, Rawsonville, hills between Breede River and Brandvlei Dam, burnt clay slope, 21 July 2009, *Le Roux & Manning 591* (NBG, holo.; K, MO, PRE, iso.).

Plants up to 40 mm high, forming small tufts. *Corm* subglobose, 10–15 mm diam.; tunics of alternating layers of fine fibres and hard, cartilaginous material, with thickened vertical ribs, accumulating with age in collar around base. *Stem* underground or reaching up to 10 mm above ground. *Leaves* ± 3, lowermost inserted well below ground shortly above corm, short and inconspicuous, remaining 2 leaves inserted at ground level, ± prostrate, narrowly lanceolate, 20–35 × 3–4 mm, shallowly channelled, margins hyaline, smooth or minutely ciliate. *Rhipidial spathes* not distinct from leaves; with 2 to 4 flowers per plant. *Flowers* fugaceous, salver-shaped, pale yellow with median brown or purplish markings at top of darker yellow cup 7–10 mm deep; perianth tube cylindric, 8–10(–15) mm long; tepals obovate, 20–25 × 7–10 mm. *Filaments* ± 7 mm long, united in a baluster-shaped column, free and diverging in upper ± 1 mm; anthers 2.0–2.5 mm long, yellow; pollen yellow. *Ovary* ± 4 × 2 mm; style erect, reaching 1.5–2.0 mm above anther tips, branches deeply fringed spreading above anthers. *Capsules* and *seeds* unknown. *Flowering time*: late July to September, rarely in early October.

Distribution and ecology: known from a handful of sites between Rawsonville and Villiersdorp in Western Cape, South Africa; in loamy clay soils in renosterveld vegetation, typically on cooler south- or southeast-trending slopes, flowering best after removal of the surrounding vegetation or after fire.

Diagnosis: with the spreading, ± fringed stigmatic lobes of ser. *Galaxia*, *Moraea vuvuzela* stands out in its pale yellow flowers with brown or purplish markings at the top of the darker yellow floral cup. Most of the remaining members of the series have uniformly bright yellow flowers. The corm tunics of *M. vuvuzela* are ± woody with prominent, thickened longitudinal ribs only partially separated from one another by transverse fibres. The corm tunics in most other species are less woody, with the longitudinal ribs separated by transverse fibres, with the exception of *M. angulata*, which has unique, woody or corky tunics with wing-like longitudinal ribs.

43. **Moraea albiflora** *(G.J.Lewis) Goldblatt* in Novon 8: 376 (1998). *Galaxia albiflora* G.J.Lewis: 44 (1941); Goldblatt: 421 (1979a). Type: South Africa, [Western Cape], Rondebosch Common, *Lewis s.n.* (SAM *54289*, holo).



Distribution of ***Moraea albiflora***.

Plants small, inconspicuous, mostly up to 30 mm high. *Corm* 8–12 mm diam.; tunics fibrous with prominent vertical ribs. *Stem* underground at flowering. *Leaves* in a basal cluster, spreading to ± prostrate, linear, channelled, 30–60 × ± 3 mm, margins hyaline, sparsely ciliate. *Rhipidial spathes* hardly distinct from leaves, with 2 to 4 flowers per plant. *Flowers* fugaceous, salver-shaped with tepals cupped below, white with yellow cup; perianth tube 10–13 mm long; tepals subequal, obovate, spreading in upper half, 9–12 × 3–4 mm. *Filaments* united in ± cylindric column ± 4 mm long; anthers sessile, erect, ± 1.5 mm long. *Ovary* ovoid, ± 3 mm long; style slender, dividing ± opposite lower $^1/_3$ to middle of anthers, branches deeply and irregularly fringed, tangled in anthers. *Capsules* and *seeds* unknown. *Chromosome number 2n* = 18. *Flowering time*: July to early September; flowers open ± 13:00 and collapse ± 15:30.

Distribution and ecology: restricted to coastal Western Cape, South Africa, from near Saldanha Bay to Cape Agulhas; on rocky granite outcrops and on wet, sandy flats.

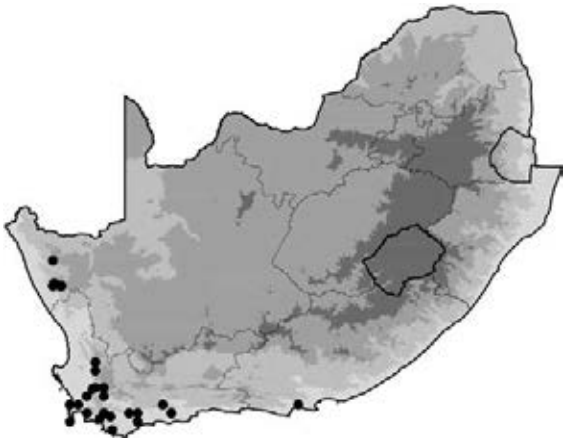
Diagnosis: an inconspicuous plant, *Moraea albiflora* has the fringed style branches characteristic of ser. *Galaxia* and is recognised by its small white flowers with a yellow cup, the tepals only 9–12 mm long, and style dividing below the apex of the anthers so that the fringed stigma lobes are tangled in the anthers. The leaves are ± straight and spreading to nearly prostrate, with finely ciliate, hyaline margins. *Moraea albiflora* is autogamous, the pollen shed directly onto the stigmatic surfaces during the few hours that each flower remains open. Despite its autogamy, hybrids with *M. fugacissima* have been recorded where the two co-occur on Rondebosch Common on the Cape Peninsula.

44. **Moraea fugacissima** *(L.f.) Goldblatt* in Novon 8: 376 (1998). *Ixia fugacissima* L.f.: 94 (April 1782); Goldblatt: 416 (1979a). *Galaxia graminea* Thunb.: 50 (July 1782a), illegitimate superfluous name [based on type of *Ixia fugacissima* L.f.] [*G. graminifolia* Harv.: 376 (1868), orthographic variant]. *Galaxia fugacissima* (L.f.) Druce: 624 (1917). Type: South Africa, [Western Cape], Cape Town, *Thunberg s.n.* [UPS-THUNB 15449, lecto., designated by Goldblatt: 416 (1979a)].

Plant solitary or several in tufts, up to 70 mm high. *Corm* mostly 10–12 mm diam.; tunics fibrous, often with prominent vertical ribs. *Stem* underground at flowering. *Leaves* in a basal tuft, ± upright or lower ± prostrate, ± linear, narrowly channelled at least in lower half, often terete distally, 30–80 × ± 2 mm, margins of channelled part smooth or rarely sparsely minutely ciliate. *Rhipidial spathes* hardly distinct from leaves, with 2 to 5 flowers per plant. *Flowers* fugaceous, salver-shaped with tepals cupped below, uniformly yellow, sweetly scented; perianth tube cylindric, (10–)15–24 mm long; tepals subequal, obovate, (11–)15–19 × 4–9 mm. *Filaments* usually entirely united (free in upper $^1/_3$), 3–6 mm long; anthers usually sessile, 1.5–4.0 mm long, yellow; pollen yellow. *Ovary* ± 2.5 mm long; style usually dividing ± 2 mm above anther tips, branches short, deeply fringed. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 18, 36. *Flowering time*: July to September; opening after 10:30 and collapsing ± 16:00.

Distribution and ecology: occurring in Northern, Western and Eastern Cape, South Africa, from south of Springbok in Namaqualand to the Cape Peninsula and east to Humansdorp, the furthest east record; mostly in seasonally wet sites, often on poorly drained sandy flats but sometimes on loamy clay soils.

Diagnosis: *Moraea fugacissima* is distinguished primarily by the relatively long, grass-like, linear leaves up to 80 mm long and usually terete distally. The fugaceous flowers are typical of ser. *Galaxia*, having a yellow perianth, filaments usually entirely united, and fringed style branches. Occasionally the filaments are free in the upper third and the style may divide opposite the anthers rather than above them, possibly a developmental aberration. *Moraea fugacissima* is most easily confused



Distribution of ***Moraea fugacissima***.

with *M. stagnalis* but that species has broader leaves and smaller flowers with a perianth tube 5–10 mm long, a short style dividing opposite the anthers, and filaments typically free in the upper third.

45. **Moraea stagnalis** *(Goldblatt) Goldblatt* in Novon 8: 377 (1998). *Galaxia stagnalis* Goldblatt: 414 (1979a). Type: South Africa, [Northern Cape], pools at the top of Vanrhyns Pass, *Goldblatt 3888* (MO, holo.; K, NBG, PRE, S, iso.).

Plant small, inconspicuous, usually solitary, mostly up to 25 mm high. *Corm* 8–10 mm diam.; tunics finely fibrous with prominent vertical ribs. *Stem* underground at flowering. *Leaves* ascending or lower ± prostrate, ± linear or narrowly lanceolate, channelled, 20–40 × ± 2 mm, margins smooth or rarely sparsely and minutely ciliate. *Rhipidial spathes* hardly distinct from leaves, with 1 to 3 flowers per plant. *Flowers* fugaceous, yellow, cup-like; perianth tube 5–10 mm long; tepals subequal, obovate, spreading in upper half, 10–15 × 5–8 mm. *Filaments* 4.5–5.0 mm long united in ± cylindric column or free in upper $^1/_3$; anthers erect, 1.5–2.0 mm long, diverging, yellow; pollen yellow. *Ovary* ovoid, ± 3 mm long; style slender, dividing ± opposite upper $^1/_3$ of anthers, branches deeply and irregularly fringed, tangled in anthers. *Capsules* and *seeds* unknown. *Chromosome number 2n* = 36. *Flowering time*: June to mid-August; opening ± 11:30 and collapsing ± 16:30.

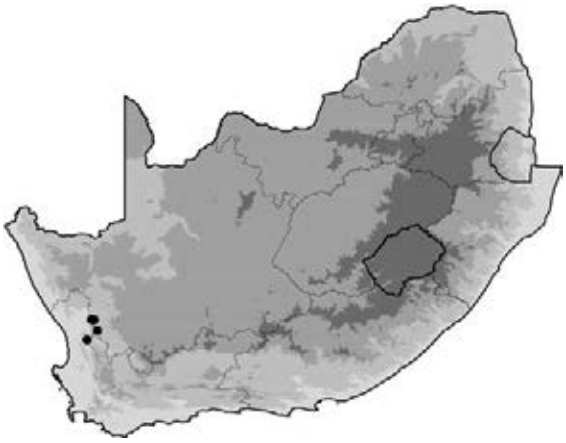
Distribution and ecology: extending from Garies in Namaqualand and the Bokkeveld Mtns of Northern Cape, South Africa, to the northern Cederberg in Western Cape; in seasonally wet sites, including shallow pools in sandstone pavement, banks of seasonal streams and wet seeps on sandy ground.

Diagnosis: the wet habitat is distinctive for *Moraea stagnalis*, which has flowers almost identical with those of other members of ser. *Galaxia* but with the filaments usually free in the upper third. The style divides opposite the anthers and the stigmatic fringes of the style branches are always in contact with the anthers and pollen. The narrow, shallowly channelled leaves have smooth to minutely ciliate margins. *Moraea stagnalis* is polyploid, 2*n* = 36, and in the laboratory is autogamous. The species is most easily confused with *M. fugacissima*, which has larger flowers with a perianth tube mostly 15–24 mm long, anthers up to 4 mm long, and the style usually exceeding the anthers rather than tangled among them. The filaments of *M. fugacissima* are usually completely united whereas those of *M. stagnalis* are typically, though not invariably, free in the upper third.

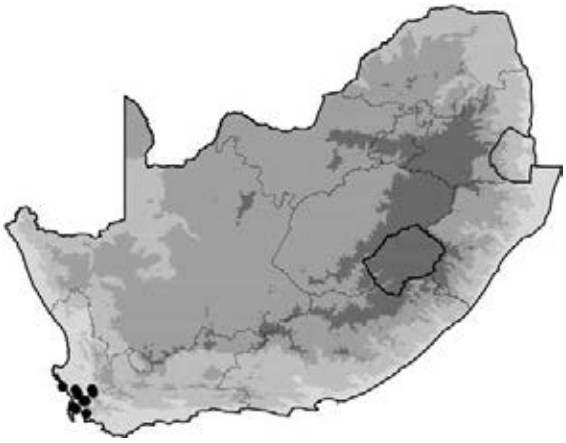
46. **Moraea angulata** *Goldblatt* in Novon 8: 376 (1998), as a new name for *Galaxia alata* Goldblatt: 418 (1979a) [not *M. alata* Vahl (1805)]. Type: South Africa, [Western Cape], roadside 20 km south of Malmesbury at Klein Dassenberg intersection, *Goldblatt 2176* (MO, holo.; K, NBG, PRE, S, iso.).

Plant small, usually solitary, 20–40 mm high. *Corm* 5–8 mm diam.; tunics pale, composed of pith-like, soft layers with conspicuous vertical wings. *Stem* underground at flowering. *Leaves* spreading to ± prostrate, channelled near base, terete in upper half, 15–30(–60) mm long, channelled part with ciliate margins. *Rhipidial spathes* hardly distinct from leaves, with 1 to 3 flowers per plant. *Flowers* fugaceous, yellow or white, salver-shaped with tepals cupped below; perianth tube cylindric, 5–20 mm long; tepals subequal, obovate, 13–19 × 6.5–8.0 mm. *Filaments* united in a cylindric column 4–5 mm long; anthers sessile, 2.0–2.5 mm long, slightly diverging, yellow or white. *Ovary* globose, ± 2 mm diam.; style slender, dividing ± 4 mm above anther tips, branches short, deeply fringed. *Capsules* and *seeds* unknown. *Chromosome number 2n* = 18 (27). *Flowering time*: July and August; flowers opening ± 12:00 and collapsing ± 15:30.

Distribution and ecology: restricted to the lowlands of the southwestern corner of Western Cape, South Africa, and known from a few sites between Yzerfontein, the Cape Peninsula and Somerset West, most of them now lost to agriculture, urban development and the spread



Distribution of ***Moraea stagnalis***.



Distribution of ***Moraea angulata***.

of alien vegetation and not recorded since the 1970s; in seasonally waterlogged, sandy ground.

Diagnosis: seemingly a typical member of ser. *Galaxia, Moraea angulata* has relatively small flowers with tepals 13–19 mm long, and is distinctive in the short, terete, fleshy leaves, usually grey in colour, and unique corm tunics of soft, pith-like material with wide vertical wings, for which the species is named. The filaments are completely united in a column enclosing the style, which divides above the tips of the diverging anthers into fringed stigmatic lobes.

Subg. 6. **Monocephalae**

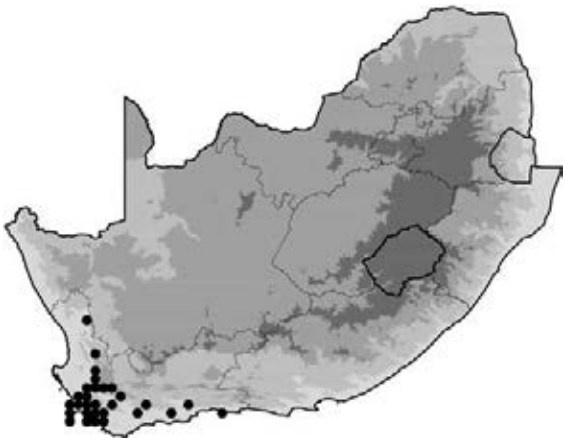
Subg. **Monocephalae** *(Baker) Goldblatt* in Annals of the Missouri Botanical Garden 63: 7 (1976b). *Moraea* [unranked] *Monocephalae* Baker: 10 (1896). Type: *M. angusta* (Thunb.) Ker Gawl., lecto., designated by Goldblatt: 7 (1976b).

Plants unbranched, often sticky at and below nodes. *Foliage leaf* solitary, distally terete or channelled almost to apex. *Flowers* fugaceous, yellow to buff-brown; stamens united only near base; style branches well developed; ovary sharply 3-angular. *Capsules* ovoid-oblong in outline, 3-lobed. *Seeds* usually flattened and discoid or somewhat angular and depressed. *Basic chromosome number x* = 10.

47. **Moraea angusta** *(Thunb.) Ker Gawl.* in König & Sims, Annals of Botany 1: 240 (1804a); Goldblatt: 740 (1976a); Goldblatt: 40 (1986a). *Iris angusta* Thunb.: 19 (1782b). Type: South Africa, [Western Cape], slopes below Devil's Peak and Lion's Head, Cape Peninsula, *Thunberg s.n.* [UPS-THUNB, lecto., designated by Goldblatt: 740 (1976a)].

Moraea obtusa N.E.Br.: 195 (1931). Type: South Africa, [Western Cape], Cape Flats, marsh at Crawford, *Weintraub sub Moss 18185* (BM, K, syn.).

Plants mostly 200–400 mm high. *Corms* 10–18 mm diam.; tunics pale to dark brown, soft textured, inner layers ± entire, outer becoming vertically split, eventually fibrous. *Stem* with long above-ground internode, flexed above sheath of foliage leaf, with 1(2) sheathing leaves 25–40 mm long, usually ± obtuse, rarely sticky below upper nodes. *Foliage leaf* solitary, inserted shortly above ground level, firm to rigid, exceeding stem, terete. *Rhipidial spathes* dark green, distal margins brown, mostly truncate or obtuse at apex, inner 50–80 mm long, outer ± half as long. *Flowers* fugaceous, usually pale yellow, sometimes flushed brown throughout, rarely pale blue-grey, veined purplish or brown outside, outer tepal limbs with clear yellow nectar guide at base, outer tepals 30–50 mm long, limbs spreading to laxly reflexed, claw 10–20 mm long, suberect; inner tepals 25–35 mm long, erect, often becoming reflexed later. *Filaments* 5–12 mm long, almost free ± to base (united for ± 1 mm); anthers 7–10 mm long, yellow; pollen usually orange-red, rarely yellow. *Ovary* ± 8–12(–18) mm long, cylindric-triangular to ± 3-winged, exserted, style branches 11–20 mm long, crests 13–23 mm long, slightly exceeding style branches. *Capsules* cylindric, somewhat 3-lobed, 15–20 mm long. *Seeds* large, flat, discoid. *Chromosome number* 2*n* = 20. *Flowering time*: late August to November.



Distribution of ***Moraea angusta***.

Distribution and ecology: extending in Western Cape, South Africa, from the Gifberg south to the Cape Peninsula and east to Knysna; on stony flats and slopes, usually in sandy ground at middle to low elevations.

Diagnosis: with the typical features of the subgenus, viz. a solitary foliage leaf with a terete blade and narrowly 3-winged ovary, *Moraea angusta* is recognised by darkly veined yellow to almost brown flowers with prominent nectar guides edged with dark pigment, filaments that are united basally for ± 1 mm, and relatively narrow style crests ± as long as but usually slightly longer than the style branches. The stem usually bears a single sheathing leaf (rarely two) and is not normally sticky below the upper nodes. Related *M. neglecta* also has filaments united only near the base but the firm-textured tepals are not darkly veined and the nectar guides consist of longitudinal lines of dark dots. In addition the style crests are ± half to $^{2}/_{3}$ as long as the style branches. In *M. anomala* the filaments are united for (2–)4–8 mm and the stem almost always has two sheathing leaves and is rarely sticky below the nodes. The red pollen colour of *M. angusta* is shared with *M. anomala* but *M. neglecta* has yellow to white pollen.

Unusually small-flowered plants collected on the Langeberg may be confused with *Moraea vallisavium* from the Klein River Mtns but can be recognised by the relatively short, stiff, terete leaf.

48. **Moraea anomala** *G.J.Lewis* in Journal of South African Botany 15: 119 (1949); Goldblatt: 743 (1976a); Goldblatt: 42 (1986a). Type: South Africa, [Western Cape], Houw Hoek Pass, Caledon District, *Lewis s.n.* (SAM [58100], holo.).

Plants mostly 300–500 mm high. *Corms* 10–18 mm diam.; tunics pale to dark brown, soft textured, inner layers ± entire, outer becoming vertically split, eventually fibrous. *Stem* flexed above sheath of foliage leaf, with long above-ground internode, bearing (1)2 sheathing leaves 30–50 mm long, usually ± obtuse, rarely sticky below upper nodes. *Foliage leaf* solitary, inserted shortly above ground level, firm to rigid, exceeding stem, terete. *Rhipidial spathes* dark green, distal margins brown, mostly truncate or obtuse at apex, inner 28–40(–60) mm long, outer ± half as long. *Flowers* fugaceous, pale yellow, outer tepal limbs with darker yellow nectar guides at bases; outer tepals 30–45 mm long, limbs ± as long as claws, inner tepals 25–35 mm long, initially erect, becoming reflexed to 40° at maturity. *Filaments* 6–14 mm long, united for at least 2 mm and usually 4–8 mm; anthers 4–8 mm long; pollen usually red. *Ovary* ± 10–15 mm long, cylindric-triangular to ± 3-winged, exserted, style branches 9–14 mm long, crests ± as long to slightly longer than style branches, 10–15 mm long, cylindric, somewhat 3-lobed, 15–20 mm long. *Seeds* large, flat, discoid. *Chromosome number* 2*n* = 20. *Flowering time*: late September to November.

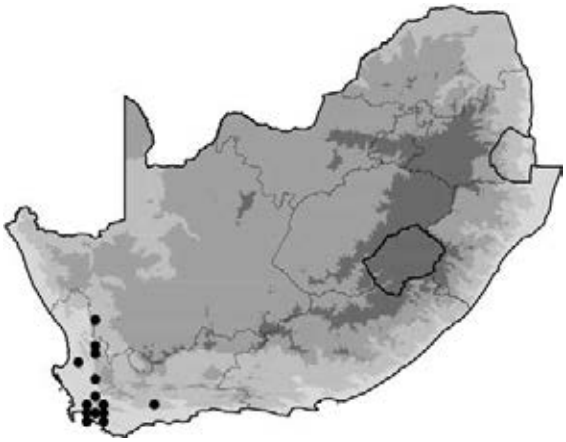
Distribution and ecology: endemic to the western half of Western Cape, South Africa, from Pakhuis Pass and the northern Cederberg to Elim on the Agulhas Plain and the Langeberg at Grootvadersbos in the southeast; typically on clay or clay loam, both in montane and lowland habitats.

Diagnosis: *Moraea anomala* can usually be distinguished from its close allies by the stem bearing two sheathing leaves (rarely one) and with nodes smooth rather than sticky, as well as by the pale yellow flower with filaments united for at least 2 mm and usually 4–8 mm long. Flowers usually open in the late morning, and last till ± 17:00 the same day, but those of the Cederberg populations only to open at ± 16:00 and evidently represent a distinct race of the species. It is most easily confused with *M. angusta* which has similar nectar guides but usually a single sheathing leaf on the stem and filaments united for ± 1 mm.

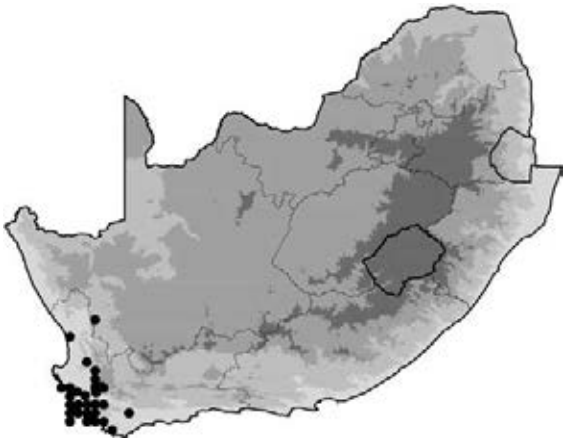
49. **Moraea neglecta** *G.J.Lewis* in Journal of South African Botany 15: 118 (1949); Goldblatt: 744 (1976a); Goldblatt: 44 (1986a). Type: South Africa, [Western Cape], near Sirkels Vlei, Cape Peninsula, *Lewis s.n.* (SAM [57107], holo.).

Plants mostly 300–500 mm high. *Corms* 10–18 mm diam.; tunics pale to dark brown, soft textured, inner layers ± entire, outer becoming vertically split, eventually fibrous. *Stem* flexed above sheath of foliage leaf, with long above-ground internode, sticky below upper nodes (rarely not sticky), with 1(2) sheathing leaves, 30–50 mm long, usually ± obtuse. *Foliage leaf* solitary, inserted shortly above ground level, firm to rigid, exceeding stem, terete. *Rhipidial spathes* dark green, distal margins brown, mostly truncate or obtuse at apex, inner 50–75 mm long, outer ± half as long. *Flowers* fugaceous, bright yellow, outer tepal limbs with nectar guide consisting of longitudinal lines of dark dots and yellow background; outer tepals 38–50 mm long, limbs slightly longer than claws; inner tepals 25–35 mm long, usually erect, obtuse. *Filaments* 6–12 mm long, united at base for ± 1 mm; anthers 7–9 mm long; pollen yellow (white). *Ovary* 9–15 mm long, exserted, cylindric-triangular to ± 3-winged, style branches 14–18(–22) mm long, crests slightly to significantly shorter than style branches, 14–22 mm long. *Capsules* cylindric, shallowly 3-lobed, mostly 15–20 mm long. *Seeds* large, flat, discoid. *Chromosome number* 2*n* = 20. *Flowering time*: middle September to November.

Distribution and ecology: from the Bokkeveld Mtns of Northern Cape, South Africa, in the north to the Caledon District in the southwest; mainly on sandy flats near the coast but also on mountain slopes and plateaus.



Distribution of ***Moraea anomala***.

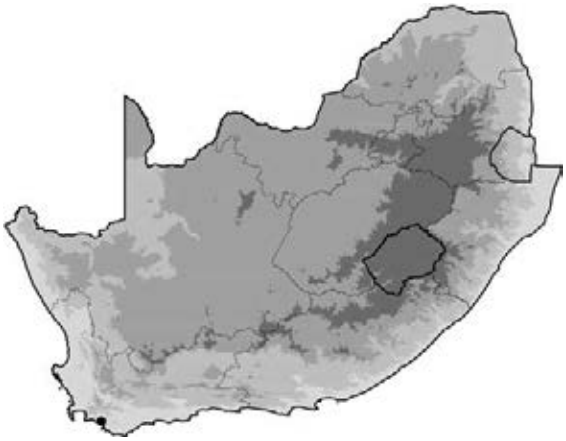


Distribution of ***Moraea neglecta***.

Diagnosis: *Moraea neglecta* is readily distinguished when alive from *M. angusta* by its bright yellow flower with nectar guides consisting of longitudinal lines of black dots across the lower third of the outer tepal limbs. It can also be recognised by its usually sticky nodes, single sheathing leaf, and style crests usually slightly shorter than the style branches. It is frequently the most robust member of the alliance with stems up to 500 mm tall (although sometimes much shorter).

50. **Moraea vallisavium** *Goldblatt* in Annals of the Missouri Botanical Garden 69: 357 (1982); Goldblatt: 40 (1986a). Type: South Africa, [Western Cape], Vogelgat, Hermanus, 1 500 ft [± 460 m], *Goldblatt 5394* (MO, holo.; K, NBG, iso.).

Plants 100–340 mm high. *Corm* small, 4–6 mm diam., with corms of past seasons persisting beneath; tunics of fine netted fibres usually accumulating as a collar around base. *Stem* ± erect to inclined, unbranched, bearing a single sheathing leaf 15–40 mm long with margins free to base. *Foliage leaf* solitary, linear, unifacial, inserted above ground level, ± 2 mm wide, exceeding stem and falcate to trailing. *Rhipidial spathes* green, inner 30–40 mm long, obtuse to truncate, outer ± half as long. *Flowers* fugaceous, yellow, claws darkly speckled, outer tepal limbs with deep yellow nectar guides at bases; outer tepals 20–24 × 8–10 mm, claws ascending, 9–10 mm long, limb horizontal to slightly reflexed; inner tepals 16–19 × 7 mm, claw 6–8 mm long, slightly reflexed. *Filaments* ± 5 mm long, united in lower 2 mm; anthers 5–6 mm long; pollen red. *Ovary* 8–10 mm long, triangular in section; style branches ± 8 × 4 mm, crests 6–10 mm long, erect. *Capsules* narrowly top-shaped, slightly 3-lobed, 12–17 mm long, dehiscent in upper $^1/_3$. *Seeds* ± angular, 2 × 1 mm. *Chromosome number* unknown. *Flowering time*: late December to January.



Distribution of ***Moraea vallisavium***.

Distribution and ecology: a rare local endemic, *Moraea vallisavium* is restricted to the Klein River Mtns near Hermanus in Western Cape, South Africa; in relatively moist sites, often on steep south-facing slopes and flowering well only after fire unless in open rocky sites.

Diagnosis: although evidently a member of subg. *Monocephalae*, *Moraea vallisavium* has some unusual features for the alliance, particularly the finely fibrous corm tunics, the persistent old corms that accumulate beneath the current corm, and the leaf blade compressed and unifacial rather than terete. Also unusual, the margins of the sheathing leaf and outer rhipidial spathes are free to the base, whereas those of other species of the subgenus are united basally for a short distance. Like other members of the subgenus *M. vallisavium* has a solitary foliage leaf, an unbranched stem and fairly large yellow flowers. The seeds are unusual for subg. *Monocephalae* in their relatively large size ± angular shape, quite unlike the flattened discoid seeds of other species of the subgenus.

Subg. 7. **Acaules**

Subg. **Acaules** (*Baker*) *Goldblatt & J.C.Manning* in Bothalia 43: 37 (2013). *Moraea* [unranked] *Acaules* Baker: 8 (1896) [as 'sect. *Acaules* Baker' in Goldblatt: 7 (1976b)]. Type: *M. ciliata* (L.f.) Ker Gawl.

Plants usually acaulescent (not *M. longipes*), usually unbranched, often with a single rhipidium; corm tunics usually pale and coarsely fibrous. *Foliage leaves* several to few, hardly distinct from spathes, channelled. *Flowers* fugaceous, retracted after anthesis to base of rhipidium, various colours; stamens united in lower half; style branches well developed. *Capsules* concealed in spathes. *Basic chromosome number x* = 10.

51. **Moraea falcifolia** *Klatt* in Abhandlungen der Naturforschenden Gesellschaft zu Halle 15: 366 (1882); Goldblatt: 709 (1976a); Goldblatt: 77 (1986a). Type: South Africa, [Northern Cape], Hantam Mts, 1869, *Meyer s.n.* (B, lecto., designated by Goldblatt: 709 (1976a); S; isolecto.).

Moraea fasciculata Klatt: 366 (1882). *Galaxia pedunculata* Bég.: 211 (1909), illegitimate superfluous name for *M. fasciculata* Klatt [based on the same type]. Type: South Africa, [Western Cape], 'Langevaley', *Drège 2600* (B, holo.; K, P, S, iso.).

Moraea galaxioides Baker: 49 (1892). Type: South Africa, 'Transvaal', 1872, *Barber s.n.* (K, holo.).

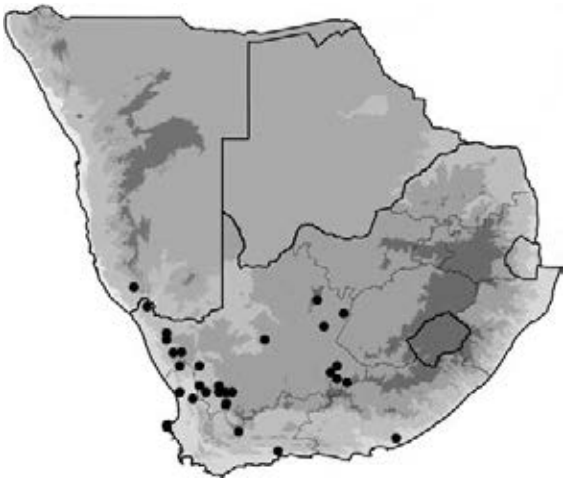
[*Moraea polyphylla* Baker: 130 (1877), invalid name without description]

Plants small, up to 60 mm high, forming a dense sessile rosette. *Corm* 14–20 mm diam., bearing small cormlets at base; tunics of coarse, dark fibres. *Stem* subterranean, produced above ground in fruit, usually with few

branches, each bearing an inflorescence. *Foliage leaves* clustered at base, several, some indistinguishable from rhipidial spathes, up to 100 mm long, linear to lanceolate, falcate or loosely twisted, channelled, margins often undulate, sometimes crisped. *Rhipidial spathes*, especially the outer, sheathing only at base, with unifacial tip, not clearly distinct from leaves, inner usually entirely sheathing, up to 25 mm long, margins membranous. *Flowers* fugaceous, white, outer tepal limbs with yellow nectar guides at bases often edged purple, inner tepals usually with purple or grey mark at top of claws and sometimes crests purple in lower half, limbs of all tepals spreading; outer tepals 15–22 × 12–15 mm, claws 8–11 mm long, ascending; inner tepals 13–20 mm long. *Filaments* up to 6 mm long, united in lower half; anthers 3–4 mm long. *Ovary* sessile, cylindric-ovoid, 4–5 mm long, style branches ± 8 mm long, crests 5–8 mm long, outer margins often obscurely serrated. *Capsules* globose-ovoid, up to 10 mm long. *Seeds* rounded-angular, surface reticulate. *Chromosome number* 2*n* = 20. *Flowering time*: May to August (September).

Distribution and ecology: widespread in southern Africa, extending from southwestern Namibia southward through Namaqualand and Bushmanland in Northern Cape, South Africa, to the Vanrhynsdorp District with outliers as far south as Jacobsbaai near Saldanha, thence through interior Western Cape from Worcester to Laingsburg, the western Karoo and Great Karoo to the Alexandria District in Eastern Cape; in dry, open habitats in karroid or semi-karroid scrub and semi-desert (records from 'the Transvaal' are probably from near Kimberley).

Diagnosis: *Moraea falcifolia* is a small, tufted plant seldom reaching 60 mm when in flower, producing several smooth, falcate leaves, sometimes with ciliate margins, surrounding one or more sessile inflorescences, the spathes of which differ hardly at all from the leaves except by their position subtending the fugaceous blooms. The flowers are white with prominent yellow nectar guides on the outer tepals and dark purple or sometimes grey markings on the inner tepals and frequently dark purple on the lower half of the otherwise white style crests. Plants from the eastern end of its range, from near Kimberley and Barkly West, were treated by J.G. Baker as *M. galaxioides* but grade without noticeable discontinuity into those from Western Cape and the western Northern Cape, which include the types of *M. falcifolia* from the Calvinia District and *M. fasciculata* from Langvlei, on the Atlantic Coast near Lambert's Bay.



Distribution of ***Moraea falcifolia***.

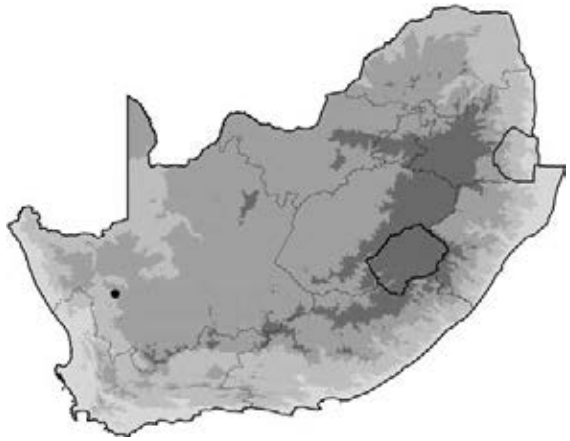
Dwarf plants from the dry country north of Loeriesfontein with leaves 10 mm long, with obtuse apices and parallel, minutely ciliate margins, once included in *Moraea falcifolia* are now regarded as a separate species, *M. filamentosa*.

52. **Moraea filamentosa** *Goldblatt & J.C.Manning* in Bothalia 43: 154 (2013). Type: [Northern Cape], 22 miles [± 34 km] north of Loeriesfontein, May 1958, *Hall 1385* (NBG, holo.).

Plants acaulescent, ± 20 mm high, including flowers. *Corms* ± 12 mm diam.; tunics of medium-textured, shaggy fibres. *Foliage leaves* several, clustered at base, blades up to 10 mm long, falcate, channelled, up to 1.2 mm wide when opened flat, with thickened, hyaline main vein on abaxial surface, apex obtuse, margins hyaline, minutely ciliate. *Rhipidial spathes*: outer not distinct from leaves, with broad, membranous sheaths, inner ± membranous, floral bracts membranous, dry, elongate, often irregularly torn, ± as long as leaves. *Flowers* fugaceous?, possibly white, markings and orientation of tepals not known; outer tepals lanceolate, ± 14 × 4 mm, claws ± 5 mm long, limbs probably spreading, inner tepals ± 12 × 2 mm, possibly erect. *Filaments* ± 4.5 mm long, united in lower half; anthers ± 2.5 mm long, evidently yellow. *Ovary* elongate, fertile part club-shaped, ± 5 mm long; style branches broad, ± 4 mm long, crests triangular, ± 4 mm long, erect. *Capsules* and *seeds* unknown. *Flowering time*: May.

Distribution and ecology: known from a single collection from north of Loeriesfontein in Northern Cape, South Africa; the habitat is not known.

Diagnosis: the acaulescent *Moraea filamentosa* is a dwarf plant, reaching no more that 20 mm high, including the flowers. The small leaves are distinctive, having broad, membranous sheaths and falcate, channelled blades with obtuse apices. The hyaline margins are minutely ciliate and the blades have a thickened ridge in the midline of the abaxial surface. A remarkable feature not known in any other species of *Moraea* is that the floral bracts are elongate, membranous, and ± as long as the leaves, thus visible as pale filamentous threads among the leaf blades The small flowers have outer tepals ± 14 mm long, with filaments united in the lower half, and with broad style branches and erect, petaloid crests. It is evidently most closely related to *M. falcifolia,* which



Distribution of ***Moraea filamentosa***.

has a similar habit but is a larger plant with larger flowers, the outer tepals mostly 18–22 mm long, and longer, often twisted, tapering leaves up to 100 mm long with acute tips.

53. **Moraea ciliata** *(L.f.) Ker Gawl.* in König & Sims, Annals of Botany 1: 241 (1804a); Goldblatt: 79 (1986a); Goldblatt & Manning: 111 (2015). *Iris ciliata* L.f.: 98 (1782). *Vieusseuxia ciliata* (L.f.) Eckl.: 11 (1827). Type: South Africa, [Western Cape], hills near Cape Town, *Thunberg s.n.* [UPS-THUNB, lecto., designated by Goldblatt: 711 (1976a)].

Plants acaulescent, mostly 100–200 mm high. *Corm* mostly 12–15 mm diam.; tunics of medium to coarse pale or rarely dark brown fibres, sometimes (subsp. *ciliata*) extending upward as a collar of fibres. *Stem* subterranean even in fruit, occasionally with 1 or 2 sessile branches at ground level, sometimes with axillary cormlets. *Leaves* 3 or 4 (rarely up to 6) including leaf-like outer spathe, inserted at ground level, often exceeding inflorescence, usually slender, ± ascending to falcate and somewhat twisted, usually exceeding inner spathe, channelled, 5–12(–25) mm wide when opened flat, smooth or softly hairy, margins often undulate, rarely slightly crisped, short to long ciliate, straight, undulate or crisped. *Rhipidia* solitary (or 2 or 3); inner spathe usually sparsely hairy (smooth), 35–140 mm long. *Flowers* fugaceous, blue to blue-grey, white, yellow or pale pink, outer tepal claws sometimes dark blue to purple, limbs with small yellow nectar guides at bases outlined dark blue to violet, purple or brown, heavily scented of vanilla; outer tepals lanceolate, (18–)20–35 mm × 5–8 mm, claws (7.5–)10.0–17.0 mm long (slightly shorter to ± as long as limb); inner tepals 15–32 mm long, linear-spathulate to narrowly lanceolate, limbs spreading to half reflexed. *Filaments* 5–10 mm long, united basally for 1.5–2.0 mm or for almost half their length; anthers 4–8 mm long, blue or white; pollen white to yellow. *Ovary* spindle-shaped, (6–)10–14 mm long, retracted after flowering; style branches (7–)9–16 mm long, crests (6–)8–15 mm long. *Capsules* 10–28 mm long, enclosed in bases of spathes, walls ± membranous-translucent. *Seeds* ± globose, 1.4–2.5 mm diam. *Chromosome number* $2n$ = (18)20, 40. *Flowering time*: mainly late July to mid-September, occasionally earlier to October at high elevations, rarely in May or June.

Distribution and ecology: widespread in South Africa, extending from the Richtersveld and northern Namaqualand in Northern Cape to the Cape Peninsula and Swellendam in Western Cape and east through the Roggeveld to isolated sites in the Upper Karoo in Eastern Cape.

Diagnosis: distinguished in subg. *Acaules* by the often pubescent leaves and spathes, and most frequently blue flowers with relatively slender inner tepals, either linear-spathulate or narrowly lanceolate, and slender style crests. The capsules of *Moraea ciliata* are the longest in the subgenus, 10–28 mm long, and the seeds are more-or-less globose or somewhat angled by pressure and ± 2 × 2–3 mm. Two additional subspecies are recognised, yellow-flowered subsp. *lutescens* and white- or pale pink-flowered subsp. *cuprina*. The subspecies have separate but complimentary ranges and are weakly differentiated from one another. *Moraea ciliata* is easily distinguished from *M. tricolor*, which has broad style crests longer than the style branches, and tepal claws shorter than the limbs. Closely related *M. macronyx* has the tepal claws much longer than the limbs, whereas in *M. ciliata* the claws are slightly shorter than to about as long as the limbs. Basic chromosome number for *M. ciliata* is x = 10, known for several populations of subsp. *ciliata* and subsp. *lutescens*, although populations of subsp. *ciliata* from the Caledon and Bredasdorp Districts are polyploid, $2n$ = 40. Subsp. *cuprina* remains uncounted.

In the Roggeveld, Klein Roggeveld and nearby *Moraea ciliata* co-occurs with closely related *M. flava*, which blooms some weeks earlier and has smaller, white and yellow flowers, leaves with thickened and crisped margins, and smaller capsules, 8–12 mm long with small angular seeds. May-flowering *M. longipes*, confused in the past with *M. ciliata*, has the leaves and rhipidia borne on an elongate stem well above ground and sheathed at the base by a prominent collar of stiff fibres.

Key to subspecies

1a Flowers yellow to beige often flushed brown outside and nectar guides edged brown; filaments 4–7 mm long, united for 2.0–2.5 mm ($^1/_3$ to almost half their length) . . . . . 53b. subsp. *lutescens*

1b Flowers blue or white often flushed grey outside or translucent white to pink flushed coppery pink outside and nectar guides edged dark blue to violet or purple; filaments 4.5–10.0 mm long, united for 1–2 mm < $^1/_3$ their length):

2a Flowers shades of blue or white; plants nearly always with single inflorescence . . . 53a. subsp. *ciliata*

2b Flowers translucent white to pink flushed coppery pink outside; plants sometimes with 2 or 3 inflorescences . . . . . 53c. subsp. *cuprina*

53a. subsp. **ciliata**

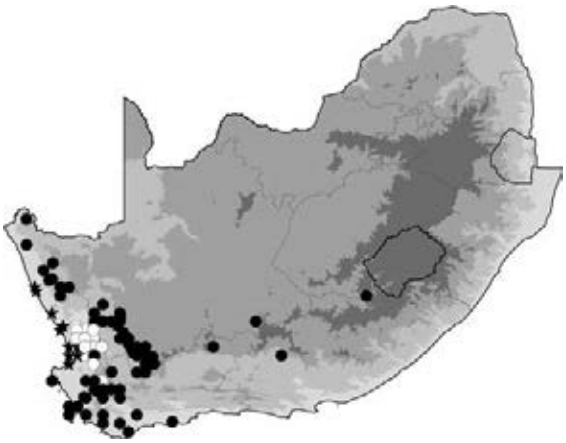
Moraea hantamensis Klatt: 365 (1882). Type: South Africa, [Northern Cape], Hantam Mts, *Meyer s.n.* (B, holo.).

Moraea macrochlamys Baker: 49 (1892). Type: South Africa, [Eastern Cape], Graaff-Reinet, Sneeuberge, *Drege 2186* (K, lecto., designated by Goldblatt: 711 (1976a); B, S, iso.).

Plants often quite tall but also dwarfed in dry habitats, leaves up to 300 mm long, usually with axillary cormlets. *Leaves* 3 or 4, often exceeding inflorescence, usually slender, ± straight to falcate and somewhat twisted, channelled, 3–8 mm wide when opened flat, glabrous or softly hairy, margins usually ciliate, straight, undulate or crisped. *Rhipidia* solitary; inner spathe smooth or sparsely hairy, 35–55(75) mm long. *Flowers* blue to blue-grey, outer tepal claws often dark blue to purple, limbs with small yellow nectar guides at bases outlined dark blue (or rarely white with yellow nectar guides); outer tepals 24–34 mm long, claws 12–17 mm long (slightly shorter to ± as long as limb); inner tepals 25–32 mm long. *Filaments* 5–10 mm long, united for 1.5–2.0 mm (± $^1/_4$–$^1/_5$ their length); anthers 5–8 mm long, blue or white. *Ovary* 6–16 mm long; style branches 9–16 mm long, crests 9–15 mm long. *Capsules* 12–20 mm long. *Seeds* ± globose, 2.0–2.5 mm diam. *Flowering time*: mainly late July to mid-September, occasionally earlier.

Distribution and ecology: widespread across the southern African winter-rainfall zone, from the Cape Peninsula north to Saldanha Bay and east to Caledon and Bredasdorp in Western Cape, and then in an arc from the Richtersveld and interior Namaqualand through the Bokkeveld Plateau to the Roggeveld in Northern Cape, with isolated records from the Great Karoo near Richmond, the Sneeuberge near Graaff-Reinet, and near Lady Grey in Eastern Cape; mostly in renosterveld shrubland on heavier, clay soils.

Diagnosis: with flowers in shades of blue, less often white, subsp. *ciliata* remains variable for plant and flower size depending on season in the arid parts of its range. The leaves and spathes are usually hairy and with undulate to crisped margins, these rarely thickened, but always ciliate. Flowers typically have tepals 24–34 mm and filaments 5–10 mm long. Notable variants are white-flowered plants from the Cold Bokkeveld and the Hex River Pass, and early-flowering plants from sandy soils in the lower Breede River Valley west and south of Swellendam. These have relatively small white flowers unusual in having a purple mark at the base of the inner tepal limbs and have outer tepals 18–20 mm long. The two known populations were collected in flower in May and June, respectively. Additional collections are needed to better understand these plants which may merit taxonomic recognition at some level. The blue- and white-flowered populations bloom from July to September, even later at high elevations. Cormlets are often produced in lower leaf axils, absent in the other subspecies. Subsp. *ciliata* is diploid over most of its range but blue-flowered populations from the Caledon and Bredasdorp Districts are tetraploid, $2n = 40$.



Distribution of ***Moraea ciliata*** subsp. ***ciliata***, ●; subsp. ***cuprina***, ★; subsp. ***lutescens***, ○.

53b. subsp. **lutescens** *Goldblatt & J.C.Manning* in South African Journal of Botany 99: 112 (2015). Type: South Africa, [Western Cape], 6 km from Klipfonteinrand to Doornbos, *Nordenstam & Lundgren 1117* (NBG, holo.; MO, S, iso.).

Like subsp. *ciliata* but often more slender, stem usually without axillary cormlets. *Leaves* 3 or 4, often exceeding inflorescence, usually ± straight to loosely twisted, narrowly channelled, mostly up to 4 mm wide in middle when opened flat, smooth or sparsely hairy, margins usually ciliate. *Rhipidia* solitary; inner spathe smooth or sparsely hairy, 35–55(–75) mm long. *Flowers* yellow to beige or light brown, usually flushed brown outside, outer tepal limbs with small yellow nectar guides at bases edged with brown; outer tepals 24–32 mm long, claws 12–16 mm long, thus ± as long as limb; inner tepals 19–22 mm long. *Filaments* 4–7 mm long, united for 2.0–2.5 mm ($^1/_3$ to almost $^1/_2$ their length); anthers 4–6 mm long; pollen yellow. *Ovary* 6–9 mm long; style branches 7–11 mm long, crests 9–11 mm long. *Capsules* 10–14 mm long (as far as known). *Seeds* ± globose, ± 1.8 mm diam. *Flowering time*: late July to mid-September.

Distribution and ecology: extending in Western Cape from near Goudini north through the Olifants River Valley and Cederberg to the Gifberg (possibly also on the Knersvlakte); on stony, sandstone or loamy clay ground.

Diagnosis: distinguished in *Moraea ciliata* by the yellow to beige flowers, the tepals usually flushed or veined brown outside, a comparatively slender habit, and leaves that are hairless or sparsely hairy and often straight but with ciliate margins. The flowers are often relatively small for *M. ciliata* with outer tepals 24–32 mm long and filaments 4–7 mm long united for one third to almost half their length. In subsp. *ciliata* the filaments are 5–10 mm long but united only up to 2 mm, thus no more that one third their length but often less.

53c. subsp. **cuprina** *Goldblatt & J.C.Manning* in South African Journal of Botany 99: 113 (2015). Type: South Africa, Western Cape, Koekenaap to coast, Farm Kommandokraal, sandveld vegetation, in sandy depression, 15 July 2013, *Manning & Parker 3406* (NBG, holo.).

Plants like subsp. *ciliata* but often with 2(3) rhipidia, without axillary cormlets. *Leaves* usually 4 or 5, falcate or ± erect, channelled, 4–6 mm wide opened flat, margins straight to undulate (rarely crisped), usually ciliate. *Rhipidia* 1 to 3; inner spathe 80–140 mm long, usually smooth including margins, with evident angular keel sometimes ciliate. *Flowers* translucent white flushed coppery outside or pink to dull translucent red, outer tepal limbs with small yellow nectar guides at bases; outer tepals 25–32 mm long, claws 9–12 mm long, thus slightly shorter than limbs; inner tepals 20–24 mm long. *Filaments* 4.5–5.5 mm long, united for ± 2 mm, thus < $^1/_2$ their length; anthers 4–5 mm long; pollen white. *Ovary* 10–16 mm long; style branches 8–9 mm long, crests 12–15 mm long. *Capsules* 18–28 mm long. *Seeds* ± globose, 1.4–1.8 mm diam. *Flowering time*: late July to late August.

Distribution and ecology: extending along the Western Cape Atlantic Coast and near interior from Redelinghuys and Rocher Pan to central Namaqualand near Hondeklipbaai and Garies in Northern Cape; in deep quartzitic sands along the coast or inland on sandy, granite-derived ground.

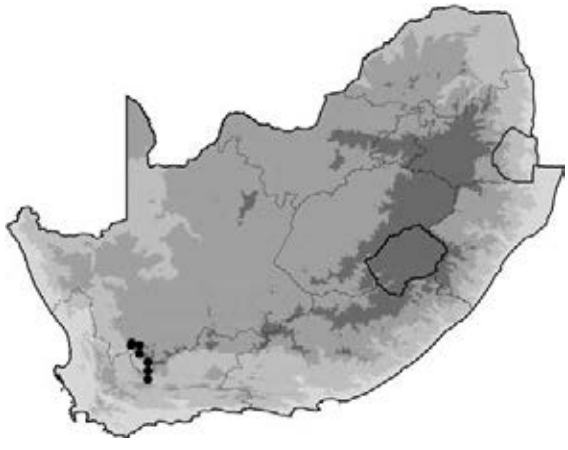
Diagnosis: the unusual flower colour, translucent white flushed pink outside or pale pink to dull red, is unique in the complex and this together with the frequent presence of two or three rhipidia in mature plants makes subsp. *cuprina* easy to recognise. Fruiting plants are notable in their particularly long capsules, mostly 20–25 mm long, occasionally slightly shorter or longer. Plants bloom relatively early for the complex, from mid-July to mid-August along the coast but somewhat later in interior Namaqualand. Plants evidently lack axillary cormlets which are common in subsp. *ciliata*.

54. **Moraea flava** *Goldblatt & J.C.Manning* in South African Journal of Botany 99: 110 (2015). Type: South Africa, Northern Cape, 57 km S of Sutherland, below Komsberg Pass, sandy valley bottom, 31 Aug. 1993, *Goldblatt & Manning 9672A* (NBG, holo.; MO, iso.).

Plants 50–70 mm high, acaulescent. *Corm* ± globose, 10–15 mm diam.; tunics of pale straw-coloured, coarsely netted fibres with heavily thickened vertical ridges. *Stem* subterranean, bearing a single rhipidium. *Leaves* mostly 3 (including leaf-like outer spathe), ascending to spreading, loosely twisted below, often tightly so distally, channelled, grey-green, smooth, 40–80 mm long, margins thickened, undulate to crisped, usually minutely papillate, rarely ciliate. *Rhipidia* solitary, mostly 2(–4)-flowered; spathes smooth, inner 35–40 mm long. *Flowers* yellow or inner tepals and style crests pale yellow to white, outer tepal limbs with deeper yellow nectar guides at bases speckled with blue or black dots, spreading at ± 45°, inner tepal claws sometimes blue-grey and limbs often remaining suberect, scented of vanilla; outer tepals lanceolate, 18–28 × 6–8 mm, claws ascending, 9–11 mm long, channelled, shortly hairy in midline, inner tepals 18–28 mm long. *Filaments* 5–8 mm long, united for 1.5–2.0 mm, diverging distally; anthers 4.5–5.5 mm long, reaching to base of stigma lobes, pale blue; pollen white. *Ovary* elongate, fertile part oblong-cylindric, 5.0–7.5 mm long, partly included or exserted; style branches diverging, 7–10 mm long, crests erect, linear to narrowly wedge-shaped, 7–10 mm long. *Capsules* ovoid, 8–12(–15) mm long, retracted to ± base of spathes, near ground level. *Seeds* straw-coloured, angular-prismatic. *Flowering time*: August to mid-September.

Distribution and ecology: local in the western Karoo in Northern and Western Cape, South Africa, occurring in the central and southern Roggeveld, Klein Roggeveld and the Matjiesfontein–Laingsburg Karoo; in stony, sandy or clay ground.

Diagnosis: *Moraea flava* is distinguished from *M. ciliata* by its consistently relatively low stature, seldom exceeding 65 mm, smooth, twisted leaves with crisped and thickened margins minutely papillate to ciliate, and moderately sized yellow or yellow and white perianth, the outer tepals 18–28 mm long with shorter claws 9–11 mm long. The relatively short capsules, 8–12 mm long contain small, angular seeds. The leaves are typically hairless with only the leaf margins sometimes minutely papillate to ciliate. The species is sympatric with *M. ciliata* in the southern Roggeveld and Klein Roggeveld where *M. ciliata* has larger (elsewhere the flowers may be smaller), consistently blue flowers, the outer tepals 28–32 mm long with claws 15–16 mm long, inner tepals 24–26 mm long, filaments 8–9 mm long, united for ± 1 mm, anthers 5–7 mm long and style branches ± 12 mm long with crests 11–12 mm long. Although usually a taller plant, typically with straight



Distribution of ***Moraea flava***.

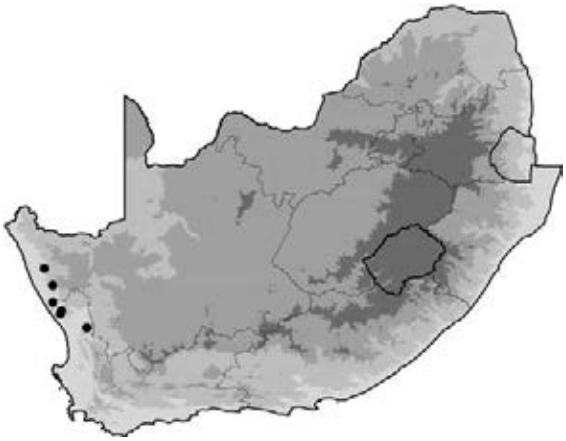
to undulate leaf margins, *M. ciliata* in the Roggeveld is occasionally only 50 mm high (most likely the result of a poor season) and may have crisped leaf margins, thus approaching *M. flava* in appearance, but the leaves are usually pubescent with the margins always ciliate, with hairs at least 0.5 mm long.

55. **Moraea longipes** *Goldblatt & J.C.Manning* in Bothalia 39: 5 (2009). Type: Western Cape, Namaqualand, 6 km NW of Bitterfontein on road to Kotzesrus, in stony granitic ground, 1 June 2008, *Manning 3172* (NBG, holo.; MO, iso.).

Plants 100–180 mm high. *Corm* globose, 15–20 mm diam.; tunics of ± straw-coloured, coarse fibres often with thickened vertical ridges. *Stem* unbranched, consisting of a single internode extending from the corm to well above ground level, sheathed by fibrous collar around base. *Foliage leaves* 3 (including leaf-like outer spathe), subopposite, inserted at base of inflorescence, suberect, straight, 45–85 mm long, channelled, margins smooth or sparsely ciliate. *Rhipidial spathe* with broad, transparent membranous margins, 50–70 mm long. *Flowers* fugaceous. Pale yellow or translucent white with pale copper-pink margins of outer tepals, inner tepals and outside of tepals, outer tepal limbs with yellow nectar guides at bases speckled with black dots, laxly spreading; outer tepals ± 30 × 19 mm, claw suberect, ± 10 mm long, hairy in midline, inner tepals ± 28 × 2–4 mm, claws suberect, ± 9 mm long, limbs laxly spreading. *Filaments* suberect, 7–9 mm long, united basally for ± 1.5 mm; anthers 7.5–9.0 mm long, reaching base of stigma lobes. *Ovary* elongate, fertile part ovoid, 5–9 mm long, usually at least partly included; style branches ascending, 13–16 mm long, crests erect, narrowly triangular, outer margins slightly and unevenly serrated, 8–10 × 2.5–3.0 mm at base. *Capsules* and *seeds* unknown. *Flowering time*: late May to mid-June.

Distribution and ecology: with a scattered distribution along the Atlantic Coast of South Africa, from Sannagas near Springbok in Northern Cape in the north to the Knersvlakte and the flats below the Gifberg in Western Cape in the south; on granitic or sandy gravel flats.

Diagnosis: flowering in mid-winter in May and June, *Moraea longipes* has the general aspect of *M. ciliata* and *M. tricolor* except that the stem is not subterranean at flowering but extends up to 180 mm above ground. Like most species of subg. *Acaules* the ovary is retracted to the base of the inflorescence spathes after flowering. The flowers are most like those of *M. ciliata* but have slightly broader style crests, triangular with the base 2.5–3.0 mm wide (± linear in *M. ciliata*) and the filaments are united basally for ± 1.5 mm, about one fifth of their length, as are those of most other species of subg. *Acaules*. The anthers of *M. longipes* are the longest in the subgenus, 7.5–9.0 mm long (5–8 mm in *M. ciliata*) and are held above the nectar guides on filaments as long as the tepal claws. A notable feature of *M. longipes* is the collar of fibres around the underground part of the stem, uncommon but not unique in the subgenus.



Distribution of ***Moraea longipes***.

The species flowers early in the season, May to early July, and grows in places where *M. ciliata* has been found in bloom six to eight weeks later. Flower colour in *M. longipes* is either pale, watery yellow or translucent white, then with the edges of the outer tepal limbs and the inner tepal limbs a pale coppery pink colour and with the tepals flushed the same colour outside.

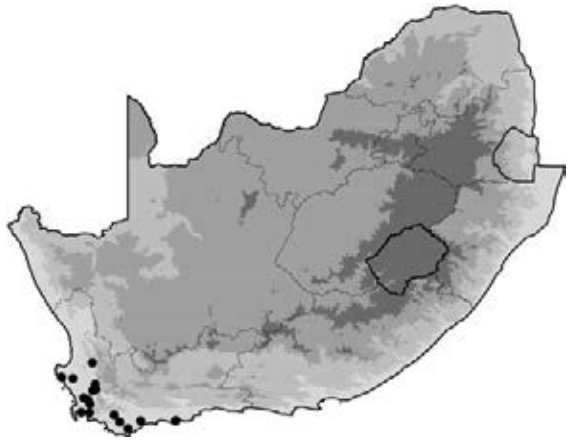
56. **Moraea tricolor** *Andrews* in The Botanist's Repository 2: t. 83 (1800a); Goldblatt: 714 (1976a); Goldblatt: 84 (1986a). *M. ciliata* var. *tricolor* (Andrews) Baker: 11 (1896). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 83 (1800a).

Iris fugax Pers.: 54 (1805), illegitimate superfluous name for *Moraea tricolor* Andrews (1800a). Type: unknown, possibly as for *M. tricolor*.

Moraea barbigera Salisb.: 306 (1812). *M. ciliata* var. *barbigera* (Salisb.) Baker: 49 (1892). Type: South Africa, without precise locality or collector, illustration in Curtis's Botanical Magazine t. 1012 '*Moraea ciliata* var.'

Moraea duthieana L.Bolus: 113 (1927a). Type: South Africa, [Western Cape], 15 km west of Stellenbosch, *L. Bolus s.n.* (BOL [18529], holo.; K, iso.).

Plants small, 50–150 mm high. *Corm* ± 15 mm diam.; tunics of medium to coarse, pale fibres. *Stem* subterranean, unbranched, bearing cormlets at nodes. *Foliage leaves* usually 2(3) (excluding opposed leaf-like spathe enclosing flowers), subopposite, inserted at ground level, suberect to falcate, exceeding inflorescence, smooth or lightly hairy or velvety, margins ciliate, straight or slightly undulate. *Rhipidial spathe* smooth or sparsely hairy, inner 20–60(–100) mm long, outer not distinct from leaves. *Flowers* fugaceous, yellow, red, pink, light purple or violet, outer tepal limbs with yellow (rarely orange) nectar guide at bases edged in darker pigment; outer tepals 20–25 mm long, lanceolate, spreading to slightly reflexed, claws 12–14 mm long; inner tepals 20–25 mm long, lanceolate, limbs like the outer. *Filaments* 3–4 mm long, united at base; anthers 2.5–3.0 mm long;



Distribution of ***Moraea tricolor***.

pollen yellow. *Ovary* ± cylindric, 8–10 mm long, usually exserted; style branches 4–5 mm long, crests 8–10 × 4–5 mm, broadly triangular, outer margins irregularly serrated. *Capsules* included bases of spathes and leaves, (7–)10–12 × 6 mm, soft walled. *Seeds* angular to subglobose, 1.0–1.4 × 1.3–2.0 mm, light brown with reticulate sculpturing. *Chromosome number* 2*n* = 18, 20. *Flowering time*: late July to middle September in the west, May and June in the east.

Distribution and ecology: extending in Western Cape, South Africa, from Hopefield and Piekenierskloof Pass south to the Cape Peninsula (now extinct there) and east as far as De Hoop and Still Bay; preferring seasonally wet sites in sandy ground, but the unusually early blooming populations from De Hoop and Still Bay occur on well-drained sandy ground.

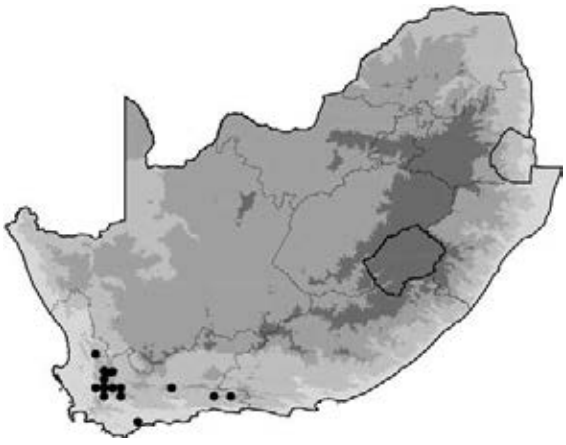
Diagnosis: *Moraea tricolor* is recognised by its broadly triangular style crests 8–10 × 5 mm and relatively short style branches, up to 5 mm long, ± half as long as the crests. In the Atlantic Coast forelands of Western Cape flowers are either predominantly deep pink to brick-red (flower colour in the type of the species) or yellow or, in the Saldanha area, violet, and have virtually hairless leaves and spathes. In the Caledon District plants grow in renosterveld on clay ground and have pale purple flowers, and the leaves and spathes are velvet. Added to these differences is a difference in chromosome number, 2*n* = 18 in the west but 20 in the Caledon District. Populations further east in the De Hoop area and near Still Bay have yellow flowers and resemble the western populations morphologically but bloom earlier in the year, in May and June versus July to September in the west.

57. **Moraea macronyx** *G.J.Lewis* in Annals of the South African Museum 40: 115 (1954); Goldblatt: 714 (1976a); Goldblatt: 82 (1986a). Type: South Africa, [Western Cape], Gydo Pass, *Lewis s.n.* (SAM [61920], holo.).

Plants acaulescent, 90–180(–250) mm high. *Corm* 10–15 mm diam.; tunics of pale fibres or entire spongy, pith-like layers, bearing cormlets at base, producing slender stolons. *Stem* subterranean, unbranched, bearing cormlets at nodes, with single rhipidium. *Foliage leaves* 2(3) (excluding opposed leaf-like spathes enclosing flowers), subopposite, channelled, suberect to falcate, smooth or lightly hairy, 120–250 mm long, margins ciliate, straight to undulate. *Rhipidial spathes* glaucous-green, smooth or lightly hairy, inner 80–110 mm long, outer not distinct from leaves, clasping inner only at base. *Flowers* fugaceous, pale yellow or sometimes style branches and crests white, outer tepal limbs with nectar guides of dark spots on a yellow field at bases often edged yellow-brown distally, spreading or recurved distally; outer tepals 40–60 × 14–20 mm, claws 25–40 mm long, half again to ± twice as long as limbs; inner tepals 30–45 × 7 mm, linear-lanceolate, obtuse, initially erect, limbs later spreading. *Filaments* 12–18 mm long, united in lower ± 6 mm; anthers linear, 8–10 mm long, apiculate; pollen yellow or white. *Ovary* cylindric, 11–15 mm long; style branches 18–20 × 5 mm, crests up to 25 mm long. *Capsules* and *seeds* not known. *Chromosome number* 2*n* = 20. *Flowering time*: September to mid-October.

Distribution and ecology: largely a montane species of Western Cape, South Africa, extending from the southern Cold Bokkeveld to Robertson and Matjiesfontein in the west through the Little Karoo to the upper Long Kloof near Avontuur in Eastern Cape, and on the Potberg in the south; usually in clay ground but also limestone outcrops.

Diagnosis: allied to the well-known and widespread *Moraea ciliata* and occurring entirely within the range of this species, *M. macronyx* can be distinguished by its larger flowers with the outer tepal claws one and a half to twice as long as the limbs. The larger outer tepals are 40–60 mm long with the claws 25–40 mm long and the style branches are ± 20 mm long with crests up to 25 mm long. The outer tepals of *M. ciliata* are mostly 25–35 mm long with the claws 12–15 mm long, thus about half as long as the limbs, and the style branches are typically 8–15 mm long. Vegetatively *M. macronyx*



Distribution of ***Moraea macronyx***.

and *M. ciliata* are nearly identical although the corm tunics may differ, those of *M. macronyx* sometimes unusual in being entire and peculiarly soft, of an almost spongy, pith-like texture. Some populations, however, have fibrous corm tunics no different from those of *M. ciliata*.

Subg. 8. **Polyanthes**

Subg. **Polyanthes** *(Goldblatt) Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 37 (2013). *Moraea* sect. *Polyanthes* Goldblatt: 8 (1976b). Type: *M. polystachya* (L.f.) Ker Gawl.

Corm tunics mostly of hard, black fibres. *Foliage leaves* several to solitary. *Flowers* fugaceous, mostly blue to mauve, also yellow or white; stamens united in lower half; ovary often included, style branches well developed with prominent crest or much reduced, sometimes as paired or single filiform arms. *Capsules* oblong-ellipsoid, sometimes beaked, exserted or included. *Basic chromosome number* $x = 10$ but four of the six sections have $x = 6$.

Sect. 5. **Serpentinae** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 37 (2013). Type: *Moraea serpentina* Baker

Foliage leaves (1)2 or 3(4), twisted or coiled. *Flowers* blue, yellow or mostly white; style branches and crests well developed. *Ovary* and *capsules* included.

58. **Moraea serpentina** *Baker*, Handbook of the Irideae 52 (1892); Goldblatt: 701 (1976a); Goldblatt: 69 (1986a). Type: South Africa, [Northern Cape], Okiep, *H. Bolus 6572* (K, lecto., designated by Goldblatt: 701 (1976a); GRA, isolecto.).

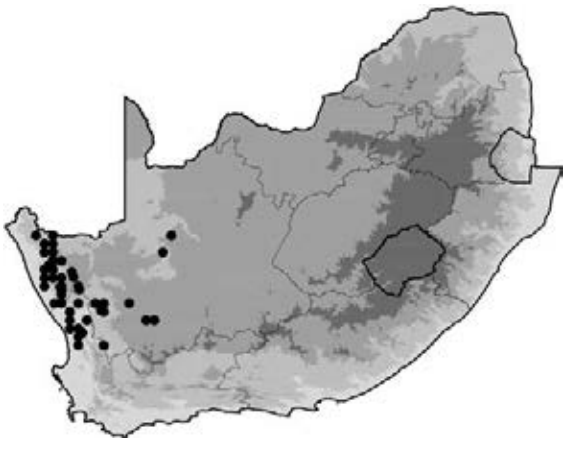
Moraea arenaria Baker: 52 (1892). Type: South Africa, [Western Cape], sand hills, Ebenezer, 1840, *Drège 8324* (K, holo.; MO, S, iso.).

Moraea framesii L.Bolus: 418 (1927b). Type: South Africa, [Northern Cape], near Calvinia, *P. Ross Frames s.n.* (BOL, holo.).

Plants (40–)70–200 mm high, usually branched. *Corm* 8–20 mm diam., asymmetric at base; tunics of tough coarse, usually dark fibres, often persisting as a collar around base. *Stem* 2 or 3 internodes long, branching from base or upper nodes, with 1 or 2 sheathing leaves 15–25 mm long, drying brown from tips. *Foliage leaves* basal only, or occasionally cauline, usually 3, occasionally 2 (or 1 in depauperate plants), channelled or ± flat, loosely coiled, margins ± undulate, sometimes lightly hairy on margins or on abaxial surface. *Rhipidial spathes* green or partly to largely dry, acute, often becoming lacerated, inner 15–30 mm long, outer entirely sheathing, ± $^1/_2$ as long. *Flowers* fugaceous, either white to yellow, tepals then often flushed with violet or pink, OR blue-violet, outer tepal limbs with large yellow nectar guides at bases, laxly spreading to reflexed; outer tepals 24–30 × 15–25 mm long, claw ± 12 mm long, limb obtuse to retuse; inner tepals 15–30 mm long, usually ± erect, spathulate. *Filaments* 5–7 mm long, united near base or up to middle; anthers 3–5 mm long, violet or white; pollen white. *Ovary* ellipsoid, 5–6 mm long, included, style branches ± 6 mm long, crests 4–8 mm long, lanceolate. *Capsules* enclosed in spathes, club-shaped sometimes tapering to short beak, 8–10 mm long. *Seeds* angled. *Chromosome number* $2n = 20$. *Flowering time*: September to October, occasionally in November.

Distribution and ecology: extending from the Richtersveld in Northern Cape, South Africa, south to Vanrhynsdorp and Klawer in Western Cape, also in Bushmanland and inland through the Upper Karoo as far east as Prieska; in sandy gravel, usually in stony places, sometimes in limestone outcrops.

Diagnosis: a small plant, *Moraea serpentina* rarely attains 200 mm in height and 90–120 mm is usual. It is readily distinguished by the typically three, rarely two or four foliage leaves, the blades channelled or flat and always at least loosely twisted, sometimes tightly so. The flowers are either partly yellow with pale yellow or white style branches and crests or white with the inner tepals and style branches flushed with violet. The inner tepals are held erect, a striking feature of the species. In the Kamiesberg populations the leaves are hairy on the margins or abaxial surface. Closely related *M. tortilis,* restricted to northern Namaqualand, has a broadly



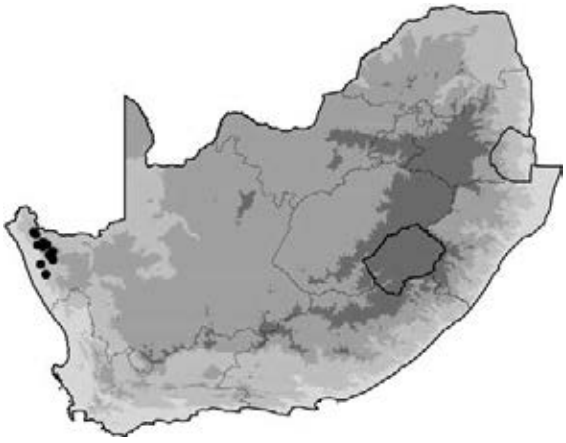
Distribution of ***Moraea serpentina***.

similar appearance but the leaf blades are terete and tightly coiled in corkscrew fashion, and the violet or white flowers have both outer and inner tepal limbs invariably half reflexed.

Populations of *Moraea serpentina* from the western Knersvlakte, north of Vredendal, stand out in having consistently smaller, pale blue-violet flowers and two or even a single leaf but evidently do not otherwise differ from white-flowered plants. One- or two-leaved plants are occasionally found elsewhere across its range rendering taxonomic recognition of the blue-flowered plants impractical.

59. **Moraea tortilis** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 705 (1976a); Goldblatt: 72 (1986a). Type: South Africa, [Northern Cape], between Okiep and Steinkopf, *Goldblatt 2771* (MO, holo.; K, NG, PRE, iso.).

Plants 10–15 mm high. *Corm* ± 10 mm diam., asymmetric at base; tunics of tough, dark fibres, sometimes as accumulating in a fibrous collar around base. *Stem* 2 or 3 internodes long, branched at base and upper nodes, sheathing leaves green or brown entirely, 12–20 mm long. *Foliage leaves* basal and sometimes cauline, (1)2 or 3, terete (flattened adaxially when dry), coiled helically like a corkscrew. *Rhipidial spathes* green to brown below, becoming completely dry and lacerated, inner 25–40 mm long, outer ± half as long, sheathing entirely. *Flowers* fugaceous, blue or white, outer tepal limbs with small yellow nectar guides at bases often edged dark violet, half reflexed; outer tepals 25–35 × ± 20 mm, limb ± $^{2}/_{3}$ as long as claws, obtuse to retuse; inner tepals to 22–30 mm long, limbs also reflexed. *Filaments* ± 8 mm long, united in lower half; anthers 5 mm long, yellow; pollen yellow. *Ovary* narrowly ovoid-ellipsoid, ± 9 mm long, included, style branches ± 10 mm long, crests narrow, ± 10 mm long, erect. *Capsules* ± ellipsoid, 12–13 mm long, included. *Seeds* angled. *Chromosome number* 2*n* = 20. *Flowering time*: September and October.



Distribution of ***Moraea tortilis***.

Distribution and ecology: rarely and local in Northern Cape, South Africa, extending from the southern Richtersveld to Springbok; confined to stony sandy places, frequently associated with quartzite outcrops.

Diagnosis: rarely exceeding 120 mm in height, *Moraea tortilis* is distinguished by tightly coiled, corkscrew-like leaves terete in section. Plants are usually branched and the flowers, violet or sometimes white with yellow nectar guides, are distinctive in the broad, half reflexed tepal limbs. The ovary and capsules remain enclosed in the spathes as in the closely allied *M. serpentina,* which has loosely coiled to twisted leaves, the blades channelled or flat, and predominantly yellow or white flowers with erect or suberect, spathulate inner tepals.

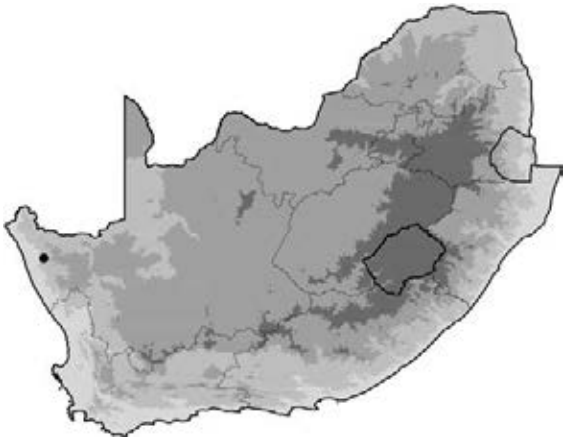
Sect. 6. **Deserticolae** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 7 (1976b). Type: *Moraea bolusii* Baker

Moraea [unranked] *Subracemosae* Baker: 9 (1896) [as 'sect. *Subracemosae* Baker' in Goldblatt: 7 (1976b)]. Type: *M. edulis* (L.f.) Ker Gawl., lecto., designated by Goldblatt: 7 (1976b) = *M. fugax* (D.Delaroche) Ker Gawl.

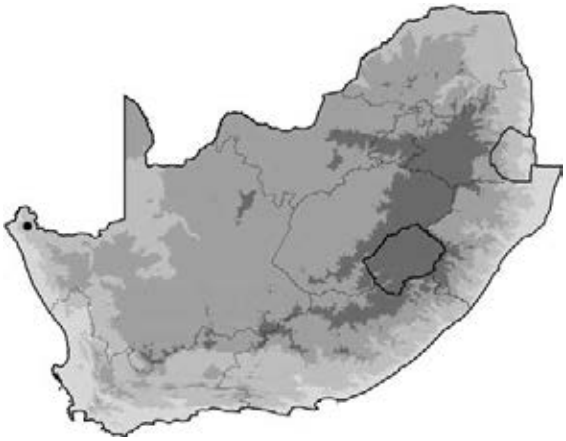
Plants unbranched or branched, branches sometimes sessile. *Foliage leaves* solitary or 2. *Flowers* usually blue to mauve or violet or white, occasionally yellow; tepal claws short or ± as long as limbs; stamens united in lower half or entirely; style branches well developed with erect crests or reduced, without crests (as paired or filiform arms extended horizontally in *M. hexaglottis*). *Ovary* and *capsules* included, sometimes beaked.

60. **Moraea geminifolia** *Goldblatt & J.C.Manning* in South African Journal of Botany 91: 79 (2014b). Type: South Africa, Northern Cape, Springbok, near Nigramoep Mine on private mining company road on low ridge in scattered bush with *Ornithogalum pruinosum*, 29 Sept. 2013, *Goldblatt, Porter & Burger 13945* (NBG, holo.; MO, PRE, iso.).

Plants 70–100 mm high. *Corm* globose, 15–20 mm diam.; tunics forming dense, fibrous mass, dark grey-brown, usually accumulating in a collar around base. *Stem* simple or 1- or 2-branched, bearing sheathing leaves 15–20 mm long, sometimes overlapping. *Foliage leaves* 2, middle green, basal, ± linear, channelled, loosely twisted, ± trailing distally, 50–80 mm long, ± 3 mm wide opened flat, margins hyaline when dry, margins undulate, rarely partly crisped. *Rhipidial spathes* with broad, dry, transparent margins, inner 25–30 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, mostly white, sometimes pale blue, outer tepal limbs with large pale yellow nectar guides edged distally with purple marks



Distribution of ***Moraea geminifolia***.



Distribution of ***Moraea teretifolia***.

at bases, odourless or faintly scented of vanilla; outer tepals 25–30 mm long, limbs ± 22 × 10 mm, claws ascending, ± 12 mm long, inner ± 28 × 6 mm. *Filaments* ± 8 mm long, united below in smooth, cylindric column ± 3 mm long; anthers ± 6 mm long, pale mauve; pollen white. *Ovary* narrowly ellipsoid, ± 6 mm long, included; style ± 4 mm long, branches diverging, ± 10 mm long, crests broadly wedge-shaped, 10–12 × 3.5 mm. *Capsules* and *seeds* unknown. *Flowering time*: late September to mid-October; opening ± 14:30 and collapsing ± 19:00.

Distribution and ecology: known only from ridge tops near the edge of the escarpment near Nigramoep west of Springbok in Northern Cape, South Africa; in stony flat ground with hard, clay substrate.

Diagnosis: immediately recognised by the two foliage leaves inserted below ground, more-or-less equal in size and with undulate margins, *Moraea geminifolia* is otherwise unremarkable in the *M. saxicola* complex. The white or pale blue-mauve flowers broadly resemble those of *M. saxicola*, although smaller in all features, with outer tepals 25–30 mm long and claws half to $^{2}/_{3}$ as long as the limbs. The filaments are ± 8 mm long and anthers ± 6 mm long. In *M. saxicola* the outer tepals are 34–45 mm long with claws about as long as the limbs, the filaments are 12–14 mm long, and anthers 6–9 mm long. *Moraea geminifolia* and *M. saxicola* are ecologically separated, growing adjacent to one anther just a few metres apart but on different soils.

61. **Moraea teretifolia** *Goldblatt & J.C.Manning* in South African Journal of Botany 91: 79 (2014b). Type: South Africa, Northern Cape, Richtersveld, slopes of Ploegberg, 27 Oct. 2008, *Nicholson s.n.* (NBG, holo. [with photo.]).

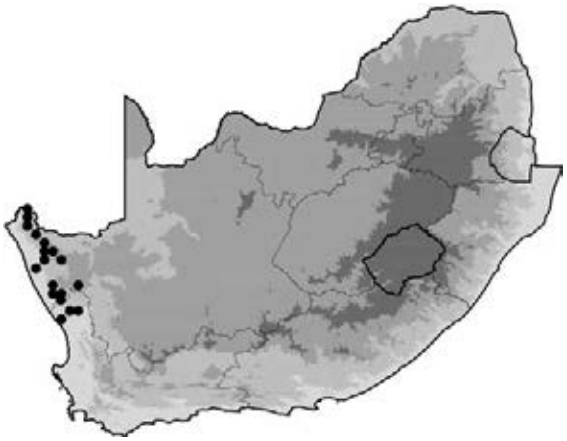
Plants up to 200 mm high. *Corm* globose, 15–20 mm diam.; tunics forming dense, fibrous mass, dark grey-black. *Stem* simple or 1-branched, 3 internodes long, bearing sheathing leaves ± 25 mm long. *Foliage leaves* 2, basal, ± linear, evidently narrowly channelled, straight, possibly ± trailing distally, ± as long as stem, slightly < 1 mm diam. margins plane. *Rhipidial spathes* with broad, dry, transparent margins, inner ± 25 mm long, outer ± $^{1}/_{2}$ as long. *Flowers* fugaceous, white with style branches flushed pale mauve, outer tepal limbs with large pale yellow nectar guides at bases white in middle, inner tepal claws speckled yellow, scent unknown; outer tepals ± 18 × 8 mm, claws ascending, ± 8 mm long, inner tepals ± 15 × 6 mm. *Filaments* ± 8 mm long, united below in smooth, cylindric column ± 4 mm long; anthers ± 4.5 mm long, pale mauve; pollen white. *Ovary* spindle-shaped, ± 7 mm long, included; style branches diverging, ± 6 mm long, crests broadly wedge-shaped, ± 7 mm long. *Capsules* ellipsoid, 9–10 mm long, without beak. *Seeds* unknown. *Flowering time*: October; recorded open in late afternoon.

Distribution and ecology: known only from the slopes of the Ploegberg in northwestern Richtersveld in Northern Cape, South Africa; in sandy, stony ground.

Diagnosis: superficially a small-flowered morph of *Moraea saxicola*, *M. teretifolia* stands out in having two basal foliage leaves with straight, terete blades ± as long as the stem. Both closely related *M. geminifolia* and *M. saxicola* also have branched stems but larger flowers, the outer tepals of *M. geminifolia* 25–30 × 10 mm and those of *M. saxicola* 34–45 × 10–16 mm, whereas in *M. teretifolia* the outer tepals are ± 18 × 8 mm. The white flowers have large nectar guides at the base of the outer tepal limbs, the nectar guides with a white centre bracketed by broad yellow borders. The capsules of *M. teretifolia* are 9–10 mm long and differ from those of *M. saxicola* in lacking a beak. Capsules of *M. saxicola* are 12–14 mm long with short beak up to 1 mm long.

62. **Moraea saxicola** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 717 (1976a); Goldblatt: 86 (1986a); Goldblatt: 76 (2014b). Type: South Africa, [Northern Cape], 5 km west of Steinkopf, *Goldblatt 3057* (MO, holo.; K, NBG, PRE, S, iso.).

Plants mostly 200–500 mm high. *Corms* 16–20 mm diam.; tunics dark brown, finely netted, extending



Distribution of ***Moraea saxicola***.

upward in a thick collar around base. *Stem* (4)5 to 8 internodes long, branched, sometimes with 1 or 2 longer branches from lower nodes, upper nodes bearing ± sessile rhipidia or branches short and concealed by attenuate sheathing leaves, mostly 35–45 mm long. *Foliage leaf* solitary, usually exceeding stem, channelled to ± flat, 4–9 mm wide, falcate or trailing distally, sometimes twisted or loosely coiled distally, margins pale, thickened, straight or undulate, occasionally partly crisped, (juvenile leaves straight or somewhat twisted, narrowly channelled, up to 2 mm wide, or terete). *Rhipidial spathes* becoming dry at flowering time, often lacerated, inner 40–60 mm long, outer ± 10 mm shorter. *Flowers* fugaceous, pale blue or white to pale watery yellow, outer tepal limbs with long yellow to orange nectar guides white in middle at bases, faintly scented; outer tepals 34–45 mm long, limbs mostly 15–22 × 10–16 mm, half reflexed, claws ± as long or slightly shorter than limbs; inner tepals 30–36 mm long, limbs reflexed. *Filaments* 12–14 mm long, united in lower half; anthers 6–9 mm long, slightly exceeding stigma lobe, pale mauve; pollen white. *Ovary* ± cylindric, 8–10 mm long; included, style branches 8–15 mm long, crests ± lanceolate, 12–18 mm long. *Capsules* ellipsoid, mostly 12–14 mm long, with short beak up to 1 mm long. *Seeds* angular. *Chromosome number* 2*n* = 20. *Flowering time*: September to October; opening after 15:00 and sometimes only after 16:00, collapsing soon after sunset.

Distribution and ecology: extending from the Richtersveld in Northern Cape, South Africa, to the northern Knersvlakte in Western Cape; relatively common on various soils but often on gritty granitic gravel in rocky ground or on clay and shale substrates.

Diagnosis: late-flowering *Moraea saxicola* is recognised by the solitary foliage leaf with thickened, straight to undulate margins, and relatively large flowers with outer tepals 34–45 mm long and the limbs of both whorls half reflexed. The tepals are usually pale blue in the north of its range, white to palest yellow elsewhere, and the outer tepal limbs bear pale yellow nectar guides. The foliage leaf is fairly broad and slightly undulate with occasionally slightly crisped margins. Unusual for *Moraea*, the juvenile leaves are narrow and sometimes terete and coiled near the apex. By the time these plants reach flowering age, the leaf is usually broad, channelled and trailing. *Moraea saxicola* is allied to the yellow-flowered *M. bolusii* of northern Namaqualand, which also has an undulate leaf.

63. **Moraea namibensis** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 721 (1976a); Goldblatt: 98 (1986a); Goldblatt: 77 (2014b). Type: Namibia, sandy flats near Udabib, *Merxmüller & Giess 3299* (WIND, holo.; M, PRE, iso.).

Plants erect, 120–400 mm high. *Corm* 15–20 mm diam.; tunics of dark, medium-textured fibres extending upward around base as a fine network. *Stem* erect, usually 2- or 3-branched. *Foliage leaf* solitary, ± basal, linear, falcate, narrowly channelled, longer than and trailing distally, margins straight. *Rhipidial spathes* with dry, brown, attenuate apices, inner 40–65 mm long; outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, white or blue-mauve, outer tepal limbs with yellow nectar guides at bases, reflexed to ± 40°; outer tepals 40–47 × 12–14 mm, limbs lanceolate, claws 20–22 mm long; inner tepals narrowly lanceolate, 35–40 × ± 7 mm, subacute. *Filaments* 10–12 mm long, united in lower half; anthers ± 6 mm long. *Ovary* ± ellipsoid, 8–18 mm long, included; style branches 10–12 mm long, crests lanceolate, 15–25 mm long. *Capsules* club-shaped, 12–20 mm long, beaked. *Seeds* unknown. *Chromosome number* 2*n* = 20. *Flowering time*: late August to October.

Distribution and ecology: poorly collected, *Moraea namibensis* is known from two sites in southwestern Namibia near Rosh Pinah and from near Port Nolloth in Northern Cape, South Africa; on sandy slopes and flats.

Diagnosis: *Moraea namibensis* stands out in the solitary basal leaf with a long, narrowly channelled blade, straight margins and relatively large, blue or white

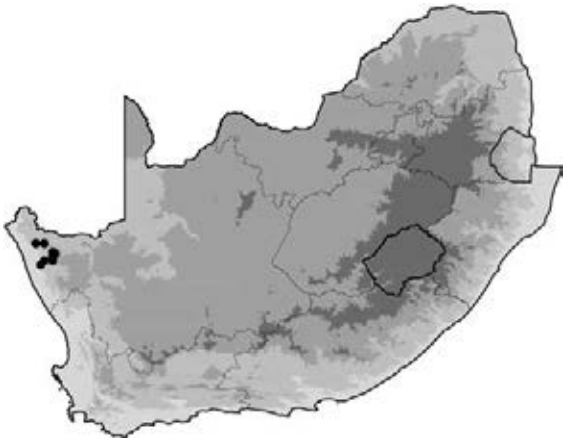


Distribution of ***Moraea namibensis***.

flowers. Typical of sect. *Deserticolae*, the ovary is included in the spathes and as far as known, the capsules are beaked, a feature of some members of the *M. saxicola* complex. When described only white-flowered plants were known but the population from near Port Nolloth has blue-mauve flowers somewhat larger that those of those from Namibia, the outer tepals up to 47 mm long and the inner up to 40 mm long. Other features of the Port Nolloth population are similarly slightly larger that previously recorded, particularly the style crests, up to 25 mm long.

64. **Moraea bolusii** *Baker*, Handbook of the Irideae: 57 (1892); Goldblatt: 721 (1976a); Goldblatt: 88 (1986a); Goldblatt: 78 (2014b). Type: South Africa, [Northern Cape], near Okiep, Sept. 1883, *H. Bolus 6574* (K, lecto., designated by Goldblatt: 721 (1976a); BOL, isolecto.).

Plants 70–200 mm high. *Corm* mostly 12–20 mm diam.; tunics of coarse black fibres usually extending upwards in a collar around base. *Stem* simple or few-branched, branches ascending, exserted from subtending sheathing leaf, sheathing leaves dry, ± membranous, 20–30 mm long. *Foliage leaf* solitary, smooth, longer than stem but usually ± trailing, shallowly channelled, usually laxly twisted for entire length, margins undulate to crisped. *Rhipidial spathes* partly green, drying from above at flowering, acute or lacerated distally, margins membranous, translucent; inner spathe 30–40 mm long, outer ± half as long. *Flowers* fugaceous, yellow, outer tepal limbs with large, deep yellow nectar guides at bases, inner tepals, style branches and crests paler yellow than outer tepals or white; outer tepals 26–33 × 11–13 mm, broadly lanceolate, ± half reflexed; inner tepals ± 25 mm long, limbs also reflexed. *Filaments* 10–12 mm long, united in lower ± $^{2}/_{3}$; anthers ± 6 mm long, yellow; pollen white. *Ovary* narrowly ellipsoid, 6–8 mm long, included; style branches ± 10 mm long, crests 10–15 mm long, broadly lanceolate. *Capsules* narrowly ellipsoid, 12–15 mm long. *Seeds* not known. *Chromosome number* 2*n* = 20. *Flowering time*: mostly September to middle October; opening 13:00 to 14:00 and collapsing at sunset.



Distribution of ***Moraea bolusii***.

Distribution and ecology: centred in northern Namaqualand, Northern Cape, South Africa, from Steinkopf southward to Garies; in shallow sandy and stony soils.

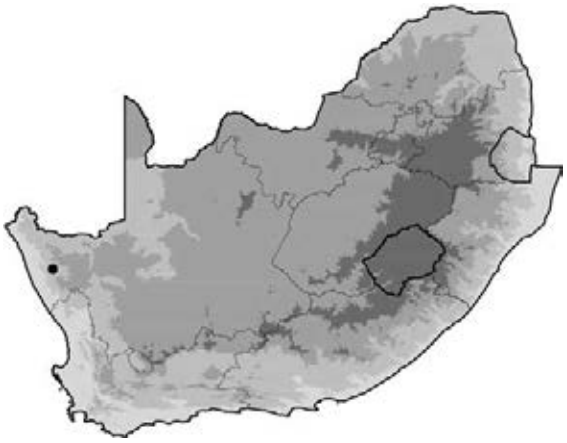
Diagnosis: relatively common in northern Namaqualand, *Moraea bolusii* is distinguished by its solitary, fairly broad, undulate and loosely twisted leaf with somewhat thickened margins, and pale yellow flowers with relatively broad tepals up to 12 mm wide, both the inner and outer tepals limbs reflexed to ± 45°. The inner tepals, style branches and crests are typically paler than the outer tepals, often almost white. Flowers of related *M. saxicola* are usually white, sometimes pale blue, and open later than those of *M. bolusii*, between 15:00 and 16:00, also collapsing at sunset. The range of *M. bolusii* falls entirely within that of *M. saxicola.*

65. **Moraea acocksii** *Goldblatt & J.C.Manning* in South African Journal of Botany 91: 80 (2014b). Type: South Africa, Northern Cape, 31 miles [± 50 km] SW of Springbok, granite hills, 25 Sept. 1957, *Acocks 19584* (NBG, holo.; K, M, PRE, iso.).

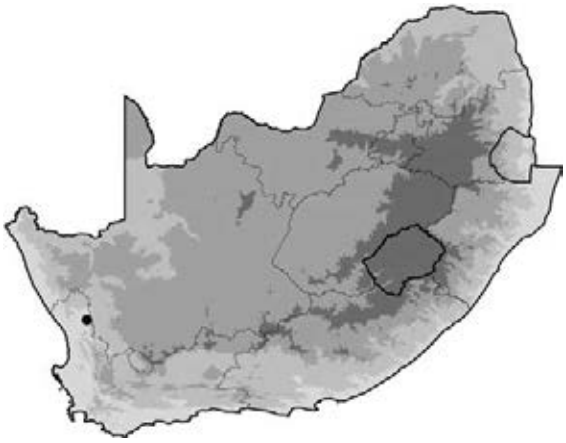
Plants 120–150 mm high, evidently without a collar of fibres at base. *Corms* obconic, ± 10 mm diam.; tunics of medium-textured, black fibres. *Stem* simple or rarely 1-branched, branch exserted from sheathing leaf, 3 aerial internodes long, bearing attenuate, partly dry sheathing leaves 15–18 mm long. *Foliage leaf* solitary, usually shortly exceeding stem, terete, ± 1 mm diam. when alive, straight below, loosely to tightly coiled in distal $^{1}/_{3}$. *Rhipidial spathes* becoming dry at flowering time, often lacerated, inner 28–35 mm long, outer ± half as long to slightly less. *Flowers* fugaceous, white to creamy white, outer tepal limbs with yellow nectar guides at bases, evidently half reflexed; outer tepals ± 22 × 8 mm, limb ± as long as claw; inner tepals ± 15 mm long, limbs also half reflexed. *Filaments* 8–10 mm long, united in lower 3–4 mm; anthers ± 4 mm long; pollen ?white. *Ovary* subcylindric, ± 7 mm long, included, style branches ± 8 mm long, crests 6–8 mm long, wedge-shaped, ± 2 mm wide at base. *Capsules* ± ellipsoid, 8–9 mm long. *Seeds* unknown. *Flowering time*: October; flower phenology unknown.

Distribution and ecology: known from the type collection from central Namaqualand in Northern Cape, South Africa; on gravelly slopes of granite hills.

Diagnosis: the most striking feature of *Moraea acocksii* is the very slender, terete leaf, straight and ± erect for most of its length but with the distal third loosely to relatively tightly coiled and then straight again near the tip. Still poorly known, plants are usually unbranched but a few plants have a single branch, this relatively long and exserted from the subtending sheathing leaf. Plants are relatively low in stature, the tallest specimens up to 150 mm high, and the aerial part of the stem consists of four internodes, each node bearing an attenuate sheathing leaf up to 18 mm long. The white or creamy white flowers are relatively small for the



Distribution of ***Moraea acocksii***.



Distribution of ***Moraea quartzicola***.

M. saxicola complex with outer tepals ± 22 mm long (34–45 mm in *M. saxicola*), filaments 8–10 mm long and anthers ± 4 mm long.

66. **Moraea quartzicola** *Goldblatt & J.C.Manning* in South African Journal of Botany 91: 82 (2014b). Type: South Africa, Western Cape, low hills near Grootdrif west of Vanrhyns Pass, among quartzite stones, 9 Oct. 2013, *Goldblatt & Porter 13989* (NBG, holo.; K, MO, PRE, iso.).

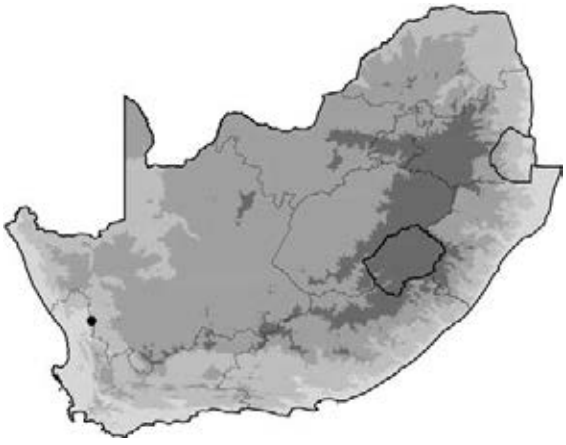
Plants 70–150 mm high. *Corms* 12–15 mm diam.; tunics wiry, dark brown, accumulating in a dense mass, becoming finely netted distally. *Stem* simple or 1- or 2-branched, branches usually shortly emerging from subtending sheathing leaf, ascending, bearing ± dry, attenuate sheathing leaves ± 20 mm long. *Foliage leaf* solitary, usually slightly longer than stem, channelled to ± flat, mostly 3–5 mm wide, laxly twisted, trailing to ± prostrate, margins pale, thickened, undulate to crisped. *Rhipidial spathes* becoming dry at flowering time, often lacerated, inner 25–30 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, pale blue-mauve to almost white, outer tepal limbs with large yellow nectar guides with white centre at bases, half reflexed; outer tepals 22–28 × ± 12 mm, limbs 15–18 mm long, claws 8–10 mm long (thus ± half as long as limbs); inner tepals 18–25 × ± 5 mm, limbs ultimately half reflexed. *Filaments* 8–9 mm long, united in lower half; anthers 3.5–5.0 mm long, pale mauve; pollen white. *Ovary* narrowly ellipsoid, ± 7 mm long, included; style branches ± 7.5 mm long, crests 8–12 mm long, lanceolate. *Capsules* ± ellipsoid, 8–9 mm long, with beak ± 1 mm long. *Seeds* unknown. *Flowering time*: October; opening 16:30 to 17:00 and collapsing ± 19:00.

Distribution and ecology: restricted to the southern edge of the Knersvlakte close to the foot of the Bokkeveld, Koebee and Gifberg Mtns in Western Cape, South Africa; on flat or gently sloping ground in clay loam among quartzite stones, a habitat common in the area.

Diagnosis: with a solitary, twisted and trailing leaf with undulate to crisped margins, *Moraea quartzicola* appears to be closely allied to the Namaqualand species *M. saxicola* but is distinguished by its smaller stature, up to 150 mm high, and smaller spathes and flowers, the outer tepals 22–24 mm long with short claws 8–10 mm long, the limbs thus almost twice as long. *Moraea saxicola*, always a taller plant, rarely < 250 mm high, has inner rhipidial spathes 40–60 mm long (vs. 25–30 mm), and outer tepals 30–40 mm long with the claws about as long as the limbs. Other floral parts of *M. saxicola* are likewise larger that those of *M. quartzicola*.

67. **Moraea macgregoriorum** *Goldblatt* [as *macgregorii*] in Annals of the Missouri Botanical Garden 63: 719 (1976a); Goldblatt: 92 (1986a) & 82 (2014b). Type: South Africa, [Western Cape], foot of Vanrhyns Pass, *Goldblatt 3097* (MO, holo.; NBG, iso.)

Plants 120–250 mm high. *Corm* ± 20 mm diam.; tunics of light brown, finely netted fibres extending upward in a collar around base. *Stem* flexuose, with several short branches, sheathing leaves attenuate, ± 20 mm long. *Foliage leaf* solitary, much exceeding stem, trailing distally, 3–4 mm wide, channelled, margins thickened.



Distribution of ***Moraea macgregoriorum***.

Rhipidial spathes dry distally at anthesis, apices sometimes lacerated; inner spathe 30–35 mm long, outer slightly shorter. *Flowers* fugaceous, pale blue-lilac, outer tepal limbs with prominent orange nectar guides in proximal half, reflexed to ± 40º; outer tepals ± 30 mm long, claws ± 15 mm long, linear, channelled below; inner tepals narrowly lanceolate, ± 25 mm long, claws ± linear, channelled, limbs similarly reflexed. *Filaments* 15 mm long, united in lower half; anthers 3–4 mm long, mauve; pollen ± white. *Ovary* ellipsoid, 7–8 mm long, included, style branches ± 12 mm long, crests narrow, up to 10 mm long. *Capsules* ± 15 mm long, ± obovoid, shortly beaked for ± 15 mm long, partly to fully included in spathes. *Seeds* small, angled. *Chromosome number* 2*n* = 20. *Flowering time*: October; opening ± 16:00 and collapsing ± 19:30.

Distribution and ecology: a narrow endemic restricted to the lower slopes of the Bokkeveld Mtns east of Vanrhynsdorp in Western Cape, South Africa; on rocky clay ground.

Diagnosis: although vegetatively there is little to distinguish *Moraea macgregoriorum* from related species, including *M. saxicola* and it allies, in the solitary, rather narrow undulate leaf, branched stem and ± dry spathes, the flower is, however, striking: the pale blue-lilac tepals are held well apart from one another and have long, very narrow claws, narrow, spreading to reflexed limbs and characteristic orange nectar guides. Particularly distinctive are the elongate filaments ± 15 mm long and disproportionately short anthers ± 4 mm long (*M. saxicola* has filaments 12–14 mm long and anthers 6–9 mm long). As in other members of sect. *Deserticolae* the ovary is included in the spathes. Molecular phylogenetic studies show that *M. macgregoriorum* is closely allied to *M. saxicola* and *M. bolusii*.

68. **Moraea graniticola** *Goldblatt* in Annals of the Missouri Botanical Garden 73: 107 (1986c). Type: Namibia, southern Namib, Aus townlands, sand around granite dome (ex hort. Kirstenbosch), *Lavranos & Pehlemann 20007* (WIND, holo.; MO, iso.).

Plants acaulescent or nearly so, up to 50 mm high. *Corm* 25–35 mm diam.; tunics of dark brown, coarse fibres accumulating in a dense mass around base, live corm up to 8 mm diam. *Stem* subterranean or produced just above ground, usually with 1 to 3 branches clustered near base. *Foliage leaves* 2(3), lowermost longest, up to 200 × ± 6 mm, shallowly channelled, spreading, white in midline, somewhat twisted, margins undulate, upper leaves similar but shorter. *Rhipidial spathes* with inner 25–30 mm long, outer somewhat membranous, slightly shorter than inner. *Flowers* fugaceous, blue-violet, outer tepal limbs with yellow nectar guides at bases; tepals united in a short tube 5–6 mm long, claws ± 3 mm long, ascending, forming a cup enclosing lower part of filament column, limbs spreading horizontally; outer tepals obovate, 18–20 × 9–11 mm; inner tepals ± 17 × 9 mm. *Filaments* 5–6 mm long, white, united below in



Distribution of ***Moraea graniticola***.

cylindric column, free and diverging in upper 1 mm; anthers ± 3.5 mm long, diverging, creamy white; pollen ± white. *Ovary* narrowly ellipsoid, 7–8 mm long, included, with a short sterile beak up to 2 mm long; style branches diverging, 2 mm long, deeply bilobed, ± 1 mm long, stigmatic towards apices, without crests. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 20. *Flowering time*: September to early October (in cultivation).

Distribution and ecology: known only from near the town of Aus in southern Namibia; in sandy ground around granite outcrops.

Diagnosis: the small, blue-violet flowers of *Moraea graniticola* with subequal, spreading, shortly clawed tepals stand out in the genus and sect. *Deserticolae* in having a shortly beaked ovary and tepals united in a short perianth tube. The species is also unusual in being more-or-less acaulescent. Molecular DNA sequence studies show the species to be closely allied to *M. rigidifolia* and *M. herrei*, which have broadly similar flowers, both with an ovary beak, particularly well developed in *M. herrei*. Both the latter species have aerial stems, a solitary foliage leaf, and free tepals.

69. **Moraea rigidifolia** *Goldblatt* in Annals of the Missouri Botanical Garden 73: 109 (1986c). Type: Namibia, southern Namib, Farm Süd Witpütz, rocky granite flats, *Goldblatt 7016* (WIND, holo.; MO, NBG, PRE, S, US, WAG, iso.).

Plants slender, 70–120 mm high. *Corm* 20–30 mm diam.; tunics of dark brown, coarse fibres tunics accumulating in a dense mass extending upwards in a collar around base. *Stem* simple or branched from below, bearing several sessile lateral rhipidia above, sheathing leaves ± dry, brown, up to 25 mm long. *Foliage leaf* solitary, basal, terete, ± 3 mm diam., fistulose, pithy inside, falcate to recurved. *Rhipidial spathes* becoming dry and brown above, inner 17–22 mm long, outer slightly shorter. *Flowers* fugaceous, blue-mauve, outer tepal limbs with ± white nectar guides at bases, claws forming



Distribution of ***Moraea rigidifolia***.

a shallow cup around base of filament column, limbs spreading horizontally; tepals lanceolate, outer 14–18 × 6–7 mm, claws 3–4 mm long, inner 13–15 × 5–6 mm. *Filaments* 4.0–5.5 mm long, united below in a slender smooth column, free in upper 1.3–2.0 mm and diverging; anthers 2.2–3.0 mm long, diverging, white; pollen white. *Ovary* ± sessile, narrowly ellipsoid, 5–7 mm long, with sterile beak ± 1 mm long, included; style branches diverging, 2.0–2.5 mm long, bilobed above and stigmatic apically, reaching to midanther level, crests lacking. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 20. *Flowering time*: late September to October; opening ± 16:30 and collapsing ± 19:00.

Distribution and ecology: known only from a single locality in southern Namibia, some 35 km north of the mining settlement of Rosh Pinah; in thin soil on low outcrops of weathered granite, the corms often wedged in cracks in rock.

Diagnosis: the small, pale blue-mauve flowers of *Moraea rigidifolia* have subequal tepals with short claws that enclose the lower part of the filaments, and divergent anthers appressed to short, narrow style branches that lack crests. The Namaqualand species *M. herrei* has similar flowers apart from the ovary, which although also subsessile has a sterile, tubular, apical beak 7–10 mm long. The beak is poorly developed in *M. rigidifolia* and only ± 1 mm long. The leaf of *M. herrei* is slender, terete and often spirally coiled, very different to the straight, relatively thick, hollow leaf of *M. rigidifolia*. Molecular studies confirm that the two species are closely related.

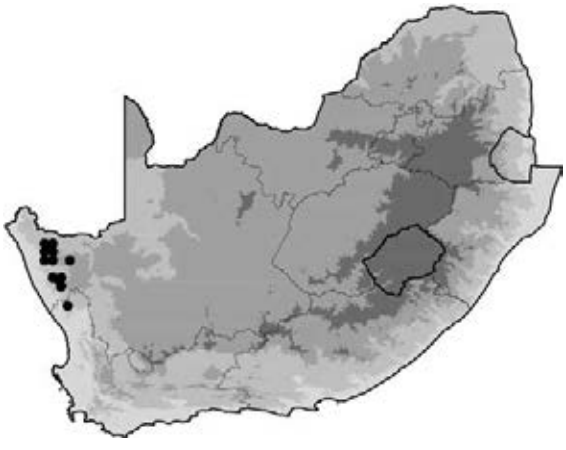
70. **Moraea herrei** *(L.Bolus) Goldblatt* in Novon 8: 374 (1998). *Homeria herrei* L.Bolus: 367 (1931b). Type: South Africa, [Northern Cape], Namaqualand, Breekpoort, Steinkopf, *Herre s.n.* (BOL, holo.).

Moraea spiralis Baker: 57 (1892), illegitimate homonym, not *M. spiralis* L.f. (1782). *Helixyra spiralis* N.E.Br.: 349 (1929b). *Gynandriris spiralis* (N.E.Br.) R.C.Foster: 41 (1936). *Barnardiella spiralis* (N.E.Br.) Goldblatt: 312 (1976c). Type: South Africa, [Northern Cape], 'Namaqualand', *Drège 2604* (K, lecto., designated by Goldblatt: 312 (1976c); BOL, isolecto.).

Plants 6–14 mm high. *Corm* up to 20 mm diam.; tunics of dark brown fibres, vertical members heavily thickened, accumulating in a dense mass, extending upward as a collar around base. *Stem* simple or few-branched near base, usually bearing 1 to several sessile lateral rhipidia, sheathing leaves ± 15 mm long, ± dry at flowering. *Foliage leaf* solitary, basal, terete, ± straight and falcate to loosely or tightly coiled in corkscrew-fashion. *Rhipidial spathes* dry, pale brown, inner 15–20 mm long, outer $^{2}/_{3}$ to ± as long, margins membranous. *Flowers* fugaceous, nearly sessile, perianth borne on an ovary tube, blue-mauve to violet, inner and outer tepal limbs with small yellow nectar guides at bases; outer tepals ± 14, claws short, ± 4 mm long, forming a cup including filament column, limbs spreading ± horizontally, 10 × 7 mm, inner with limbs 9 × 6 mm. *Filaments* ± 5.5 mm long, united in a slender column minutely scabrid in lower half, free and diverging in upper ± 1 mm; anthers ± 3.5 mm long, white, initially concealing style branches; pollen pale yellow. *Ovary* cylindric, 12–15 mm long, fertile in lower ± 5 mm, prolonged distally as a sterile, tubular beak; style branches short, ± 1 mm long, dividing into two diverging, narrow, apically stigmatic arms without crests, reaching to middle of anthers. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 20. *Flowering time*: mainly September and October; opening ± 14:30 and collapsing at sunset.

Distribution and ecology: fairly widespread in Namaqualand in Northern Cape, South Africa, from near Steinkopf in the north to Bitterfontein in Western Cape in the south, and common west of Springbok; in hard, stony sandy gravel or clay.

Diagnosis: *Moraea herrei* stands out in its slender, terete leaf, often loosely spirally coiled, and in the small, violet flower with subequal tepals with spreading to reflexed



Distribution of ***Moraea herrei***.

limbs and short, almost vestigial style branches lacking crests. The flower is subsessile and the perianth is raised above the spathes on a sterile, tubular extension of the ovary, a structure that is paralleled in sect. *Gynandriris*. *Moraea herrei* is allied to two southern Namibian species, *M. graniticola* and *M. rigidifolia,* both of which have a shortly beaked ovary with the beak much shorter than in *M. herrei*. *Moraea graniticola* differs additionally in having a true perianth tube and a stem barely reaching above ground.

71. **Moraea hexaglottis** *Goldblatt* in Annals of the Missouri Botanical Garden 73: 108 (1986c). Type: Namibia, Huib Plateau, Farm Aub, 80 km N of Rosh Pinah, *Lavranos & Pehlemann 21704* (MO, holo.; WIND, iso.).

Plants small, 80–100 mm high. *Corm* 10–15 mm diam.; tunics of coarse brown fibres. *Stem* weakly flexuose below nodes, 1- or 2-branched, bearing sheathing leaves 12–18 mm long, green becoming dry above. *Foliage leaf* solitary, basal, slender, apparently terete but linear and channelled, with tightly inrolled margins, sometimes slightly twisted above, ± twice as long as stem. *Rhipidial spathes* becoming dry and pale straw-coloured above, inner 16–19 mm long, outer ± half to nearly as long. *Flowers* fugaceous, blue-violet, outer tepal limbs with pale yellow nectar guides at bases; outer tepals 12–14 × 6–7 mm, claw ± 1 mm long, clasping filament column, limb obovate, spreading ± horizontally, obovate; inner tepals smaller than outer, 10–12 mm long, lanceolate. *Filaments* ± 4 mm long, united in lower half in a smooth cylindric column, diverging in upper half; anthers 3–4 mm long, ascending, yellow; pollen yellow. *Ovary* ± cylindric, ± 3 mm long, at least partly exserted; style branches divided almost to base into paired slender tapering arms extending upwards between filaments, style arms ± 2.7 mm long, apically stigmatic, crests lacking. *Capsules* globose, 4–6 mm diam. *Seeds* angular. *Chromosome number* 2*n* = 20. *Flowering time*: September to October, opening ± 16:00, fading at sunset.



Distribution of ***Moraea hexaglottis***.

Distribution and ecology: restricted to southern Namibia and known from only one site on the Huib Plateau at ± 1 300 m; in silt on black limestone.

Diagnosis: named for the six, filiform style branches, *Moraea hexaglottis* has small, blue-violet flowers with spreading, subequal tepals very like those of *M. rigidifolia* and the widespread *M. crispa* but with short style branches, each divided almost to the base into a pair of slender, ascending arms resembling those of the species of sect. *Hexaglottis*, except that in sect. *Hexaglottis* the filaments are united only near the base, the style arms are stouter, and the flowers are always yellow. The blue flowers and chromosome number $x = 10$ suggest that *M. hexaglottis* is allied to the *M. herrei* group of sect. *Deserticolae*. Blue-flowered *Moraea pearsonii* of sect. *Pseudospicatae* has remarkably similar paired, filiform style branches.

72. **Moraea fugax** *(D.Delaroche) Jacq.*, Hortus botanicus vindobonensis 3: 14 (1776); Goldblatt: 98 (1986a, incl. *M. filicaulis*). *Vieusseuxia fugax* D.Delaroche: 33 (1766). Type: South Africa, without precise locality or collector, illustration in Van Hazen: 67 (1759).

Iris edulis L.f.: 98 (1782). *Moraea edulis* (L.f.) Ker Gawl.: t. 613 (1803a). *Vieusseuxia edulis* (L.f.) Link: 56 (1821). Type: South Africa, without precise locality, *Thunberg s.n.* [UPS-THUNB, lecto., designated by Brown 1928: 38].

Moraea corniculata Lam.: 115 (1791). Type: South Africa, without precise locality, *Sonnerat s.n.* [P, lecto., designated by Goldblatt: 725 (1976a)].

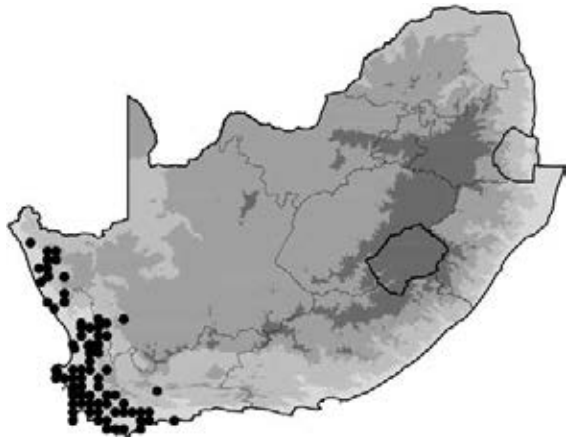
Iris longifolia Schneev.: t. 20 (1793). *Moraea longifolia* (Schneev.) Sweet: 497 (1830), illegitimate homonym, not *M. longifolia* (Jacq.) Pers. (1805). *M. edulis* var. *longifolia* (Schneev.) Baker: 21 (1896). Type: South Africa, without precise locality or collector, illustration in Schneev.: t. 20 (1793).

Moraea odora Salisb.: t. 1, 10 (1805). *M. edulis* var. *odora* (Salisb.) Baker: 21 (1896). Type: South Africa, without precise locality or collector, illustration in Salisb.: t. 1, 10. (1805).

[*Iris imberbis* van Hazen ex Ker Gawl.: t. 1238 (1809), invalid name only in synonymy. *Iris imberbis, etc.* van Hazen: 67 (1759) polynomial.]

[*Vieusseuxia longifolia* Eckl.: 14 (1827), invalid name without description.]

Plants medium to large, mostly 200–500 mm high. *Corm* 15–30 mm diam.; tunics of light, rarely dark brown, medium-textured fibres. *Stem* mostly 2–3 mm diam., suberect to inclined, with long basal internode, sheathing leaves mostly 15–30 mm long, dry and brown distally. *Foliage leaves* inserted at first node above ground, solitary or 2, ± opposite and subequal or unequal, linear, much exceeding stem, ± falcate, trailing distally, channelled, (1.5–)3.0–7.0 mm wide, margins sometimes



Distribution of ***Moraea fugax***.

tightly inrolled, then evidently terete. *Rhipidial spathes* with age dry and membranous distally, inner 35–80 mm long, outer entirely sheathing, ± 1/3 as long. *Flowers* fugaceous, white, blue or yellow, outer tepal limbs with yellow or white nectar guides at bases, strongly vanilla-scented; tepals lanceolate, limbs ± spreading, claws ascending; outer tepals 30–50 mm long, limb ± as long as claw or slightly shorter; inner tepals 26–43 × 5–9 mm. *Filaments* 7–13 mm long; anthers 6.5–10.0 mm long, usually white; pollen usually white. *Ovary* ellipsoid, 10–20 mm long with beak ± 1.5 mm, included; style branches (10–)12–20 mm long, crests lanceolate, 10–20 mm long. *Capsules* club-shaped to ± cylindric, shortly beaked, mostly 12–30 mm long. *Seeds* many, angled. *Chromosome numbers* 2*n* = 20, 18, 16, 14, 12, 10. *Flowering time*: mainly late August to October; usually opening ± 13:00 (later in some populations), collapsing near sunset.

Distribution and ecology: relatively widespread along the western and southern coasts and near interior of South Africa, extending from the Bokkeveld Mtns in Northern Cape through Western Cape to the Cape Peninsula and east to Albertinia, as well as northwards along the coast into central Namaqualand; in sandy ground and rock outcrops, both in rocky sites and deep sands, from coastal sites to mountains at middle elevations.

Diagnosis: usually easy to recognise by the long basal internode with the leaf or leaf pair inserted at the first node above ground, *Moraea fugax* has a few- to several-branched stem and relatively large flowers. Also distinctive, the ovary and capsules are included in the spathes and have a short beak, conspicuous in fruit. The species includes three main morphs. The typical form with yellow flowers and relatively broad inner tepal limbs is often early flowering, mainly in August to the middle of September, and occurs mostly on stony sandstone slopes. A second morph has white to blue flowers with narrower inner tepals and is largely coastal, occurring in deep sands and extending from Namaqualand to Hermanus but inland for some distance and occasional in the Olifants River Valley. A third morph from interior southwestern Cape has smaller, white flowers with unusually narrow inner tepals. The tall, white to blue-flowered morph has been recognised as *M. longifolia* (or as *M. edulis* var. *longifolia*) [under the assumption that *M. edulis* represented yellow-flowered plants]. Another unusual variant is represented by yellow flowered plants from the Pakhuis Mtns and nearby flowering in late September and October, with inner tepals erect (unique in the complex) and particularly slender stems and filiform, tightly rolled leaves.

Not only is *M. fugax* diverse morphologically but chromosome numbers are strikingly varied, with diploid numbers ranging from 2*n* = 20 to 10, the lower numbers usually associated with yellow-flowered populations. Further investigation at population level is necessary to resolve variation in the complex into a more refined taxonomy.

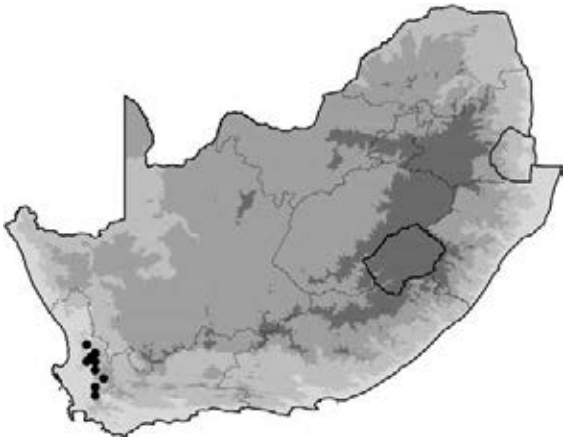
73. **Moraea gracilenta** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 724 (1976a); Goldblatt: 94 (1986a). Type: South Africa, [Western Cape], sandy flats south of Piekenierskloof Pass, *Goldblatt 3279* (MO, holo.; K, NBG, PRE, S, iso).

Moraea edulis var. *gracilis* Baker: 56 (1892). Type: South Africa, [Western Cape], Tulbagh Kloof to Piekenierskloof, *Zeyher 1647* (K, lecto., designated by Goldblatt: 724 (1976a); PRE, S, isolecto.).

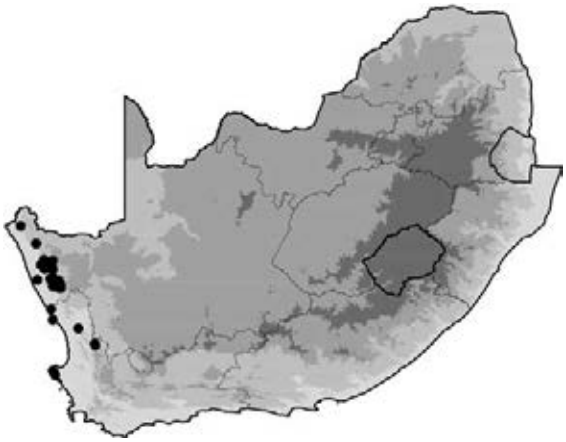
Plants 300–800 mm high. *Corm* 15–20 mm diam.; tunics of fine to medium-textured, pale or dark brown fibres. *Stem* with long basal internode, many-branched, sheathing leaves 25–35 mm long, dry and brown distally. *Foliage leaf* solitary, channelled, linear, exceeding stem and trailing distally, inserted well above ground at first aerial node. *Rhipidial spathes* becoming dry above, apices brown, acute; inner 25–35(–40) mm long, outer slightly < 1/2 as long. *Flowers* fugaceous, pale blue-mauve, outer tepal limbs with yellow nectar guides at bases, strongly vanilla-scented; outer tepals 20–30 × ± 8 mm, lanceolate, laxly spreading; inner tepals 18–28 × 5–6 mm, limbs laxly spreading. *Filaments* ± 5 mm long, united in lower half; anthers 4–6 mm long, white; pollen white. *Ovary* narrowly ellipsoid, 8–10 mm long, usually partly included at anthesis; style branches 7–9 mm long, crests linear-lanceolate, 7–12 mm long. *Capsules* mostly 10–12 mm long, shortly beaked. *Seeds* angular. *Chromosome number* 2*n* = 20. *Flowering time*: late September to November, extending to December at higher altitudes; opening ± 15:30 and collapsing ± 19:00.

Distribution and ecology: local in Western Cape, South Africa, from Clanwilliam in the north to Tulbagh and Piketberg: on sandy flats, often in deep sandy ground (many of the known sites for the species are degraded or lost to agriculture).

Diagnosis: *Moraea gracilenta* differs consistently from all morphs of the very variable *M. fugax* in its distinctive



Distribution of ***Moraea gracilenta***.



Distribution of ***Moraea filicaulis***.

extended stem, multi-branched habit, and smaller pale blue to almost white flowers, the outer tepals 20–30 mm long. The rhipidial spathes are also relatively short, the inner spathe, 25–40 mm long, and the capsules are only ± 10 mm long. Timing of anthesis is also different in the two species. Flowers of *M. gracilenta* open ± 15:30 and last until 19:00, whereas those of *M. fugax* open between 11:00 and 13:00 and collapse by 18:00. The flowering phenology of *M. gracilenta* appears to vary hardly at all in wild populations.

74. **Moraea filicaulis** *Baker* in Bulletin de l'Herbier Boissier, sér. 2: 1005 (1904b). *M. fugax* subsp. *filicaulis* (Baker) Goldblatt: 155 (1986b). Type: South Africa, [Northern Cape], Kamiesberg between Roodeberg and Ezelskop, *Drège 2605* (K, lecto., designated by Goldblatt: 725 (1976a); MO, P, isolecto.).

Moraea diphylla Baker: 42 (1906). Type: South Africa, [Western Cape], Olifants River, *Penther 734* [K, lecto., designated by Goldblatt: 725 (1976a)].

Plants (60–)120–200 mm high. *Corm* 7–16 mm diam.; tunics usually pale, rarely dark brown, of fine to medium fibres. *Stem* slender, up to 1 mm diam., with long basal internode, few- to several-branched, sheathing leaves 12–20 mm long, green, becoming dry above. *Foliage leaves* usually 2, inserted at first above-ground node, subopposite, occasionally solitary, linear-filiform, narrowly channelled, 1–2 mm wide, subequal or unequal in length, occasionally loosely spiralled distally. *Rhipidial spathes* green or becoming dry distally, inner 20–35(–40) mm long, outer ± $^{1}/_{3}$–$^{1}/_{2}$ as long. *Flowers* fugaceous, white, sometimes shaded blue or pink, or blue-mauve, rarely violet or purple, vanilla-scented, outer tepal limbs with yellow nectar guides at bases, limbs of both whorls reflexed up to 40º; tepals lanceolate, outer 20–30(–35) × 8–12 mm, claws ± 8 mm long; inner 18–30 × 5–7 mm. *Filaments* 5–6 mm long, united in lower half; anthers 4–6 mm long, usually white; pollen white. *Ovary* narrowly ellipsoid, 8–11 mm long, included, style branches 8–10 mm long, crests lanceolate 8–15 mm long. *Capsules* 8–13(–15) mm long, shortly beaked. *Chromosome number* 2*n* = 18, 12, 10. *Flowering time*: August to October.

Distribution and ecology: extending from the Richtersveld of Northern Cape, South Africa, to Vanrhynsdorp in Western Cape and along the Atlantic Coast as far south as Saldanha; in stony or hard sandy ground.

Diagnosis: closely resembling *Moraea fugax* in general appearance except smaller in all features, *M. filicaulis* has a slender, almost filiform stem ± 1 mm in diam., and one or more often two subequal or unequal, filiform, narrowly channelled leaves inserted at the first above ground internode. The flowers are usually white, but occasionally pink or blue-mauve or even violet, and have outer tepals mostly 20–35 mm long (occasionally longer) and inner tepals 18–30 mm long. Flowers of *M. fugax* have outer tepals mostly 30–45 mm long and inner tepals 25–35 mm long. The inner rhipidial spathes, a useful measure of plant size, are 20–35(–40) mm long in *M. filicaulis* but 40–65 mm long in *M. fugax*.

Moraea filicaulis has been treated as a subspecies of *M. fugax* and an important reason for recognising it as a separate species is that it sometimes co-occurs with typical *M. fugax* but always showing slightly different habitat preferences.

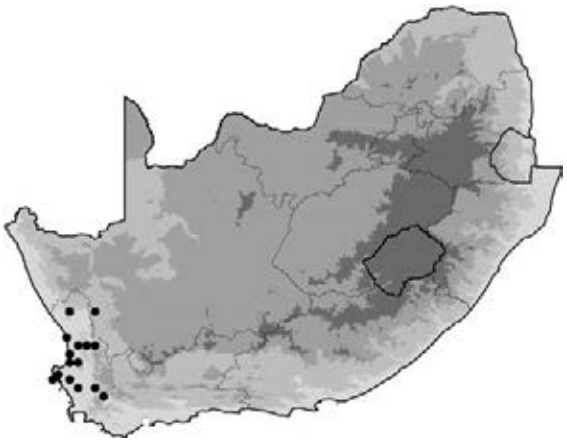
75. **Moraea macrocarpa** *Goldblatt* in Annals of the Missouri Botanical Garden 73: 151 (1986b). Type: South Africa, [Western Cape], Piketberg Mtns, south of Redelinghuys, *Acocks 24359* (PRE, holo.; MO, iso.).

Plants 40–80 mm high, usually stem ± underground. *Corm* 8–12 mm diam., deeply seated 115 mm or more; tunics of fine pale fibres. *Stem* sometimes initially underground or barely above ground, in fruit well above ground (not known for subsp. *virginea*); filiform, simple or 1 or 2 (rarely 3 or 4) shortly stalked inflorescences. *Foliage leaf* solitary, often inserted shortly below

ground or at ground level, linear-filiform, narrowly channelled or entirely terete, 0.4–1.5 mm wide, much exceeding stem, up to 600 mm or more (subsp. *virginea*). *Rhipidial spathes* becoming dry above, tips brown, acute, inner (34–)40–50(–65) mm long, outer ± $^1/_3$–$^1/_2$ as long incl. dry tapering tip. *Flowers* fugaceous, either pale to middle blue-mauve with yellow nectar guides at outer tepal limb bases edged violet or purple and claws yellow with dark spots, or white with yellow guides without dark edges and claws with yellow midline, vanilla-scented, limbs of both whorls slightly reflexed or spreading; outer tepals lanceolate, limb 12–26 × 7–15 mm, claws 8–12 mm long; inner tepals 18–32 × 5–8 mm. *Filaments* 5–9 mm long, united in lower half; anthers 4–9 mm long, ± white pale violet inside; pollen off white. *Ovary* ± cylindric, 17–22 mm long, included, style branches 6–10 mm long, crests narrowly lanceolate, 12–18 mm long, suberect. *Capsules* ± cylindric, 18–36 mm long, shortly beaked. *Chromosome number* $2n = 20$ (subsp. *Macrocarpa*). *Flowering time*: mainly August to early October; opening ± 12:00 and collapsing ± 19:00 or (subsp. *virginea*), or opening ± 10:00 and collapsing 16:30.

Distribution and ecology: extending from the Bokkeveld Mtns in Northern Cape, South Africa, south through Western Cape to Saldanha and Darling and locally inland in the Breede River Valley near Worcester or (subsp. *virginea*) in the De Hoop hills; always in deep sandy ground.

Diagnosis: until 1986 associated with the widespread *Moraea fugax, M. macrocarpa* is immediately recognised by its low stature, mostly 40–80 mm in height with stem underground or barely exserted at flowering, single narrow, falcate to trailing foliage leaf, and elongate, included ovary, 17–22 mm long. The capsules are even longer, up to 36 mm long and remain largely included in the spathes. Apart from the unusually long ovary, the flowers differ little from those of *M. fugax* and *M. filicaulis* and it has the beaked ovary of those two species. Capsules of *M. filicaulis* are usually 8–15 mm long and those of *M. fugax* typically 15–27 mm long vs 18–36 mm in *M. macrocarpa*. The tepals of *M. macrocarpa* are either blue-mauve, the outer with deep yellow nectar guides at the bases of the limbs edged in dark purple or in subsp. *virginea* white, also with yellow nectar guides, but lacking dark edges.



Distribution of ***Moraea macrocarpa*** subsp. ***macrocarpa***, ●; subsp. ***virginea***, ○.

Key to the subspecies

1a Flowers pale to middle blue-mauve with yellow nectar guides at bases of outer sepals edged in dark purple; outer tepals mostly 20–30 mm long; foliage leaf channelled almost to apex and mostly ±1.5 mm wide when opened flat (though margins often inrolled) . . . . . 75a. subsp. *macrocarpa*

1b Flowers white with yellow nectar guides without dark edges; outer tepals mostly 32–38 mm long; leaves usually terete throughout (occ. channelled for some distance) and ± 1 mm diam. . . . . 75b. subsp. *virginea*

75a. subsp. **macrocarpa**

Foliage leaf solitary, linear-filiform, narrowly channelled or with margins inrolled, 0.4–1.5 mm wide, much exceeding stem. *Rhipidial spathes* acute, inner (34–)40–50(–65) mm long, outer ± $^1/_3$–$^1/_2$ as long incl. dry tapering tip. *Flowers* pale to middle blue-mauve with yellow nectar guides at bases of outer tepals edged violet or purple and claws yellow with dark spots; outer tepal limbs 12–15 × 5–10 mm, claws 8–11 mm long; inner tepals 18–28 × 5–7 mm. *Filaments* 5–6 mm long, united in lower $^1/_2$; anthers 4–5 mm long. *Ovary* ± cylindric, 17–21 mm long, included, style branches 6–7 mm long. *Capsules* ± cylindric, 18–35 mm long, shortly beaked. *Flowering time*: mainly August to early October; opening ± 12:00 and collapsing ± 19:00.

Distribution and ecology: the range of *Moraea macrocarpa* except for the De Hoop hills.

Diagnosis: distinguished from subsp. *virginea* by the smaller, blue-mauve perianth with outer tepals 17–25 mm long, inner 18–28 mm long, and the channelled foliage leaf, the margins sometimes closely inrolled but always with a narrow adaxial groove.

75b. subsp. **virginea** *Goldblatt & J.C.Manning*, new subspecies. Type: South Africa, Western Cape, 3.5 km along road to De Hoop, wide valley in deep sandy loam, burned (?the previous summer), 30 Sept. 2016, *Goldblatt & Porter 14181* (NBG, holo.; K, MO, PRE, iso.).

Foliage leaf solitary, usually terete above base, rarely narrowly channelled for up to half its length, up to 600 mm or more. *Rhipidial spathes* acute, inner 50–55 mm long, outer ± $^1/_2$ as long incl. dry tapering tip. *Flowers* fugaceous, white with yellow guides without dark edges and claws white, yellow in midline, limbs of both whorls ± spreading; outer tepal limbs 20–26 ×

12–15 mm, claws ± 12 mm long; inner tepals 24–32 × 6–8 mm. *Filaments* 7–9 mm long, united in lower half; anthers ± 9 mm long, ± white; pollen off white. *Ovary* ± cylindric, 20–22 mm long, included, style branches ± 10 mm long, crests narrowly lanceolate, 12–18 mm long, suberect. *Capsules* ± cylindric, 33–36 mm long, shortly beaked. *Flowering time*: mainly mid-September and October; opening ± 10:00 and collapsing ± 16:30.

Distribution and ecology: currently known from a single shallow, sandy valley in the hills east of the road to De Hoop National Park.

Diagnosis: immediately distinguished by the relatively large, white flowers with outer tepals 32–38 mm long, inner tepals 24–32 mm long, and the terete leaf blade, rarely partly channelled in the lower half.

Sect. 7. **Hexaglottis** *(Vent.) Goldblatt* in Novon 8: 376 (1998). *Hexaglottis* Vent.: 6 (1808). Type: *H. longifolia* (Jacq.) G.J.Lewis, lecto., designated by Lewis: 219 (1959) = *Moraea longifolia* (Jacq.) Pers.

Plantia Herbert: 89 (1844). Type: *P. flava* Herb. (probably = *Moraea virgata* Jacq.)

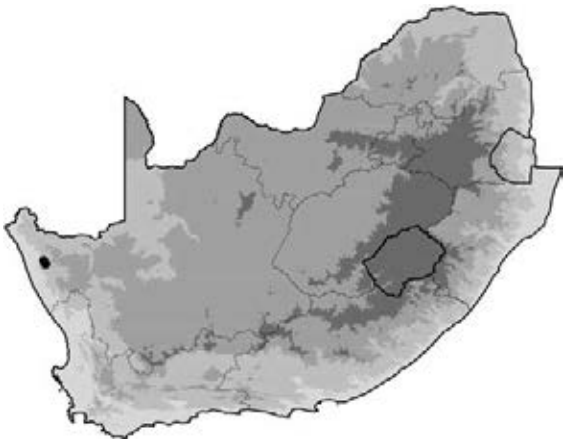
Plants usually branched, secondary branches usually sessile. *Flowers* yellow, with tepals subequal with claws short; tepals united in tube in two species; style branches reduced to paired filiform arms extended either side of opposed stamen, ovary exserted or included and ± sessile in species with perianth tube. *Ovary* and *capsules* exserted or included.

76. **Moraea namaquana** *(Goldblatt) Goldblatt* in Novon 8: 376 (1998). *Hexaglottis namaquana* Goldblatt: 554 (1987). Type: South Africa, [Northern Cape], Namaqualand, top of Spektakel Pass, clay in quartzite patches, *Goldblatt 3059* (MO, holo.; K, NBG, iso.).

Plants 150–300 mm high. *Corm* 10–15 mm diam.; tunics of dark brown to black fibres, extending upward into short stiff bristles. *Stem* several-branched, all stalked, sheathing leaves 17–21 mm long. *Foliage leaves* 2 or 3, all ± basal, 80–150 mm long, up to 11 mm wide, spreading to ± prostrate, undulate and loosely twisted, margins undulate or crisped. *Rhipidial spathes* green or becoming dry from tips, acute, inner 25–30 mm long, outer ± half as long. *Flowers* fugaceous, stellate, yellow, tepal limbs spreading; tepals ± 20 mm long, claws ± 2 mm long, erect and clasping filament bases, outer tepals up to 5 mm wide, inner narrower. *Filaments* united only at base (seeming free), 3–4 mm long; anthers ± 3 mm long, straight and suberect before dehiscence, yellow. *Ovary* 4–5 mm long, usually barely exserted from spathes, style arms paired, filiform, spreading, ± 4 mm long. *Capsules* narrowly oblong-ellipsoid, 8–10 mm long. *Seeds* angular, ± 1 mm diam. *Chromosome number* 2*n* = 12. *Flowering time*: late September to October; opening ± 15:00 and collapsing near sunset.

Distribution and ecology: known only from the eastern slopes of Spektakel Pass west of Springbok in Northern Cape, South Africa; in stony, clay ground mostly covered with white quartzite pebbles.

Diagnosis: *Moraea namaquana* stands out in sect. *Hexaglottis* in the spreading to prostrate basal leaves, undulate and twisted leaf blades with crisped margins, and



Distribution of ***Moraea namaquana***.

branched stem with all lateral inflorescences stalked. Other species have linear, upright leaves with straight margins and sessile or very shortly stalked lateral inflorescences. The flowers are virtually identical with those of *M. lewisiana* and *M. rupicola* except for their slightly smaller size, with tepals ± 20 mm long. The capsules are ellipsoid and well exserted from the spathes. *Moraea lewisiana* growing nearby at the type locality has linear leaves and tall stems but no intermediates between the two species are known.

77. **Moraea thermarum** *Goldblatt & J.C.Manning* in Bothalia 43: 156 (2013). Type: Namibia, Karas, Ai-Ais Hotsprings Game Park, along Orange River, on cliff face, 13 Sept. 2012, *A. Burke 12035* (WIND, holo.).

Plants 30–100 mm high. *Corm* 10–15 mm diam.; tunics of dark brown to black fibres, extending upward as short stiff bristles. *Stem* simple or 1- or 2-branched; branches shortly stalked; sheathing leaves 1 or 2, 11–17 mm long. *Foliage leaves* 3 or 4, all ± basal, trailing or pendent, 80–120 × 1–3 mm, undulate and loosely twisted, margins crisped, with 1 conspicuous lateral vein per side. *Rhipidial spathes* becoming dry from tips, acute, inner 15–25 mm long, outer ± half as long. *Flowers* fugaceous, stellate, yellow, tepals connate basally in short cylindric tube ± 1.5 mm long, limbs spreading, elliptic,



Distribution of ***Moraea thermarum***.

± 15 × 5 mm, shortly clawed, claws 0.5–1.0 mm long. *Filaments* united only at base (seeming free), ± 5 mm long; anthers ± 3 mm long, straight and suberect before dehiscence, yellow. *Ovary* included, style arms paired, filiform, spreading, 4–5 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid- September to October.

Distribution and ecology: known from two collections fringing the Huib Hoch Plateau in southwestern Namibia, one from the summit of the Aurusberg and the other along the Orange River near Ai-Ais; confined to shaded cliff faces, growing wedged in cracks in the rocks.

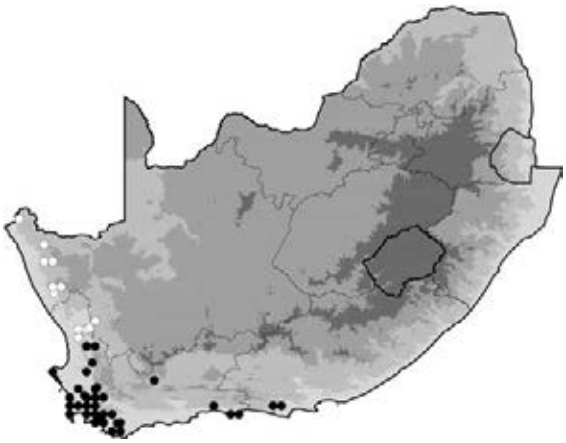
Diagnosis: resembling *Moraea namaquana* in its trailing, undulate or crisped leaves and stalked lateral inflorescences, *M. thermarum* is distinguished by its narrower, linear leaves, 1–3 mm wide with a single lateral vein on each side and somewhat smaller flowers with a distinct perianth tube ± 1.5 mm long, and the ovary included in the spathes. *Moraea namaquana*, which grows in open rocky ground, is a more robust plant, with leaves 5–11 mm wide with two conspicuous lateral veins per side, and tepals free to the base.

78. **Moraea lewisiae** *(Goldblatt) Goldblatt* in Novon 8: 376 (1998). *Hexaglottis lewisiae* Goldblatt: 234 (1971a), as a new name for *M. flexuosa* L.f.: 100 (1782), illegitimate superfluous name for *Ixia longifolia* Jacq. (1776); Goldblatt: 554 (1987). *Sisyrinchium flexuosum* Spreng.: 167 (1824). *Homeria flexuosa* Sweet: 395 (1826a). *Hexaglottis flexuosa* Sweet: 498 (1830). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* [UPS-THUNB 1217, lecto., designated by Goldblatt: 234 (1971a)].

Plants variable in size, (120–)200–700 mm high. *Corm* 15–20 mm diam.; tunics (pale) dark brown, fibrous. *Stem* bearing 1 to 3 secondary branches near base (rarely simple), often flexuose, with sessile lateral rhipidia, usually overlapping one above, sheathing leaves concealing at least lower part of rhipidia, usually 25–30 mm long. *Foliage leaves* 1 to 3(4), ± basal (or inserted shortly above ground), linear, channelled, ascending but trailing distally, normally much exceeding stem, sometimes shorter, margins often inrolled, straight, rarely undulate. *Rhipidial spathes* usually dry above, 30–45 mm long, attenuate, outer slightly shorter than inner. *Flowers* fugaceous, stellate, pale to deep yellow, often feathered brownish outside, inner and outer tepal limbs with deeper yellow nectar guides at bases, usually edged with small dark green to black spots, with strong sweet scent; outer tepals 19–24 × 7–10 mm (subsp. *lewisiae*), 24–30 × 9–13 mm (subsp. *secunda*), claws 1.5–2.0 mm long, clasping filament column, limbs spreading, outer ovate, inner ± wedge-shaped, ± as long to 2 mm shorter but narrower than outer. *Filaments* 4–6 mm long, united in lower 1.0–1.5 mm; anthers 5–7 mm long, shorter after releasing pollen, yellow; pollen yellow. *Ovary* cylindric-ellipsoid, (5.5–)6.5–12.0 mm long, usually partly to entirely exserted, rarely included; style branches divided almost to base into paired filiform arms 6–7 mm long, extended horizontally. *Capsules* narrowly triangular-cylindric, 11–16(–20) mm long (subsp. *lewisiae*) or ovoid-ellipsoid, 8–13(–15) mm long (subsp. *secunda*), often shortly beaked, splitting in upper $^1/_3$ to half. *Seeds* angular, sometimes narrowly, tapering at both ends, 1.2–2.0 × 0.7–1.0 mm, winged in northern populations. *Chromosome number* 2*n* = 12. *Flowering time*: (September) October and November; usually opening between 15:00 to 16:00 in the south, collapsing ± 19:00, opening later in Namaqualand populations and fading at ± 20:00.

Distribution and ecology: widespread in the southern African winter-rainfall zone, from the Richtersveld in Northern Cape, South Africa, south through Western Cape and as far east as Humansdorp in Eastern Cape, sometimes common; usually in dry, exposed sites, often in stony ground, on both sandy and clay soils.

Diagnosis: the flowers of *Moraea lewisiae* are typical of sect. *Hexaglottis* in the yellow tepals with short erect claws and it is distinguished mainly by the capsules



Distribution of ***Moraea lewisiae*** subsp. ***lewisiae***, ●; subsp. ***secunda***, ○.

either cylindric but triangular to 3-lobed in section and 11–20 mm long or ovoid-ellipsoid and round in section, 8–15 mm long, and usually with a short beak up to 1 mm long. The tepal limbs bear yellow nectar guides at their bases dotted with fine, green to black spots. Taller *M. longifolia* has paler yellow tepals of similar size but lacking spotted nectar guides and the flowers have none or little scent and slightly shorter style branches, and characteristic obovoid, club-shaped capsules with obviously truncate apex and larger seeds. Two subspecies of *M. lewisiae* are recognised, typical subsp. *lewisiae* with elongate capsules 3-lobed to 3-angled in section and often slightly smaller upright flowers, and subsp. *secunda* with larger, nodding flowers and ovoid-ellipsoid capsules round in section, often with a short beak.

Key to subspecies

1a Capsules cylindric or nearly so, 11–16(–20) mm long, not beaked; outer tepals 19–24 mm long; flowers ± upright ..... 78a. subsp. *lewisiae*

1b Capsules obovoid-ellipsoid, 8–13(–15) mm long, often distinctly beaked; outer tepals 24–30 mm long; flowers usually nodding ..... 78b. subsp. *secunda*

78a. subsp. **lewisiae**

Plants mostly 200–600 mm high. *Flowers* usually upright; tepals 19–24 × 7–10 mm. *Ovary* 8–10 mm long, usually partly to entirely exserted at flowering, rarely included. *Capsules* ± cylindric, triangular in section, 11–15(–20) mm long, dehiscing in upper $^1/_3$–$^1/_2$. *Seeds* angular-ellipsoid, tapering at both ends, 1.2–1.4 × 0.7 mm.

Distribution and ecology: extending from the Atlantic coast of Western Cape east through the southern Cape to Humansdorp in Eastern Cape; evidently common only in the west and records are very scattered east of Bredasdorp, possibly because of inadequate collecting.

78b. subsp. **secunda** *(Goldblatt) Goldblatt* in Goldblatt & Manning in Novon 14: 296 (2004). *Hexaglottis lewisiae* subsp. *secunda* Goldblatt: 558 (1987). Type: South Africa, [Northern Cape], near the top of Spektakel Pass, *Goldblatt 6673* (PRE, holo.; K, MO, NBG, S, US, WAG, iso.).

Plants 200–600 mm high. *Flowers* usually nodding; outer tepals 24–30 × 9–13 mm. *Ovary* 5.5–9.5 mm long, usually at least partly exserted at flowering. *Capsules* ovoid-ellipsoid, 8–13(–15) mm long, often distinctly beaked, dehiscing for at least $^1/_2$ its length. *Seeds* angular, narrowly winged on ridges, ± 2 × 1 mm.

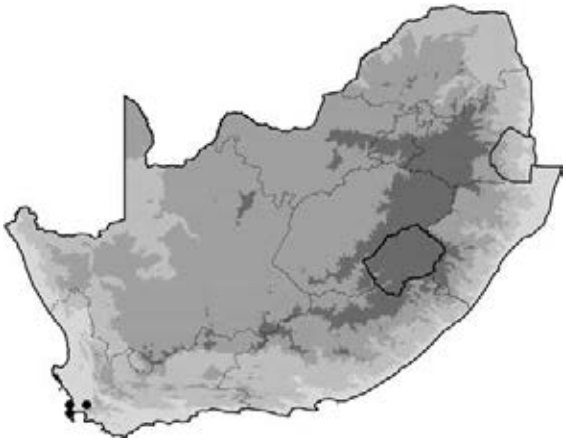
Distribution and ecology: scattered through Northern Cape and northern Western Cape, from the Richtersveld southward to the Olifants River Valley near Clanwilliam; in rocky ground, either in clay ground, less often in sand.

Diagnosis: particularly variable, subsp. *secunda* usually has two foliage leaves and produces 1 to 3 long branches from the base. It may be a tall plant up to 600 mm high, but plants from the dry foothills of the Bokkeveld and Koebee Mtns may be only 200 mm high and have only a single leaf. Also unusual, flowers in these populations open later than elsewhere, usually after 16:30. Plants from dolerite outcrops in the Calvinia District may have up to four leaves and appear very different vegetatively.

79. **Moraea longifolia** *(Jacq.) Pers.*, Synopsis plantarum 1: 49 (1805). *Ixia longifolia* Jacq.: 47 (1776). *Hexaglottis longifolia* (Jacq.) Salisb.: 313 (1812); Goldblatt: 560 (1987). Type: South Africa, without precise locality or collector, illustration in Jacq.: 47 (1776).

Hexaglottis longifolia var. *angustifolia* G.J.Lewis: 222 (1959). Type: South Africa, [Western Cape], Du Toit's Kloof, *Pillans 8436* (BOL, holo.).

Plants 600–2 000 mm high. *Corm* 15–20 mm diam.; tunics of fine, light brown fibres. *Stem* ± straight, simple or 1- to 3-branched from lower nodes, lateral rhipidia sessile, each subtended by sheathing leaf often entirely concealing rhipidia. *Foliage leaves* 3 or 4(5), linear, ascending below, bent and trailing distally, lowermost longest, 250–600 mm long, progressively shorter above, 6–12(–20) mm wide, ± flat or channelled. *Rhipidial spathes* attenuate, dry at tips, inner 3.5–5.5(–7.5) mm long, outer slightly shorter. *Flowers* fugaceous, stellate, pale yellow, usually only outer tepal limbs with inconspicuous, slightly darker yellow nectar guides, odourless or faintly scented; tepals with claws ± 2 mm long, clasping filament column, limbs spreading, outer with limbs 19–27 × 8–11 mm, inner 16–23 × 6–9 mm. *Filaments* 4–6 mm long, united in lower 2–3 mm; anthers 5–6 mm long before anthesis, yellow; pollen yellow. *Ovary* 8–12 mm long, exserted, style branches divided to base in filiform, horizontally extended arms 4–6 mm long. *Capsules* obovoid-clavate, truncate, 12–16(–23) mm long, exserted, splitting for $^1/_2$ to $^3/_4$ their length. *Seeds* angular, 2.0–2.3 mm long. *Chromosome number* $2n = 24$. *Flowering time*: mid-October and November; opening ± 14:00–14:45, collapsing after 18:00.



Distribution of ***Moraea longifolia***.

Distribution and ecology: restricted to the Cape Peninsula and surrounds in Western Cape, South Africa; in relatively moist situations, along streams and in marshes or shady places close to bush or forest.

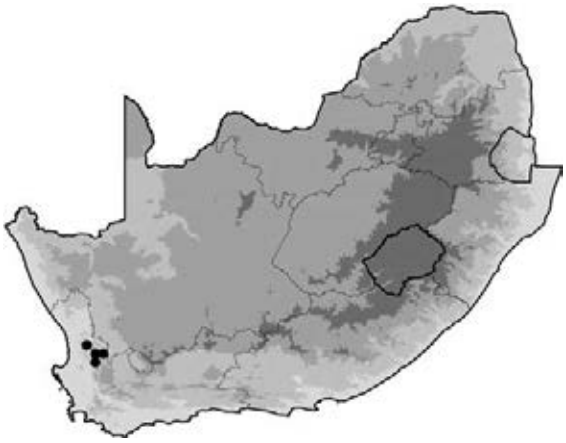
Diagnosis: particularly tall for sect. *Hexaglottis* and standing up to 2 m high, *Moraea longifolia* is distinguished by the pale yellow flowers with faint nectar guides without dark spotting, comparatively short style branches, 4–6 mm long, and large, obovoid to club-shaped capsules. *Moraea longifolia* is tetraploid and known to be self-compatible and autogamous, whereas the other species of the section are diploid and self-incompatible (compatibility relations are not known for *M. brevituba*). Closely related and similar *M. lewisiae* has cylindric 3-lobed capsules, slightly larger, deeper yellow flowers with prominently spotted nectar guides, and style branches 6–7 mm long. Also sometimes confused with *M. longifolia*, *M. riparia* has smaller capsules and bright yellow, strongly scented flowers, and is self-incompatible.

80. **Moraea riparia** *(Goldblatt) Goldblatt* in Novon 8: 376 (1998). *Hexaglottis riparia* Goldblatt: 559 (1987). Type: South Africa, [Western Cape], Olifants River at Citrusdal, after fire, *Goldblatt 6706* (NBG, holo.; K, MO, NBG, PRE, iso.).

Plants 450–900 mm high. *Corm* 13–20 mm diam.; tunics of fine, light brown fibres. *Stem* straight, simple or 1- to 3-branched from lower nodes, bearing sessile lateral rhipidia at upper nodes, subtended by sheathing leaves often concealing rhipidial spathes, 32–35 mm long, often exceeding node above. *Foliage leaves* (2)3, linear, ascending, usually bent and trailing above, lowermost longest, ± as long or longer than stem, 3–5 mm wide, channelled, upper leaves progressively shorter and narrower. *Rhipidial spathes* with attenuate dry apices, inner 33–38 mm long, outer slightly shorter. *Flowers* fugaceous, stellate, deep yellow, strongly scented; tepals 16–21 × 6–8 mm, claws ± 2 mm long, clasping filament column, limbs spreading, inner slightly shorter but as wide as outer. *Filaments* 4–6 mm long, united in lower 1.5–2.5 mm; anthers initially 5–6 mm long, yellow; pollen yellow. *Ovary* cylindric, 5–7 mm long, exserted; style branches divided to base in paired, filiform arms 5–6 mm long, extended horizontally. *Capsules* obovoid–club-shaped, ± truncate, 6–10(–12) × ± 4 mm. *Seeds* angular, 1.0–1.5 × ± 1 mm. *Chromosome number* $2n = 12$. *Flowering time*: October and November; opening ± 17:00, collapsing after 19:30.

Distribution and ecology: restricted to Western Cape, South Africa, from Clanwilliam in the north and Wolseley in the south; restricted to riverbanks and possibly the edges of marshes, habitats frequently overgrown with tall vegetation, thus blooming in such places only after fires or clearing of surrounding bush.

Diagnosis: with yellow flowers typical of sect. *Hexaglottis*, *Moraea riparia* is distinctive largely in its small obovoid to club-shaped capsules and comparatively



Distribution of ***Moraea riparia***.

slender, often willowy stems. The capsules, 6–10 mm long (occasionally up to 12 mm long in robust plants), recall those of *M. longifolia* but this species has much larger capsules, usually 16–23 mm long. *Moraea riparia* is diploid, $2n = 12$, whereas *M. longifolia*, usually a taller plant, is tetraploid, $2n = 24$. The flowers of *M. riparia* are deep yellow and scented in contrast to the pale yellow, usually odourless flowers of *M. longifolia.*

81. **Moraea brevituba** *(Goldblatt) Goldblatt* in Novon 8: 376 (1998). *Hexaglottis brevituba* Goldblatt: 562 (1987). Type: South Africa, [Northern Cape], Richtersveld, Sabiesies, road to Cornellsberg, *Viviers s.n.* (NBG, holo.; K, MO, PRE, iso.).

Plants 400–550 mm high. *Corm* 12–18 mm diam. or larger if surrounded by accumulated tunic layers; tunics of coarse, dark brown to blackish fibres. *Stem* simple or with 2 or 3 diverging secondary branches from near base, straight or slightly flexuose, bearing several sessile lateral rhipidia at upper nodes partly enclosed by slightly shorter sheathing leaves mostly 18–25 mm long. *Foliage leaves* 2 to 4, basal or inserted low on stem, linear, ascending, longer than stem and trailing distally, channelled with margins incurved. *Rhipidial spathes* usually partly to entirely dry and pale at flowering, attenuate, inner (20–)25–30 mm long, outer half to $^2/_3$ as long, exserted from subtending sheathing leaf. *Flowers* fugaceous, rotate, upright to nodding, pale yellow, evidently odourless; tepals united below in a short closed tube 1–2 mm long, tepals 16–19 × 5–8 mm long, claws ± 1 mm long, suberect, clasping bases of filament column, limbs extended horizontally, narrowly ovate, inner slightly smaller than outer. *Filaments* 3–4 mm long, united below for ± 1 mm; anthers initially 7–8 mm long, yellow; pollen yellow. *Ovary* included, cylindric, often curved outward distally, 8–11 mm long, upper 1 mm narrow and sterile, usually half exserted; pedicel (4–)7–10 mm long; style branches divided to base into filiform, horizontal arms ± 6 mm long. *Capsules* included, ellipsoid, shortly beaked, ± 15 mm long including beak ± 2 mm long. *Seeds* evidently angular, dark brown,



Distribution of ***Moraea brevituba***.

± 2 mm long. *Chromosome number* 2*n* = 24. *Flowering time*: September to October; opening middle afternoon ± 16:00 and collapsing after 19:00.

Distribution and ecology: evidently fairly rare and known from only a few sites in central and northern Namaqualand, Northern Cape, South Africa, from the Richtersveld south to Garies but apparently centred in the Springbok–Richtersveld area, with a sterile collection from Witputz in southern Namibia that requires confirmation; in arid, stony places.

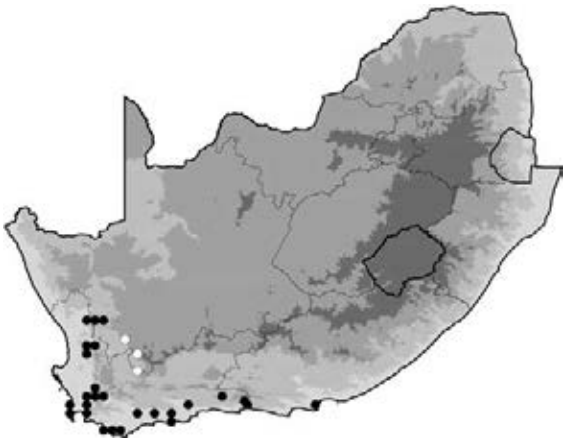
Diagnosis: the yellow flowers with a short perianth tube only 1–2 mm long distinguish *Moraea brevituba* from close allies in sect. *Hexaglottis,* particularly the widespread *M. virgata*, which has similar vegetative morphology but flowers with a well-developed perianth tube some 4–7 mm long, and the ovary entirely included on short pedicels 4–6 mm long. The ovary of *M. brevituba* is often partly exserted and the pedicels are (4–)7–10 mm long. Like other species of the section, the flowers open in the middle of the afternoon and last just a few hours.

82. **Moraea virgata** *Jacq.*, Collectanea 3: 194 (1791). *Ixia virgata* (Jacq.) Willd.: 202 (1797). *Homeria virgata* (Jacq.) Sweet: 395 (1826a). *Hexaglottis virgata* (Jacq.) Sweet: 498 (1830); Goldblatt: 563 (1987). Type: South Africa, without precise locality or collector, illustration in Jacq.: t. 228 (1792).

Plants variable in size, 120–850 mm high. *Corm* 13–18 mm diam., or larger if surrounded by accumulated tunic layers; tunics of coarse, dark brown to blackish fibres. *Stem* with simple or with 1 to 3(6) long, diverging secondary branches, straight to slightly flexuose, bearing sessile lateral rhipidia at upper nodes, each partly to almost entirely enclosed by subtending sheathing leaf, usually as long or longer than rhipidia. *Foliage leaves* usually (1)2 or 3(4), ± basal, linear, ascending, longer than stem, trailing distally, channelled with margins curving inward, occasionally loosely coiled above. *Rhipidial spathes* partly to entirely dry and pale at anthesis, attenuate, inner 22–30(–37) mm long, $^{1}/_{2}$–$^{2}/_{3}$ as long. *Flowers* fugaceous, rotate, pale yellow, with tepals united below in a closed tube, upright or secund, evidently odourless, tepal limbs with deeper yellow nectar guides at bases; perianth tube cylindric, narrow, usually slightly curving outward, 4–7(–9) mm long, usually included; tepals 14–25 (subsp. *virgata*), 23–32 (subsp. *karooica*) mm long, with short, erect claws 1.0–1.5 mm long, limbs extended horizontally, 4–8(–11) mm wide; outer larger, lanceolate to ovate, inner lanceolate to wedge-shaped. *Filaments* 3.3–6.0 mm long, united for 1–2 mm; anthers initially 6–9 mm long, yellow; pollen yellow. *Ovary* 8–16(–20) mm long, upper 1–2 mm a narrow, sterile beak, cylindric, included, on pedicels 5–6 mm long; style branches divided almost to base in paired filiform arms 5–6 mm long, extending horizontally. *Capsules* narrowly ellipsoid, shortly beaked, 9–13 × 2–3 mm (subsp. *virgata*), or 16–22 × 4 mm (subsp. *karooica*), only 1 (rarely 2) developed in each rhipidium. *Seeds* narrowly angular, 1–2 × 0.7–1.0 mm. *Chromosome number* 2*n* = 12, 10 (subsp. *virgata*), or 2*n* = 14 (subsp. *Karooica*). *Flowering time*: (late September) October to December (mid-January); opening 15:00–15:30 (up to 16:00 on cooler days), collapsing after 18:30.

Distribution and ecology: widespread through the Cape Floristic Region of South Africa, from the Bokkeveld Mtns in Northern Cape in the northwest through Western and Eastern Cape to Port Elizabeth in the east; most often on heavier soils, particularly shales of the Malmesbury System, but also on granitic substrates and occasionally on sandy soils of the Cape System.

Diagnosis: *Moraea virgata* is unmistakable in its relatively straight stems with strongly diverging lateral branches, and tepals united in a relatively long perianth tube 4–7 mm in length. Associated with the development of a perianth tube, the ovary is entirely included in the spathes and borne on a short pedicel 5–6 mm long. The



Distribution of ***Moraea virgata*** subsp. ***virgata***, ●; subsp. ***karooica***, ○.

capsules remain included in the spathes even as they ripen. Related *M. brevituba* has a much shorter perianth tube only 1–2 mm long. Two subspecies of *M. virgata* are recognised, subsp. *virgata* and larger flowered subsp. *karooica*.

Key to subspecies

1a Outer tepals 14–25 × 5–7(–11) mm; foliage leaves 1 to 3; spathes, at least terminal, 22–32 mm long . . . . . 82a. subsp. *virgata*
1b Outer tepals 23–32 × 7–11 mm; foliage leaves usually 4 or 5; spathes, at least terminal, 32–37 mm long. . . . . 82b. subsp. *karooica*

82a. subsp. **virgata**

Plantia flava Herbert in Lindl. in Edwards's Botanical Register 30 (misc.): 89 (1844). Type: uncertain.

Hexaglottis virgata var. *lata* G.J.Lewis: 228 (1959). Type: South Africa, [Western Cape], Biedouw Valley, Welbedacht, *Lewis 2514* (SAM [61821], holo.; BOL, PRE, SAM, iso.).

Plants 120–500(–700) mm high. *Foliage leaves* 1 to 3(4). *Rhipidial spathes* 22–28(–32) mm long. *Flowers* with perianth tube (3.0–)4.0–5.5(–7.0) mm long; tepals 14–22(–25) mm long. *Filaments* 3.3–6.0 mm long; anthers 5–8 mm long. *Ovary* 8–12 mm long. *Capsules* 9–13 mm long. *Chromosome number* 2*n* = 12, 10.

Distribution and ecology: as for the species but absent from the Roggeveld Escarpment.

Diagnosis: fairly uniform across its range, subsp. *virgata* is distinguished by slightly shorter rhipidial spathes mostly 22–28 mm long and flowers with a perianth tube mostly 4.0–5.5 mm long and tepals 14–25 mm long. The capsules are shorter than in subsp. *karooica*, 9–13 mm long.

82b. subsp. **karooica** *(Goldblatt) Goldblatt* in Goldblatt & Manning, Novon 14: 296 (2004). *Hexaglottis virgata* subsp. *karooica* Goldblatt: 568 (1987). Type: South Africa, [Northern Cape], 22 km W of Middelpos, Farm Blomfontein, *Snijman 765* (NBG, holo.; K, MO, PRE, iso.).

Plants robust, 300–850 mm high. *Leaves* usually 4 or 5, rarely 2 or 3. *Rhipidial spathes* 32–37 mm long. *Flowers* with perianth tube 6.5–9.0 mm long; tepals 23–32 × 7–11 mm. *Filaments* 4–6 mm long; anthers 6–8 mm long. *Ovary* 15–20 mm long. *Capsules* 16–22 mm long. *Chromosome number* 2*n* = 14.

Distribution and ecology: known from three widely separated sites on the Roggeveld Escarpment in Northern Cape, extending from west of Middelpos south to the Farm Blesfontein, SW of Sutherland; in stony ground or dolerite outcrops.

Diagnosis: subsp. *karooica* has larger rhipidial spathes 32–37 mm long and flowers with a perianth tube 6.5–9.0 mm long and tepals 23–32 mm long. Other features of the flowers are likewise slightly larger than in subsp. *virgata*, particularly the capsules 16–22 mm long vs. 9–13 mm in subsp. *virgata*.

Sect. 8. **Gynandriris** *(Parl.) Goldblatt* in Novon 8: 376 (1998). *Gynandriris* Parl.: 49 (1854). *Iris* subg. *Gynandriris* (Parl.) Baker: 2 (1892). *I.* sect. *Gynandriris* (Parl.) Dykes: 229 (1913). Type: *M. sisyrinchium* (L.) Ker Gawl.

Moraea subg. *Helixyra* Salisb. ex Baker [as a combination but *Helixyra* Salisb. an invalid name]: 48 (1892). Type: *M. simulans* Baker, lecto., designated by Goldblatt & Manning in Goldblatt et al.: 38 (2013).

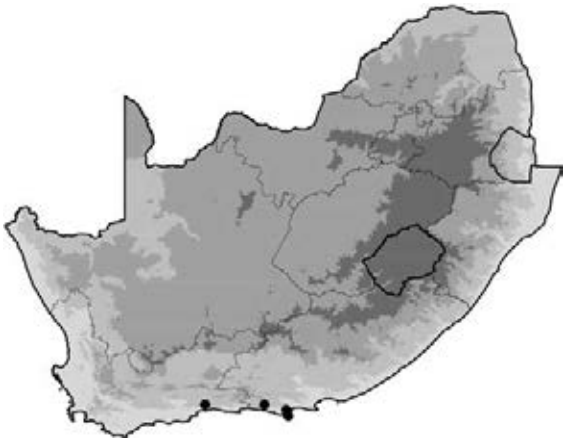
Plants few-branched, occasionally simple; spathes membranous-translucent with prominent veins. *Flowers* fugaceous, blue to purple or white; stamens united in lower half; style branches well developed with erect crests; ovary ± sessile and with sterile tubular beak. *Capsules* with transparent walls, remaining enclosed in spathes.

83. **Moraea australis** *(Goldblatt) Goldblatt* in Novon 8: 376 (1998). *Gynandriris australis* Goldblatt: 251 (1980b). Type: South Africa, [Eastern Cape], Jeffrey's Bay, duineveld, *Fourcade 3309* (BOL, holo.; K., iso.).

Plants 60–250 mm high. *Corm* ± 1.5 mm diam.; tunics of soft, pale fibres. *Stem* usually branched, elongate or barely produced above ground, then with branches clustered near base; upper nodes with sheathing leaves ± as long as spathes. *Foliage leaf* solitary, channelled, erect to trailing, exceeding stem. *Rhipidial spathes* ± dry, membranous with prominent veins, inner 35–60 mm long, outer slightly shorter. *Flowers* fugaceous, pale blue to blue-lilac, outer tepal limbs with white nectar guides edged orange distally, spreading horizontally to slightly reflexed; outer tepals lanceolate, 23–30 × 8–10 mm, claws ± 10 mm, inner tepals 18–22 × 4–5 mm, suberect, ultimately half reflexed. *Filaments* 5–6 mm long, united in lower 1 mm; anthers ± 5 mm long. *Ovary* included; style branches 8–9 mm long, crests 8–12 mm long. *Capsules* and *seeds* not known. *Chromosome number* 2*n* = 12. *Flowering time*: late September to early November; opening ± 13:00 and collapsing ± 19:30.

Distribution and ecology: endemic to the south coast of Western and Eastern Cape, South Africa, between Mossel Bay and Jeffrey's Bay; in coastal dunes and flat sandy ground.

Diagnosis: distinguished in sect. *Gynandriris* by the relatively large flower, the outer tepals 23–30 mm long



Distribution of ***Moraea australis***.

and style crests 8–12 mm long, *M. australis* otherwise closely resembles the widespread *M. setifolia*. The latter, an autogamous, weedy species has smaller flowers with outer tepals 12–18 mm long and style crests 4–7 mm long.

84. **Moraea setifolia** *(L.f.) Druce* in Botanical Society Exchange Club of the British Isles 4 (suppl. 2): 636 (1917). *Iris setifolia* L.f.: 99 (1782). *Helixyra setifolia* (L.f.) N.E.Br.: 39 (1928). *Gynandriris setifolia* (L.f.) R.C.Foster: 40 (1936); Goldblatt: 251 (1980b). *Iris setacea* Thunb.: 20 (1782b), illegitimate superfluous name for *I. setifolia* L.f. *Moraea setacea* Ker Gawl.: 240 (1804a), illegitimate superfluous name. *Vieusseuxia setacea* Eckl.: 13 (1827), illegitimate superfluous name. Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB 1163, holo.).

Moraea rogersii Baker: 57 (1892). *Helixyra rogersii* (Baker) N.E.Br.: 349 (1929b). *Gynandriris rogersii* (Baker) R.C.Foster: 40 (1936). Type: South Africa, [Western Cape], Mossel Bay, *Rogers s.n.* (K, holo.).

Moraea xerospatha MacOwan ex Baker: 529 (1897). Type: South Africa, [Western Cape], Cape Town, *MacOwan 3118* (K, lecto., designated by Goldblatt: 251 (1980b); BOL, isolecto.).

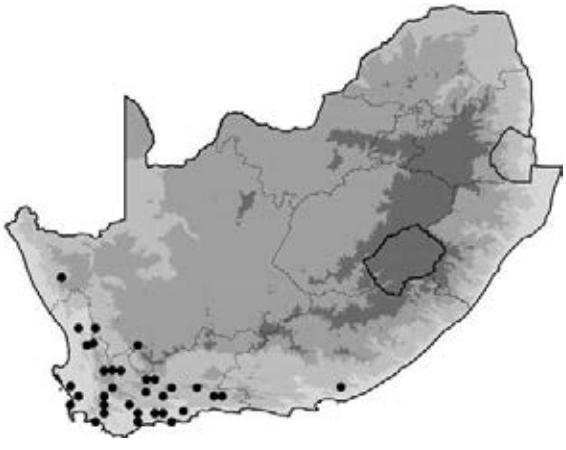
Moraea xerospatha var. *monophylla* J.M.Black: 113 (1922). Probable type: South Australia (introduced from South Africa), without precise locality or collector, illustration in Black: 113 (1922).

[*Moraea humilis* Eckl.: 15 (1827), invalid name without description.]

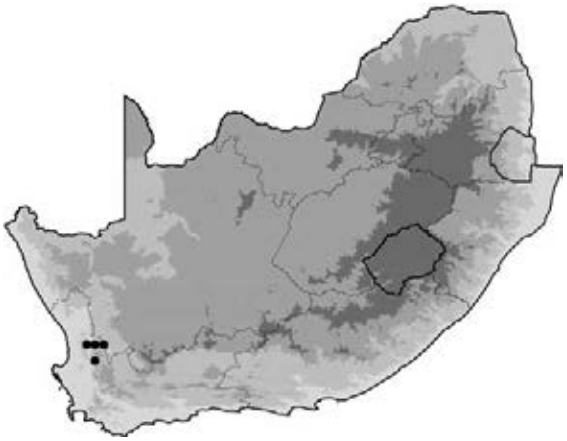
Plants small, 50–180(–250) mm high. *Corm* 10–15 mm diam.; tunics of pale, netted fibres. *Stems* usually branched, either very short with nodes condensed, or elongated, sheathing leaves 25–35 mm long. *Foliage leaves* 1 or 2, linear, channelled, much longer than stem, 2–3 mm wide, margins straight; upper nodes with sheathing leaves ± as long as spathes. *Rhipidial spathes* membranous with prominent veins, becoming dry and transparent at flowering, inner 20–35(–40) mm long, outer slightly shorter. *Flowers* fugaceous, small, pale blue-mauve (rarely white), outer tepal limbs with white nectar guides edged orange distally, half reflexed; outer tepals 12–18 × 5–9 mm, claws as long or slightly shorter than limbs; inner tepals 12–16 mm long, limbs half reflexed. *Filaments* 3.5–6.0 mm long, united in lower $^1/_3$–$^1/_2$; anthers 2.5–4.0 mm long. *Ovary* ± cylindric, included, 16–23 mm long, fertile part ± 6 mm long; style branches 4–7 mm long, diverging, crests 4–7 mm long, erect. *Capsules* ellipsoid, ± 10 mm long. *Seeds* dark brown, angular. *Chromosome number* $2n = 12$. *Flowering time*: late spring, September to early November; opening 12:00–13:00 and collapsing after 17:00.

Distribution and ecology: widespread in southwestern and southern South Africa, extending from the Kamiesberg of central Namaqualand in Northern Cape south and east through Western Cape to Grahamstown in Eastern Cape, but evidently absent from the south coast between Mossel Bay and Port Elizabeth; weedy and adventive, it often occurs in waste places, trampled sites, roadsides and even lawns in a variety of soils. It is naturalised in Australia.

Diagnosis: *Moraea setifolia* is readily distinguished in sect. *Gynandriris* by its low stature and small flowers. The blue-mauve flowers have orange and white nectar guides on the outer tepals, 12–18 mm long, and the limbs of both outer and inner tepals are half reflexed. The small flower size is reflected in the short filaments 3.5–6.0 mm long and short anthers up to 4 mm long. The flowers open between noon and 13:00 and fade shortly before sunset. Several populations examined for chromosome number are diploid, $2n = 12$, and plants have been found in the greenhouse to be reproductively self-compatible and autogamous. They thus produce ample seed wherever they occur. This mode of reproduction is unusual in *Moraea* but explains its success as a weed.



Distribution of ***Moraea setifolia***.



Distribution of ***Moraea cedarmontana***.

85. **Moraea cedarmontana** *(Goldblatt) Goldblatt* in Novon 8: 376 (1998). *Gynandriris cedarmontana* Goldblatt: 250 (1980b). Type: South Africa, [Western Cape], Biedouw Valley, Welbedacht, *Goldblatt 4287* (MO, holo.; K, NBG, PRE, S, US, WAG, iso.).

Plants 100–300 mm high. *Corm* 10–15 mm diam.; tunics of stiff, dark, coarse fibres covered by mealy substance. *Stem* with one main axis and few to several ± sessile, lateral branches; sheathing leaves 40–55 mm long. *Foliage leaves* 2, linear, channelled, ± erect or trailing, longer than stem. *Rhipidial spathes* membranous with prominent veins, ± dry at flowering, attenuate, inner 40–60 mm long, outer slightly shorter. *Flowers* fugaceous, white, outer tepal limbs with small, yellow nectar guides at bases, ultimately ± half reflexed; outer tepals lanceolate, 24–27 × 10–12 mm, claws suberect, 10–12 mm long, inner tepals 20–25 × 3–5 mm, erect. *Filaments* 5–6 mm long, united in lower $^1/_3$–$^1/_2$; anthers 5–6 mm. *Ovary* ± cylindric, included, ± 50 mm long, fertile in lower 10 mm; style branches 7–11 mm long, ascending, crests erect, 11–13 mm long. *Capsules* and *seeds* not known. *Chromosome number* 2*n* = 12. *Flowering time*: September and October.

Distribution and ecology: a narrow endemic of Western Cape, South Africa, restricted to the interior valleys of the northern Cederberg and Nardouw Mtns; associated with wet sites such as along streams and drainage lines.

Diagnosis: recognised by the relatively small, white flowers, *Moraea cedarmontana* has outer tepals 24–27 mm long and the inner 20–25 × 3–5 mm, relatively narrow in proportion to the length. Plants are usually fairly slender and up to 300 mm tall.

86. **Moraea simulans** *Baker*, Handbook of the Irideae 58 (1892). *Helixyra simulans* (Baker) N.E.Br.: 350 (1929b). *Gynandriris simulans* (Baker) R.C.Foster: 40 (1936); Goldblatt: 252 (1980b). Type: South Africa, [North West], Bloemhof, *Nelson 203* [K, lecto., designated by Goldblatt: 252 (1980b)].

Moraea burchellii Baker: 57 (1892). *Helixyra burchellii* (Baker) N.E.Br.: 349 (1929b). *Gynandriris burchellii* (Baker) R.C.Foster: 40 (1936). Type: South Africa [as Bechuanaland], [Northern Cape], Jabrin's Fountain, *Burchell 2250* (K, holo.).

Moraea cladostachya Baker: 58 (1892). *Helixyra cladostachya* (Baker) N.E.Br.: 349 (1929b). *Gynandriris cladostachya* (Baker) R.C.Foster: 40 (1936). Type: South Africa, [Northern Cape], Verleptpram, Orange River, *Drège 2610* (K, lecto., designated by Goldblatt: 252 (1980b); BM, L, LE, MO, S, isolecto.).

Helixyra elata N.E.Br.: 349 (1929b). *Gynandriris elata* (N.E.Br.) R.C.Foster: 40 (1936). Type: South Africa, [Mpumalanga], Standerton, *Rogers 14799* (K, holo.).

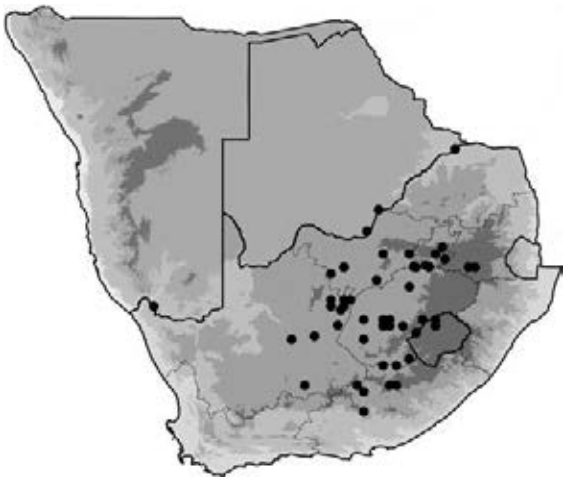
Helixyra mossii N.E.Br.: 350 (1929b). *Gynandriris mossii* (N.E.Br.) R.C.Foster: 40 (1936). Type: South Africa, [Gauteng], Gedult, 15 Oct. 1927, *Moss 15607* (K, holo.; P, S, iso.).

Helixyra propinqua N.E.Br.: 349 (1929b). *Gynandriris propinqua* (N.E.Br.) R.C.Foster: 40 (1936). Type: South Africa, [Limpopo], Soutpansberg, *DvS s.n.* (PRE, holo.).

Helixyra spicata N.E.Br.: 349 (1929b). *Gynandriris spicata* (N.E.Br.) R.C.Foster: 41 (1936). Type: South Africa, [Northern Cape], Griqualand West, *Burchell s.n.* (K, holo.).

Plants (100–)140–450 mm high. *Corm* 15–20 mm diam.; tunics of pale to dark coarse fibres, often with a cormlet in leaf axil. *Stems* either contracted, sometimes with many basal branches or extended, with short to ± sessile aerial branches and sometimes longer basal branches; upper nodes with sheathing leaves ± as long as spathes. *Foliage leaves* 1 or 2, linear, channelled, longer than the stem, often trailing distally, 2–4 mm wide. *Rhipidial spathes* usually dry at flowering time, sometimes green toward base; inner (25–)35–55 mm long, outer slightly shorter. *Flowers* fugaceous, pale blue-mauve mottled darker mauve to violet, outer tepal limbs white nectar guides at bases edged orange proximally, half reflexed; outer tepals (17–)20–28 × ± 8 mm, claws slightly shorter than limbs, inner tepals 15–19 × 3–4 mm, spreading, ultimately half reflexed. *Filaments* 5–6 mm long, united for 1.0–1.5 mm; anthers 4–8 mm long. *Ovary* ± cylindric, included, 15–25 mm long, fertile in lower ± 6–8 mm; style branches 8–12 mm long, crests 3–6 mm long, erect. *Capsules* ± ovoid, 13–20 mm long. *Seeds* large, dark brown, elongate-angular. *Chromosome number* 2*n* = 24, 36. *Flowering time*: mainly August and September, at the end of the dry season; opening after 15:30, collapsing after 19:00.

Distribution and ecology: widespread across summer-rainfall southern Africa, extending from Victoria West in South Africa north through eastern Northern Cape, Free State, North West Province, Gauteng and



Distribution of ***Moraea simulans***.

interior Mpumalanga, as well as western Lesotho and eastern Botswana, with isolated populations in the lower Orange River in the Richtersveld, probably also in Namibia; usually in dry grassland, open bushveld and karroid scrub.

Diagnosis: living plants of *Moraea simulans* are readily recognised by their distinctive flowers with the tepals speckled throughout with darker mauve to violet blotches on a pale blue-lilac background, a feature unique in the section but unfortunately not visible when dry. The flowers are moderate in size, having outer tepals 17–28 mm long and both inner and outer tepals are rather narrow with laxly spreading to half reflexed limbs. Flowers open in the middle of the afternoon, usually after 15:30 and last just a few hours, collapsing after 19:00. Despite its several synonyms, *M. simulans* is not particularly variable except in height and the number of branches, features dependent on growing conditions rather than genetically determined.

The species is evidently polyploid but chromosome numbers are known from only two collections, one tetraploid, $2n = 24$, and the other hexaploid, $2n = 36$.

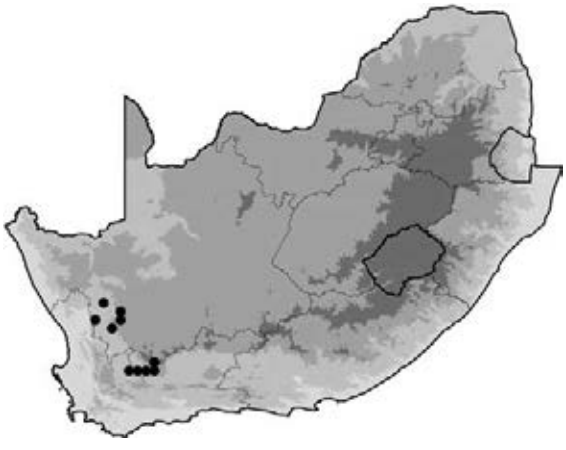
87. **Moraea pritzeliana** *Diels* in Botanische Jahrbücher für Systematik 44: 117 (1909). *Gynandriris pritzeliana* (Diels) Goldblatt: 781 (1976a) & 248 (1980b). Type: South Africa, [Northern Cape], Calvinia District, *Diels 694* (B, holo.).

Moraea torta L.Bolus: 418 (1927b). *Helixyra torta* (L.Bolus) Barnard: 52 (1932). *Gynandriris torta* (L.Bolus) R.C.Foster: 41 (1936). Type: South Africa, [Northern Cape], near Calvinia, *Compton s.n.* (BOL, holo.).

Plants mostly 120–350 mm high. *Corm* 15–20 mm diam.; tunics of coarse, dark, rigid fibres often covered with white, mealy substance. *Stem* either contracted, with branches produced near ground, or extended with branches produced from base and at aerial nodes; upper nodes with sheathing leaves ± as long as spathes; stem becoming loosely coiled in fruit. *Foliage leaves* 2, linear, flat but helically coiled from base or middle, either upright and exceeding stem, or spreading, 2.5–5.0 mm wide, with broad translucent band on adaxial midline, usually with prominent submarginal veins. *Rhipidial spathes* becoming dry above or completely, then ± translucent with prominent veins, inner (34–)37–45 mm long, outer slightly shorter. *Flowers* fugaceous, dark blue-violet, outer tepal limbs with white nectar guides at bases, ± half reflexed, odourless; outer tepals 21–30 × 10–15 mm, claws ± $^1/_3$ as long as limbs, inner tepals 20–26 × 7 mm long, limbs half reflexed. *Filaments* 5–6 mm long, united in lower 1.5–3.0 mm; anthers 4.5–6.5 mm long; pollen yellow. *Ovary* ± cylindric, subsessile, 32–38 mm long, fertile part ± 10 mm long; style branches 8–10 mm, diverging, crests (4–)7–11 mm long, ± linear. *Capsules* ellipsoid, 15–20 mm long. *Seeds* angular, relatively large. *Chromosome number* $2n = 12$. *Flowering time*: middle September to November; opening 1:00–12:00, collapsing after 16:00.

Distribution and ecology: widespread in the western Karoo, extending from near Loeriesfontein in Northern Cape, South Africa, across the Bokkeveld Plateau and Roggeveld to the Koedoes Mtns and the Komsberg Escarpment in the south; in dry stony ground in karroid succulent scrub or mountain renosterveld.

Diagnosis: *Moraea pritzeliana* is unmistakable in having two opposed, strongly coiled leaves, each with a broad, translucent central band along the midline. The translucent, prominently veined spathes and subsessile, cylindric ovary with a sterile tubular beak are typical of sect. *Gynandriris*, in which the large, dark blue to violet flowers with broad reflexed inner and outer tepal limbs, the latter 21–30 × 10–15, are also distinctive. *Moraea pritzeliana* and *M. contorta* share an unusual feature, viz. as the capsules mature at the end of the growing season the stem becomes loosely coiled. This feature as well as the similar, large dark blue to violet flowers suggests a close relationship between the two, a hypothesis that is supported by molecular studies which retrieve the two as sister species.



Distribution of ***Moraea pritzeliana***.

88. **Moraea contorta** *Goldblatt* in Novon 8: 376 (1998), as a new name for *Gynandriris anomala* Goldblatt: 250 (1980b) [not *M. anomala* G.J.Lewis]. Type: South Africa, [Northern Cape], Roggeveld, west of Middelpos, *Goldblatt 4396* (MO, holo.; K, NBG, PRE, iso.).

Plants 250–300 mm high. *Corm* 15–18 mm diam.; tunics of coarse, dark, rigid fibres often covered with white, mealy substance. *Stem* erect, with short, lateral branches at upper nodes; with sheathing leaves ± as long as spathes; stem becoming loosely coiled in fruit. *Foliage leaf* usually solitary, linear, channelled, much longer than stem, erect below, trailing distally, 5–7 mm wide. *Rhipidial spathes* ± membranous, dry or sometimes green below, with prominent hyaline veins, inner 36–45 mm long, outer slightly shorter. *Flowers* fugaceous, dark blue, outer tepal limbs with white nectar guides at bases, limbs of both whorls half reflexed, with a strong spicy-sweet scent; outer tepals 21–26 × 10–12 mm long, claws 8–9 mm, ± $^1/_3$ as long as limbs, inner tepals ± 22 × 7 mm. *Filaments* 4.5–6.0 mm long, united for ± $^1/_2$ their length; anthers 5–7 mm long. *Ovary* ± cylindric, 30–38 mm long, fertile part ± 10 mm long; style branches 8–10 mm long, crests ± 10 mm long, erect. *Capsules* narrowly ellipsoid, 15–18 mm long. *Seeds* lozenge-shaped, dark brown. *Flowering time*: October to mid-November; opening 1:00–12:00, collapsing in late afternoon.

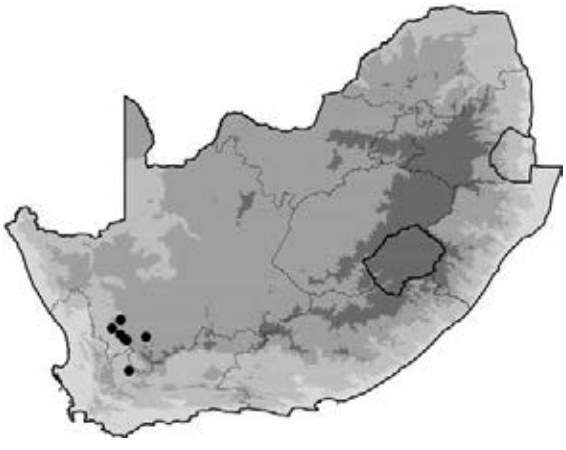
Distribution and ecology: recorded on the Hantamsberg at Calvinia in Northern Cape, South Africa, at scattered sites to the south and in the Roggeveld close to the escarpment edge, as well as in the Koedoes Mtns; in relatively well-watered sites.

Diagnosis: recognised by the large dark blue flowers with relatively broad tepals, the outer 21–26 × 10–12 mm long, with the claws ± a third as long as the limbs, *Moraea contorta* is most closely related to the more widespread *M. pritzeliana* and its range falls entirely with that of the latter. The flowers of *M. contorta* have a strong sweet, coconut-like scent while those of *M. pritzeliana*, often darker in colour, are apparently unscented. Vegetative differences are more pronounced, and *M. contorta* typically has a single, linear, channelled leaf in contrast to the very distinctive pair of opposed, helically coiled leaves of *M. pritzeliana.* The two species share a unique feature, as the capsules ripen and the stems dry out they become loosely coiled, speculatively an adaptation for dispersal by becoming entangled in the feet of passing antelope or other animals.

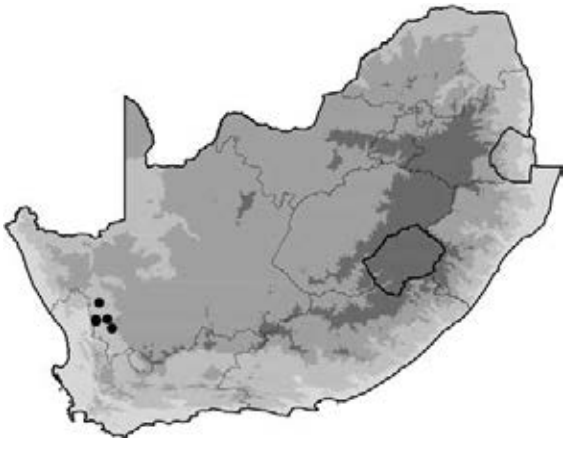
89. **Moraea hesperantha** *(Goldblatt) Goldblatt* in Novon 8: 376 (1998). *Gynandriris hesperantha* Goldblatt: 248 (1980b). Type: South Africa, [Northern Cape], Nieuwoudtville, Glenlyon, rocky hills, *Goldblatt 4371* (MO, holo.; NBG, PRE, iso.).

Plants 400–650 mm high. *Corm* 20–30 mm diam.; tunics of wiry, pale, mealy fibres. *Stem* suberect, sometimes with 1 or more long branches from near base and with short, subsessile lateral branches; upper nodes with sheathing leaves ± as long as spathes. *Foliage leaves* 2, linear, much longer than stem, suberect, trailing distally, channelled, 6–8 mm wide, margins straight. *Rhipidial spathes* becoming membranous with fine longitudinal veins, inner 45–60 mm long, outer slightly shorter. *Flowers* fugaceous, violet, outer tepal limbs with yellow nectar guides at bases, half reflexed; outer tepals 26–29 × 10 mm, claws diverging, ± 10 mm long, inner tepals narrowly lanceolate, suberect, 22–26 × 5 mm. *Filaments* 5.0–6.5 mm long, united in lower $^1/_3$–$^1/_2$; anthers 7–8 mm long, violet; pollen yellow. *Ovary* ± cylindric, 40–55 mm long, fertile in lower ± 12 mm; style branches 9–12 mm long, diverging, crests 7–9 mm long. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: October to mid-November; opening 16:00–16:30, collapsing after 19:00.

Distribution and ecology: restricted to the western Karoo and known from less than a handful of sites between Nieuwoudtville and Loeriesfontein in Northern Cape, South Africa; in heavy red clay in dolerite outcrops.



Distribution of ***Moraea contorta***.



Distribution of ***Moraea hesperantha***.

Diagnosis: one of the tallest and most robust species of sect. *Gynandriris,* stems of *Moraea hesperantha* may reach up to 650 mm high and bear several, short lateral branches. The two long, suberect, channelled leaves trail distally. The dark violet flowers recall those of *M. pritzeliana* but have suberect inner tepals vs. reflexed in *M. pritzeliana*, which has characteristically coiled leaves and is a much shorter plant. *Moraea hesperantha* stands out in particular in being evening blooming: the flowers open at 16:00–16:30, about the time that flowers of *M. pritzeliana* begin to fade, and the flowers last till well after dark, usually collapsing by 19:30. The evening blooming habit is unique in sect. *Gynandriris*.

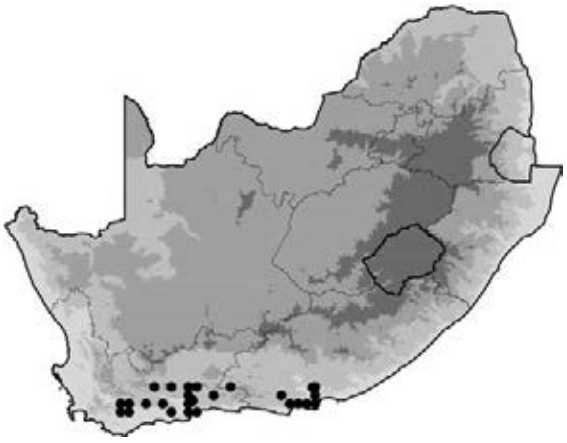
Sect. 9. **Polyanthes** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 8 (1976b). Type: as for subgenus.

90. **Moraea bipartita** *L.Bolus* in Journal of Botany, British and foreign 71: 122 (1933); Goldblatt: 107 (1986a). Type: South Africa, [Western Cape], Riversdale Karoo, on road to Adams Kraal, *Ferguson s.n.* (BOL [20068], holo.).

Plants mostly 200–350 mm high. *Corm* ± 15 mm diam.; tunics of hard, dark brown to black fibres. *Stem* several-branched, sheathing leaves green, becoming dry at tips, mostly 25–35 mm long. *Foliage leaves* usually 3 or 4, rarely only 2, linear, channelled, 2–6 mm wide, lowermost ± basal and usually exceeding stem, upper leaves shorter. *Rhipidial spathes* often becoming dry and brown above, attenuate; inner (20–)25–45 mm long, outer ± $^1/_2$ as long. *Flowers* fugaceous, pale blue to blue-mauve or violet, scented of burned vanilla or unscented, outer tepal limbs with small to large yellow nectar guides at bases sometimes edged white, ± half reflexed; tepals lanceolate, outer 16–30 mm long, claws ± $^1/_3$ as long as limbs; inner smaller, 14–25 mm long. *Filaments* 4–6 mm long, united in lower $^2/_3$; anthers ± 5 mm long, pale mauve; pollen white. *Ovary* ovoid, 4–5 mm long, usually partly exserted at flowering; style branches ± 5 mm long, crests 5–8 mm. *Capsules* ellipsoid broadly ovate, ± 9 mm long. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: mainly August to October (to November); flowers open after midday and fade after 17:30, sometimes shortly after dark.

Distribution and ecology: common in the Little Karoo but extending from near Swellendam and Robertson in southern Western Cape, South Africa, through the Little Karoo and southern Cape to Uitenhage in Eastern Cape.

Diagnosis: *Moraea bipartita* is distinguished by the two or more foliage leaves, the blades linear, channelled and up to 6 mm wide, and the relatively small, *Moraea*-type flower with well-developed, broad style branches and prominent, erect crests. The stems have several branches in mature plants in seasons of adequate rainfall and the flowers are usually blue to blue-mauve with yellow nectar guides only on the outer tepal limbs, the outer tepals 16–30 mm long and the inner 14–25 mm long. Plants from the Perdebont Valley in the southern Little Karoo near the northern end of Robinson Pass have pale yellow flowers otherwise exactly like those of blue-flowered plants. This is a striking exception not only for *M. bipartita* but for the entire sect. *Polyanthes*.



Distribution of ***Moraea bipartita***.

Closely related *Moraea polyanthos* is virtually identical vegetatively to *M. bipartita* but has subequal tepals, the limbs of both whorls spreading horizontally and bearing small white to yellow nectar guides, and the style branches, ± as wide as the anthers, lack crests. The filaments of *M. polyanthos* are united in a slender column whereas those of *M. bipartita* are free in the upper third. Hybrids between *M. bipartita* and *M. polyanthos* have been recorded where the two species co-occur, and plants with a range of flowers intermediate between the two indicate introgression among the hybrids.

Moraea polystachya has flowers of similar form to those of *M. bipartita*, thus with broad style branches and crests, but plants are larger as are the flowers, the outer tepals 36–55 mm long. The ovary is often veined dark red in *M. polystachya* but is uniformly green in *M. bipartita*.

91. **Moraea polystachya** *(Thunb.) Ker Gawl.* in König & Sims, Annals of Botany 1: 240 (1804a); Goldblatt: 746 (1976a); Goldblatt: 118 (1986a). *Iris polystachya* Thunb.: 25 (1782b). *Iris lacera* Lam.: 304 (1789), illegitimate superfluous name for *I. polystachya* Thunb. Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB, syn.).

Moraea toxicaria Dinter: 237 (1923). Type: Namibia, Entemba, Walthers Farm, Okongue, *Dinter 3414* (SAM, holo.).

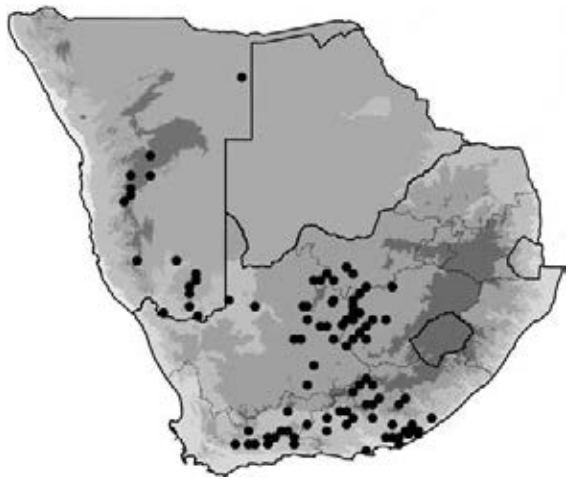
[*Vieusseuxia multiflora* Eckl.: 12 (1827), invalid name without description.]

[*Moraea multiflora* Sol. ex Baker: 18 (1896), invalid name only in synonymy.]

Plants medium to large, up to 800 mm high. *Corm* 25–50 mm diam.; tunics of hard, dark coarse fibres. *Stem* several-branched, with green to partly to completely dry sheathing leaves at upper nodes 60–80 mm long. *Foliage leaves* 3 to 5, ± linear, channelled, usually as long as or longer than stem, trailing distally, 6–12(–20) mm wide. *Rhipidial spathes* green or turning brown and dry above, attenuate, inner 50–70 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, blue to mauve or violet, outer tepal limbs with yellow to orange nectar guides at bases, limbs of both whorls reflexed up to ± 40° or erect (Little Karoo populations), claws suberect; outer tepals 36–55 × 13–25 mm, inner 36–55 × 13–21 mm, claws 15–21 mm long. *Filaments* ± 10 mm long, united in lower $^{3}/_{4}$; anthers 8–10 mm long, pale mauve; pollen white. *Ovary* ± ellipsoid, conspicuously veined red, mostly 7–12 mm long; style branches ± 10 mm long, crests up to 20 mm long. *Capsules* obovoid, 9–16 mm long. *Seeds* angular-prismatic, 1.2–1.6 mm long. *Chromosome number* 2*n* = 12. *Flowering time*: autumn and winter (December to) March to July (August).

Distribution and ecology: widespread in interior southern Africa, extending from the Little Karoo in Western Cape, South Africa, north into the eastern Upper Karoo, Eastern Cape, and western Free State to northern Namibia; most often on rocky slopes and flats and typically flowering in late summer and autumn but in winter in the Little Karoo.

Diagnosis: widespread and relatively common in interior southern Africa, *Moraea polystachya* is recognised by the combination of several foliage leaves, branched stem, and large blue-mauve to violet flowers. The limbs of both tepal whorls are half reflexed but only the outer tepals bear nectar guides, and the tepal claws form a narrow cup enclosing the filaments and broad style branches, leaving the style crests prominently displayed. An unusual and particularly distinctive feature of most populations is the red veining on the ovary, this absent in plants from the Little Karoo. Once regarded as an ecological variant of *M. polystachya*, *M. venenata* is now regarded as a separate, but closely related species. A shorter plant, *M. venenata* has somewhat larger flowers with inner tepals usually held ± erect, the ovary also typically red-veined. The larger capsules, up to 16–20 mm long, are nodding when mature and contain larger seeds, ± 2 mm long. Capsules of *M. polystachya* are held erect, are 9–16 mm long and the smaller seeds are 1.2–1.6 mm long. Both *M. polystachya* and *M. venenata* are poisonous to stock.



Distribution of ***Moraea polystachya***.

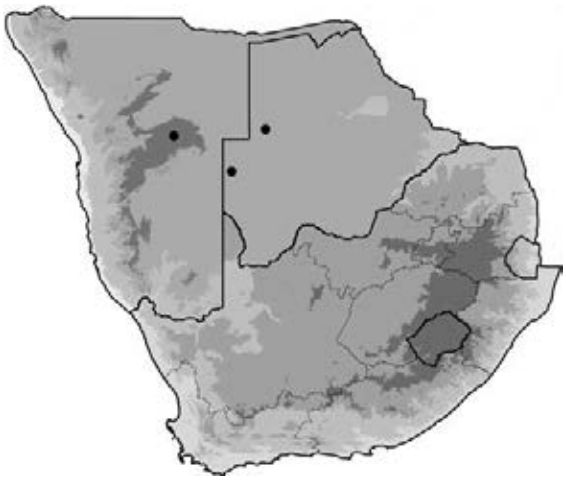
Moraea polystachya in the Little Karoo is distinctive not only in lacking red veining on the ovary but in having blue rather than violet flowers with the inner tepals held erect for most of the flowering cycle. No other features appear to distinguish these plants, which flower in the winter months rather than in late summer and autumn.

92. **Moraea carsonii** *Baker* in Bulletin of Miscellaneous Information Kew 1894: 391 (1894); Goldblatt: 252 (1977a); Goldblatt: 126 (1986a). Type: Zambia, Mbala, 'Fwambo', *Carson s.n.* (K, holo.).

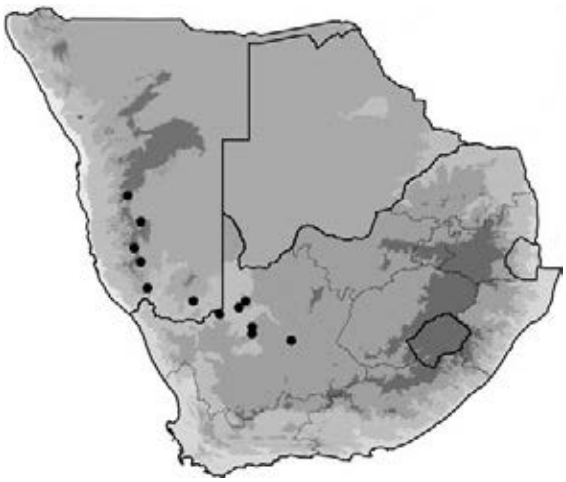
Moraea homblei De Wild.: 7 (1932). Type: Congo, Shaba, near Kolwezi, *Homblé 1024* (BR, holo.).

Plants 200–400 mm high. *Corm* 10–15 mm diam.; tunics of fine to medium, dark brown fibres. *Stem* usually with 1 or 2 (several) ascending branches, sheathing leaves 25–60 mm long, green with dry, brown, attenuate apices. *Foliage leaves* 2(3), exceeding stem, linear, channelled, 2–5 mm wide, lowermost basal or inserted shortly to well above the ground, often trailing distally, upper 1 or 2 leaves shorter than basal. *Rhipidial spathes* attenuate, becoming dry and brown apically, sometimes flushed red, inner 30–40(–50) mm long, outer ± 10 mm shorter. *Flowers* fugaceous, blue-violet, outer tepal limbs with white to yellow nectar guides at bases; outer tepals 20–30 mm long, lanceolate, limb slightly longer than claw, spreading at ± 30° below horizontal; inner tepals 17–28 mm long, narrowly lanceolate to nearly linear, limb also spreading. *Filaments* ± 7.5 mm long, united below, free in upper $^{1}/_{3}$; anthers 4.5–5.5 mm long, yellow. *Ovary* narrowly ovoid, 3.5–7.0 mm long, exserted, style branches 8–10 mm long, crests 7–10 mm long, ± erect. *Capsules* ± globose, 7–9 mm long. *Chromosome number* 2*n* = 12. *Flowering time*: February to April (also December and January in tropical Africa).

Distribution and ecology: largely tropical African, extending from northern Namibia and northern Botswana through Zambia, Mozambique and Zimbabwe to Congo, Malawi and southern Tanzania; in grassland, especially rocky sites.



Distribution of ***Moraea carsonii***.



Distribution of ***Moraea venenata***.

Diagnosis: the two or three foliage leaves and relatively small, violet flowers with yellow nectar guides on the lower tepals and broad, well-developed style branches and crests are diagnostic for *Moraea carsonii*. It is the only tropical member of sect. *Polyanthes*, the other species all southern African and mostly occurring in the winter-rainfall zone of the subcontinent. The fugaceous flowers last a single day.

93. **Moraea venenata** *Dinter* in Repertorium specierum novarum regni vegetabilis 19: 238 (1923); Goldblatt: 121 (1986a). Type: Namibia, Bullspoort Flats, *Dinter 2141* [SAM, lecto., designated by Goldblatt: 121 (1986a)].

Moraea polystachya var. *brevicaulis* E.Phillips: 16 (1926). Type: South Africa, without precise locality, *Stent & Curton s.n.* [illustration in Phillips: fig. 2 (1926)].

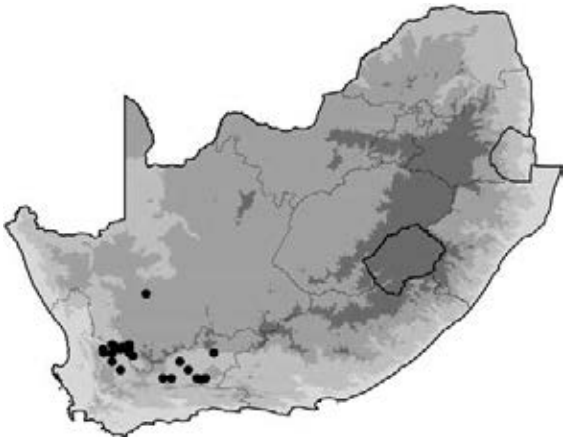
Plants medium to large, 200–300 mm high. *Corm* globose, 20–35 mm diam.; tunics of hard, dark medium-textured to coarse fibres. *Stem* several-branched, with green to partly to completely dry, attenuate sheathing leaves at upper nodes 30–50 mm long. *Foliage leaves* 3 to 6, lanceolate to linear, channelled to ± flat, as long or longer than stem, falcate, usually trailing distally, 8–30 mm wide, margins often thickened, hyaline. *Rhipidial spathes* green or turning brown and dry above, long attenuate, with broad, translucent margins, inner mostly 40–60 mm long, outer almost as long, margins free nearly to base. *Flowers* fugaceous, blue-violet, outer tepal limbs with yellow to orange nectar guides at bases, reflexed up to ± 40º; outer tepals mostly 45–60 × 18–25 mm, claws ± 22 mm long, inner 35–50 × 9–12 mm, evidently ± erect. *Filaments* 10–15 mm long, united in lower $^{2}/_{3}$; anthers 8–9 mm long. *Ovary* ± cylindric, mostly 15–20 mm long, sometimes veined red, usually included; style branches ± 12 mm long, crests up to 15 mm long. *Capsules* narrowly obovoid, 16–20 mm long, nodding when mature. *Seeds* angular, ± 2 mm long. *Chromosome number* 2*n* = 12. *Flowering time*: mainly autumn and early winter, mostly March to July.

Distribution and ecology: occurring in central and southeastern Namibia and the adjacent Upper Karoo of Northern Cape, South Africa; in dry stony ground, sometimes with limestone substrate.

Diagnosis: *Moraea venenata* has the several leaves, a branched stem, and blue-violet flowers much like those of *M. polystachya*, but is a more robust species, although often not as tall. The flowers have outer tepals 40–60 mm long with the claws 22–30 mm long, and as far as known the inner tepals are erect. The widest of the several leaves are up to 30 mm wide near the middle [vs. 6–12(–20) mm in *M. polystachya*] and the outer spathes are up to 60 mm long and the inner about half as long but with unusually broad, translucent margins, free almost to the base, an unusual feature among the southern African members of the genus.

94. **Moraea speciosa** *(L.Bolus) Goldblatt* in Botaniska Notiser 133: 92 (1980a); Goldblatt: 122 (1986a). *Homeria speciosa* L.Bolus: 10 (1920). Type: South Africa, [Western Cape], near Prince Albert, *Krige s.n.* (BOL [13486], lecto., designated by Goldblatt: 122 (1986a); BOL, PRE, isolecto.).

Plants medium to large, 400–700 mm high. *Corm* globose, 30–40 mm diam.; tunics of hard, dark medium-textured to coarse fibres. *Stem* several-branched, with green to partly to completely dry sheathing leaves at upper nodes 30–40 mm long. *Foliage leaves* several, narrowly lanceolate (to ± linear), channelled to ± flat and twisted distally, ± $^{1}/_{2}$–$^{2}/_{3}$ as long as stem, up to 40 mm wide, margins undulate. *Rhipidial spathes* green, turning pale and membranous later, inner 50–70 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, sometimes half nodding, pale blue-mauve with yellow cup, limbs of inner and outer tepals with yellow to orange nectar



Distribution of ***Moraea speciosa***.

guides at bases edged violet, spreading to slightly reflexed, claws diverging, forming a wide cup including filaments; outer tepals 35–45 × 18–25 mm, claws 12–15 mm long, inner ± as long but slightly narrower. *Filaments* united in a cylindric column finely hairy below, mostly 9–13 mm long; anthers (8–)12–17 mm long, initially contiguous, becoming slightly divergent in upper half, orange or yellow; pollen orange. *Ovary* ± cylindric, 8–12 mm long, green, sometimes included; style dividing opposite middle of anthers, branches 3–6 mm long, narrowly diverging, not reaching anther tips, without crests. *Capsules* ± club-shaped, 12–22 mm long, nodding to pendent when mature. *Seeds* angular, ± 2 mm long. *Chromosome number* 2*n* = 12. *Flowering time*: mainly autumn and early winter, mostly March to July.

Distribution and ecology: centred in the Tanqua Karoo of Western Cape, South Africa, and extending to the east in the Great Karoo as far as Prince Albert and to the west into the dry interior valleys of the Cederberg and locally north near Calvinia in Northern Cape; on dry, stony flats, flowering irregularly, only in years of adequate rainfall.

Diagnosis: *Moraea speciosa* is easily recognised by the large, pale blue-mauve flowers with a deep, wide, pale yellow floral cup that includes the filaments, these entirely united in a cylindric column. The anthers are initially contiguous and appressed to the style, later becoming slightly divergent distally. The style divides opposite the middle of anthers and the slender branches lack crests and do not reach the tips of the anthers. Plants have several, relatively broad leaves up to 40 mm wide, trailing distally and with undulate margins.

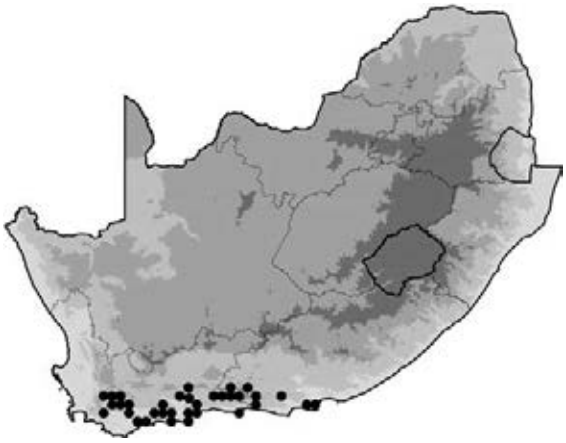
95. **Moraea polyanthos** *L.f.*, Supplementum plantarum: 99 (1782); Goldblatt: 746 (1976a); Goldblatt: 108 (1986a). Type: South Africa, [Western Cape], near the Kore River, *Thunberg s.n.* (UPS–THUNB 1126, holo.).

Homeria lilacina L.Bolus: 9 (1920). Type: South Africa, [Western Cape], near Matjiesfontein, *Beattie & H. Bolus s.n.* (BOL [15186], holo.).

Plants mostly 150–450 mm high. *Corm* 10–15 mm diam.; tunics of hard, dark brown to black fibres. *Stem* several-branched, with attenuate sheathing leaves dry at tips, mostly 35–45 mm long. *Foliage leaves* usually 3 or 4, rarely only 2, linear, channelled, lowermost ± basal, usually exceeding stem, trailing distally, upper leaves shorter, 2–6 mm wide. *Rhipidial spathes* often becoming dry and brown above, attenuate; inner 33–45 mm long, outer ± $^1/_2$ as long. *Flowers* fugaceous, blue to blue-mauve or white, scented of burned vanilla or unscented, all tepal limbs with small to yellow to orange nectar guides at bases sometimes edged white, spreading ± horizontally, claws diverging to form a cup including filaments and sometimes anthers; tepals lanceolate, outer 23–40 × 8–10 mm long, claws 10–12 mm long; inner smaller, 20–35 × 6–9 mm. *Filaments* united in a smooth, slender column (5–)6–9 mm long; anthers 4–7 mm long, pale mauve or white; pollen usually white. *Ovary* narrowly obovoid, 5–7 mm long, usually partly exserted at flowering; style branches 4–5 mm long, ± as wide as anthers, bilobed at tips, without crests. *Capsules* ellipsoid–obovoid, 7–11 mm long. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: mainly September and October (November); opening after midday and collapsing at nightfall.

Distribution and ecology: relatively common and widespread in southern and interior Western Cape and coastal Eastern Cape, South Africa, from near Worcester though the Little Karoo and Long Kloof to Uitenhage and in the south from Stormsvlei to Mossel Bay.

Diagnosis: *Moraea polyanthos* is recognised by the branched stem bearing two to four foliage leaves, and moderate-sized, blue to blue-mauve, violet or rarely white flowers with style branches as narrow and as long as or slightly longer than the anthers and lacking style crests. The ascending tepal claws diverge slightly to form a relatively narrow cup that includes the filaments and the lower part of the anthers or all of the anthers, and the tepal limbs spread more-or-less horizontally. The filaments are united in a slender, smooth column usually 7–9 mm long. A notable variant of



Distribution of ***Moraea polyanthos***.

the species from near Albertinia and Herbertsdale in southern Western Cape has slightly smaller, white or pale blue flowers with the filaments only 5–6 mm long, and both filaments and anthers are included in the floral cup whereas the anthers are usually fully excluded from the cup in typical *M. polyanthos*. The species is closely allied to *M. bipartita*, which has conventional *Moraea*-type flowers with broad style branches with prominent crests but the two are identical in vegetative features. Hybrids between these two species have been recorded where they co-occur.

96. **Moraea deserticola** *Goldblatt* in Annals of the Missouri Botanical Garden 73: 113 (1986c). Type: South Africa, [Western Cape], Knersvlakte, Farm Quaggasfontein, *Hall 5089* (NBG, holo.; MO, iso.).

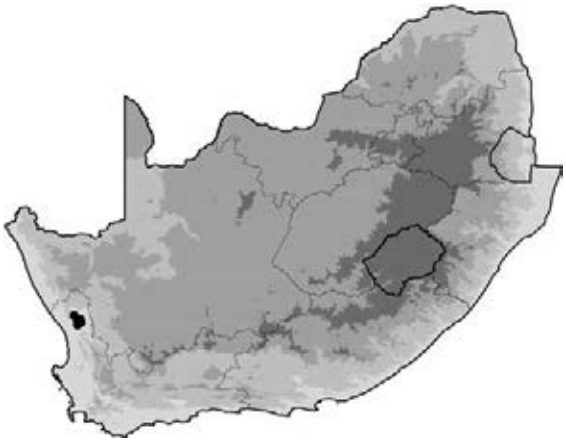
Plants 350–450 mm high. *Corm* ± 10 mm diam.; tunics of hard, dark brown to blackish fibres. *Stem* simple or 1- to 3-branched from upper nodes, sheathing leaves 25–40 mm long. *Foliage leaves* 2 or 3, linear, channelled, 2–3 mm wide, ± as long as the stem, margins becoming tightly inrolled when dry, lowermost basal and largest. *Rhipidial spathes* becoming dry and brown above, inner 33–40 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, pale blue or white with pale blue outside, limbs of all tepals with yellow nectar guides at bases, tepal claws ascending and forming a wide cup including the filament column, limbs extended horizontally; tepals 30–36 × 11–12 mm, claws ± 12 mm long, inner slightly smaller than outer. *Filaments* 8–10 mm long, united in a smooth slender cylindric column; anthers 5.5–6.5 mm long, erect, contiguous, appressed to and initially concealing style branches. *Ovary* 6–7 mm long, narrowly obconic, exserted, conspicuously red-veined; style dividing into 3 short horizontal lobed branches just above apex of anthers ± 1 mm long, crests lacking. *Capsule* ± obovoid, 9–10 mm long, red-veined. *Seeds* many, angular. *Chromosome number* 2*n* = 12. *Flowering time*: June to August.

Distribution and ecology: a narrow endemic of the Knersvlakte between Vanrhynsdorp and Nuwerus in Western Cape, South Africa; on stony slopes and flats on and around outcrops of marble or other limestone type rocks, sometimes in fine clay-like soil.

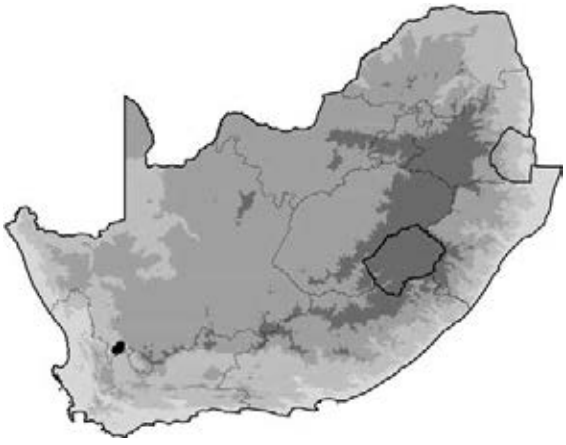
Diagnosis: *Moraea deserticola* is distinguished by the large, deeply cupped, pale blue to white flowers with subequal tepals, 30–36 mm long, horizontally spreading tepal limbs, and long conspicuous, erect and contiguous anthers. It most closely resembles *M. speciosa*, which has somewhat larger flowers of similar morphology with tepals 36–45 mm long, and several broad leaves up to 40 mm wide unlike the two or three narrow foliage leaves of *M. deserticola,* only 2–3 mm wide, with the margins often tightly inrolled. The ovary of *M. deserticola* is veined dark purple whereas *M. speciosa* has a uniformly green ovary.

97. **Moraea tanquana** *Goldblatt & J.C.Manning* in Bothalia 39: 4 (2009). Type: South Africa, Northern Cape, Tankwa National Park, small koppie east of Leeuberg, 404 m, 4 Aug. 2006, *Steyn 872* (NBG, holo.; PRE, iso.).

Plants up to 500 mm high. *Corm* subglobose, ± 20 mm diam.; tunics of coarse, dark brown to blackish fibres. *Stem* up to 3-branched from upper nodes, sheathing leaves green, attenuate. *Foliage leaves* 3, lowermost basal, linear and channelled, 2–5 mm wide, ± $^{3}/_{4}$ as long as stem, upper 2 leaves cauline, ± as long as basal. *Rhipidial spathes* green but dry and membranous apically with brownish cusps; inner ± 30 mm long, outer ± half as long. *Flowers* fugaceous, pale blue or mauve with a yellow cup, and small, rounded, yellow nectar guides at bases of all tepal limbs, tepal claws minutely pubescent at base, 8–9 mm long, ascending and forming wide cup, limbs spreading horizontally; outer tepals obovate, ± 25 mm long, limb 15–16 × 12 mm, inner tepals slightly shorter, ± 22 mm long. *Filaments* ± 10 mm long, reaching to mouth of floral cup or exserted ± 1 mm, united, column cylindric, minutely pubescent at base; anthers erect, contiguous, 4–5 mm long at anthesis (shrinking to 3 mm after dehiscence), yellow, concealing style branches. *Ovary* ovoid, 4–5 mm long, exserted from spathes; style



Distribution of ***Moraea deserticola***.



Distribution of ***Moraea tanquana***.

branches ± 1 mm long, concealed by anthers; stigma lobes bifid, crests lacking. *Capsules* and *seeds* unknown. *Flowering time*: August, probably also in late July.

Distribution and ecology: a rare species known from a single hill in the Tanqua Karoo National Park east of Leeuberg in Western Cape, South Africa; on clay soils on a dolerite outcrop.

Diagnosis: closely related to *Moraea deserticola* from the Knersvlakte, *M. tanquana* is distinguished by the three linear foliage leaves up to 5 mm wide, pale blue to mauve flowers with subequal tepals ± 22 mm long, united filaments, and short, contiguous anthers, 4–5 mm long that exceed the style branches and enclose them. The style divides opposite the lower third of the anthers so that the stigmatic tips of the short style branches, ± 1 mm long, emerge from between the middle of the ± contiguous anthers, and the branches lack crests. A smaller plant, *M. deserticola* has narrow foliage leaves 2–3 mm wide, tepals 30–36 mm long, and anthers 6.0–6.5 mm long (shrinking after anthesis to 5 mm) that remain contiguous around the style with their bases held within the floral cup. The ovary is conspicuously veined with dark red in *M. deserticola* but uniformly green in *M. tanquana*.

Sect. 10. **Pseudospicatae** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 38 (2013). Type: *Moraea pseudospicata* Goldblatt

Plants unbranched or branched, secondary branches sometimes sessile. *Foliage leaves* solitary (2 in *M. callista* which may be misplaced here). *Flowers* usually blue to mauve or violet; tepal claws short or ± as long as limbs; stamens united in lower half; style branches will developed with erect crests or reduced, without crests, sometimes as paired or single filiform arms extended horizontally. *Ovary* and *capsules* exserted or included.

98. **Moraea elliotii** *Baker*, Handbook of the Irideae: 58 (1892); Goldblatt: 127 (1986a). *Vieusseuxia elliotii* (Baker) Klatt: 154 (1894). Type: South Africa, [Mpumalanga], marshes near Lake Chrissie, *Scott Elliot 1592* (K, holo.).

Moraea macra Schltr.: 377 (1898). Type: South Africa, [Eastern Cape], Queenstown, *Galpin 2193* (B, holo.; BOL, PRE, iso.).

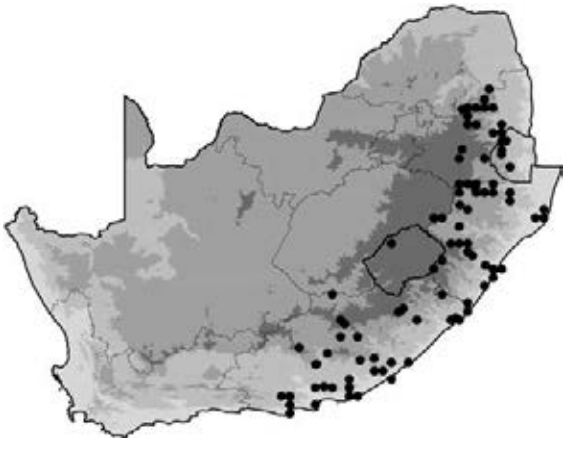
Moraea violacea Baker: 863 (1901). Type: South Africa, [KwaZulu-Natal], Byrne, *Wood 5220* (Z, holo.; BM, iso.).

Moraea juncifolia N.E.Br.: 346 (1929b). Type: South Africa, [Mpumalanga], Saddleback, *Galpin 8539* (K, holo.; SAM, iso.).

Moraea stewartiae N.E.Br.: 346 (1929b). Type: Swaziland, Hlatikulu, *Stewart 44* (K, holo.; PRE, iso.).

Plants mostly 300–500 mm high. *Corm* 12–20 mm diam.; tunics of dark brown fairly coarse fibres often forming a collar around base. *Stem* simple or with several (up to 8) branches, these suberect, flexed away from axis, sheathing leaves 40–60 mm long. *Foliage leaf* solitary, ± basal or inserted above ground, sometimes ± in middle of stem, linear, channelled or seeming terete with margins tightly inrolled with narrow adaxial groove, longer than stem, initially ± erect often becoming trailing above. *Rhipidial spathes* attenuate, green with brown membranous tips or becoming largely dry and brown, inner 40–60 mm long, outer shorter by ± 10 mm. *Flowers* fugaceous, blue to violet, occasionally pale lilac to ± white, outer tepal limbs with yellow-orange (or ± white) nectar guides at bases edged purple or violet, ± laxly spreading or reflexed to ± 45°; outer tepals 20–30 × 10–12 mm, claws ascending, ± $^1/_3$ as long as limbs; inner tepals 15–24 × 2–4 mm, narrowly lanceolate, initially suberect, either limbs becoming half-reflexed OR entirely spreading and twisted through 90°, claws 2–3 mm long. *Filaments* 3.4–4.5 mm long, united in lower 1–2 mm; anthers 5–6 mm long, white, pale grey-blue or yellow; pollen white or yellow. *Ovary* ovoid-ellipsoid, 6–8 mm long; style branches 8–10 mm long, crests erect, 5–9 mm long. *Capsules* club-shaped, 9–12 mm long. *Seeds* small, angled. *Chromosome number* 2*n* = 12, 24. *Flowering time*: September to March, usually late spring, from September in the south, and summer to autumn, from December to March in the north.

Distribution and ecology: widespread through the eastern half of the country, from near Mossel Bay in Western Cape north through Eastern Cape and KwaZulu-Natal to Mpumalanga and Limpopo in South Africa, also in Lesotho and Eswatini; in tropical Africa in Malawi and probably Mozambique; typically in open grassland, in a variety of soils, often in stony sites where corms are protected from predation.



Distribution of ***Moraea elliotii***.

Diagnosis: with relatively small flowers, *Moraea elliotii* currently includes plants from the Mpumalanga highveld with a linear leaf inserted high up on the stem but not immediately under the inflorescence, as well as those with a more-or-less basal leaf. The leaf is channelled but sometimes with margins tightly inrolled and appearing subterete or terete (the type of the synonym *M. juncifolia*). Plants from Gauteng, Mpumalanga and Eswatini mostly flower from December to March, whereas those from the KwaZulu-Natal Midlands generally flower in late spring, and those in the Eastern Cape may bloom as early as September. The flowers are small, with outer tepals 20–30 mm long and those from the north of its range are blue to violet with yellow-orange nectar guides and have inner tepals with half reflexed limbs. Populations from KwaZulu-Natal and Eastern Cape are variable in colour, sometimes pale violet to lilac or even white, often with the inner tepals spreading almost from the base and twisted through 90° and the filaments united for only ± 1 mm, vs 2.0–2.5 mm elsewhere. There appear, however, to be no consistent floral differences between the southern and northern populations and this makes formal recognition of subspecies impossible.

Populations of *Moraea elliotii* with the leaf inserted high on the stem can be confused with *M. natalensis*, but the latter is a more slender plant usually with smaller flowers, and the leaf is inserted higher on the stem at the base of the crowded branches.

99. **Moraea stricta** *Baker* in Vierteljahrsschrift der Naturforschenden Gesellschaft Zürich 49: 178 (1904a); Goldblatt: 134 1986a). Type: South Africa, [Limpopo], Shilouvane, *Junod 563* (Z, holo.; K, LD, iso.).

Moraea tellinii Chiov.: 138 (1911). Type: Ethiopia, Semien, Debarek, *Chiovenda 3007* [F, lecto., designated by Goldblatt: 262 (1977a)].

Moraea mossii N.E.Br.: 347 (1929b). Type: South Africa, [Gauteng], Johannesburg, *Moss 15805* (K, holo.; PRE, iso.).

Moraea parva N.E.Br.: 347 (1929b). Type: South Africa, [Limpopo], Woodbush, *Moss 15564* (K, holo.).

Moraea trita N.E.Br.: 345 (1929b). Type: South Africa, [Mpumalanga], Lydenburg, *Wilms 1419* (K, holo.; P, PRE, iso.).

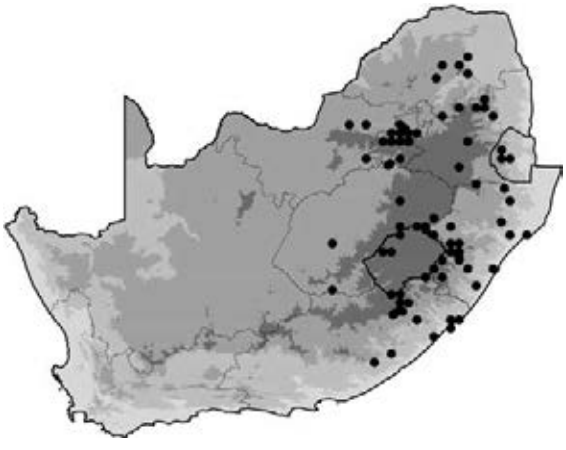
Moraea trita var. *foliata* N.E.Br.: 347 (1929b). Type: several specimens cited, no lectotype designated.

Moraea curtisiae R.C.Foster: 46 (1939). Type: Kenya, near Noyrosera, 40 miles [64 km] SE of Narok, *Curtis 676* (GH, holo.).

Plants mostly 150–250 mm high, excluding leaf. *Corm* 10–30 mm diam.; tunics of medium to coarse, dark brown fibres, often bearing cormlets at base. *Stem* usually with 2 or 3 branches, these held close to main axis on short stalks, and with sessile rhipidia at upper nodes, sheathing leaves 30–60 mm long, dry, papery, brown; apices often lacerated. *Foliage leaf* solitary, usually absent, dry and broken, or emergent at flowering, basal, ultimately up to 600 mm long or longer, terete, strongly ribbed, ± 1.5 mm diam., becoming dry and broken before flowering. *Rhipidial spathes* dry, papery, rarely green near base, apices speckled darker brown, sometimes lacerate, attenuate; inner 30–40 mm long; outer slightly smaller or ± as long. *Flowers* fugaceous, pale lilac to blue-mauve, outer tepal limbs with yellow to orange nectar guides at bases edged purple or violet; outer tepals obovate to lanceolate, ± 20 × 4–7 mm, claws ± as long as limbs, ascending, narrow; inner tepal ± usually suberect, ± 15–18 × 2–4 mm, linear-lanceolate. *Stamens* united basally, filaments ± 3.5 mm long; anthers 5 mm long, yellow (?or white). *Ovary* obovoid, 6–8 mm long; style branches 7–8 mm long, appressed to outer tepal claws, crests lanceolate, suberect, ± 3 mm long. *Capsules* ± club-shaped, ± 10 mm long. *Seeds* angular, yellow-brown. *Chromosome number*: $2n$ = 24, 36, 48, 60. *Flowering time* (in southern Africa): (July–)September to November.

Distribution and ecology: the most widespread species of *Moraea*, extending in South Africa from near Stutterheim in Eastern Cape through KwaZulu-Natal, Gauteng, Mpumalanga and Limpopo into tropical Africa as far north as Ethiopia; flowering at the end of the dry season in dry grassland, often in rocky sites on thin soils.

Diagnosis: *Moraea stricta* is recognised by the combination of a dry (or absent) foliage leaf at flowering, a fairly short stem up to 250 mm high, and small, pale blue-mauve to lilac flowers. Only the outer tepals bear nectar guides and the style branches are relatively well developed and bear short, erect crests ± 3 mm long. The foliage leaf, also distinctive, is emergent at or soon after flowering, and has a terete, prominently ribbed blade with a thickened apex. Ultimately the leaf may be up to 600 mm long or longer, then trailing through low, grassy vegetation. At the end of the growing season the leaf turns dry and brown and the flowering stem to which it is attached begins to elongate in preparation for flowering the following spring. Flowering at the end



Distribution of ***Moraea stricta***.

of the dry season, the rhipidial spathes and sheathing leaves are, like the foliage leaf, usually dry and brown.

Moraea stricta is one of relatively few polyploid species. Tetraploid, hexaploid and octoploid populations, $2n$ = 24, 36 and 48, have been recorded in southern Africa and a population from Malawi is decaploid, $2n$ = 60.

100. **Moraea alpina** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 225 (1973); Goldblatt: 136 (1986a). Type: South Africa, [KwaZulu-Natal], Mont-aux-Sources, *Galpin 10361* (PRE, holo.).

Plants 50–120 mm high. *Corm* 7–10 mm diam.; tunics of fine, light brown fibres. *Stem* few-branched or simple; contracted, sheathing leaves green or becoming dry and brown. *Foliage leaf* absent or emergent at flowering, attached to corm not flowering stem, when fully developed slender, terete, 0.5 mm diam. *Rhipidial spathes* usually green with translucent margins, attenuate, inner ± 25 mm long, outer ± $^2/_3$ as long. *Flowers* fugaceous, dark blue to violet, outer tepal limbs with yellow nectar guides at bases, claws ascending, limbs reflexed to ± 35°; outer tepals ± 12–15 × 3–4 mm; inner tepals shorter and narrower than outer. *Filaments* ± 6 mm long, united in lower ± 1.5 mm; anthers ± 3 mm long, yellow. *Ovary* obovoid, ± 4 mm long; style branches ± 6 mm long, style crests ± 1.5 mm long. *Capsules* ± obovoid to subglobose, ± 5 mm long. *Seeds* angular. *Chromosome number* $2n$ = 12. *Flowering time*: December and January.

Distribution and ecology: a high elevation species, occurring on the upper slopes and summit plateau of the Drakensberg in KwaZulu-Natal, South Africa, and Lesotho; in mixed grassland.

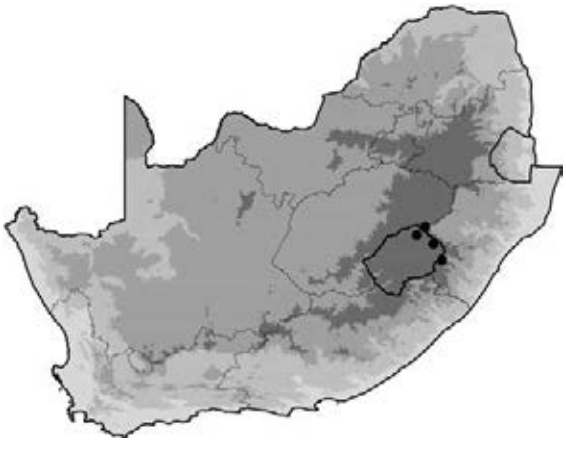
Diagnosis: most remarkable for its small size, *Moraea alpina* stands no more than 120 mm high and is distinguished by the solitary, terete basal leaf, which is absent or emergent from a separate shoot at flowering, as in *M. stricta*. That species blooms early in the season before the new leaf has emerged, and the leaf attached to the flowering stem is dry or absent. *Moraea alpina* has deep blue to violet flowers somewhat larger than those of *M. stricta* and ± globose capsules ± 5 mm long, whereas capsules of *M. stricta* are club-shaped and up to 10 mm long.

101. **Moraea thomsonii** *Baker*, Handbook of the Irideae: 57 (1892); Goldblatt: 137 (1986a). Type: Tanzania, 'plateau north of Lake Nyassa', Oct. 1880, *Thomson s.n.* (K, holo.).

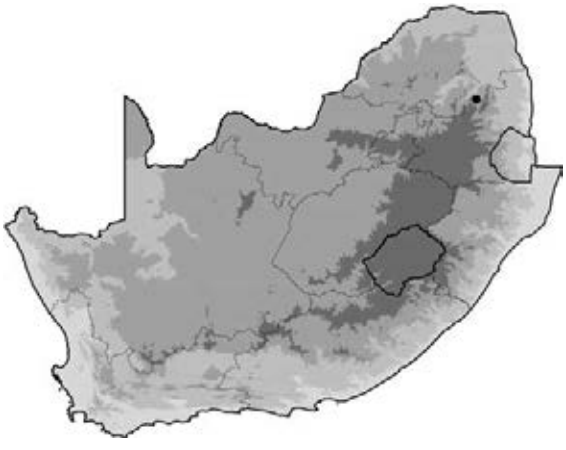
Plants mostly 150–300 mm high, excluding leaf. *Corm* 10–20 mm diam.; tunics of medium to coarse, dark brown fibres. *Stem* usually with 3 to 6 branches held close to main axis on short stalks or ± sessile, sheathing leaves 30–60 mm long, dry, papery, brown, often lacerated. *Foliage leaf* solitary, usually absent, dry and broken, or emergent at flowering, basal, ultimately up to 500 mm long or longer, terete, ribbed, ± 1.5 mm diam., becoming dry and broken before flowering. *Rhipidial spathes* dry, papery, rarely green near base, apices speckled darker brown, sometimes lacerate, attenuate; inner 25–40 mm long; outer ± $^2/_3$ as long. *Flowers* fugaceous, pale blue-mauve, limbs of all tepals with yellow to orange nectar guides at bases; outer tepals obovate to lanceolate, 20–24 × 5–8 mm, claws slightly shorter than limbs, ascending, narrow; inner tepals 16–18 × ± 7 mm, lanceolate. *Filaments* 3–4 mm long united in lower $^1/_3$; anthers ± 5 mm long, white or yellow. *Ovary* narrowly ellipsoid, ± 4.5 mm long; style branches 7–8 mm long, crests vestigial, shorter than stigma lobes. *Capsules* ± club-shaped, ± 10 mm long *Seeds* angular. *Chromosome number* $2n$ = 12. *Flowering time*: August to September (to November in tropical Africa).

Distribution and ecology: recorded only once in southern Africa, on Mt Sheba in Mpumalanga, South Africa, otherwise occurring in eastern Zimbabwe, adjacent Mozambique, Malawi and southern Tanzania; in dry grassland, blooming early in the season, usually before the first rains.

Diagnosis: virtually identical to the relatively common *Moraea stricta* in vegetative features and life history,



Distribution of ***Moraea alpina***.



Distribution of ***Moraea thomsonii***.

M. thomsonii is distinguished only by the flowers. The blue-mauve tepals have nectar guides on both the outer and inner tepal limbs and the inner tepals, ± 7 mm wide, are broader than in *M. stricta*. The style branches are poorly developed and have vestigial crests shorter than the stigma lobes. In *M. stricta* the style crests are 3–4 mm long and held erect above the nectar guides and the inner tepals are only 3–4 mm wide. As in *M. stricta*, the leaf is terete, usually dry and broken at flowering time and the sheathing leaves and spathes are more-or-less dry.

102. **Moraea natalensis** *Baker*, Handbook of the Irideae: 56 (1892); Goldblatt: 221 (1973) & 130 (1986a). Type: South Africa, [KwaZulu-Natal], without precise locality, *Sanderson 253* (K, lecto., designated by Goldblatt: 221 (1973); S; isolecto.).

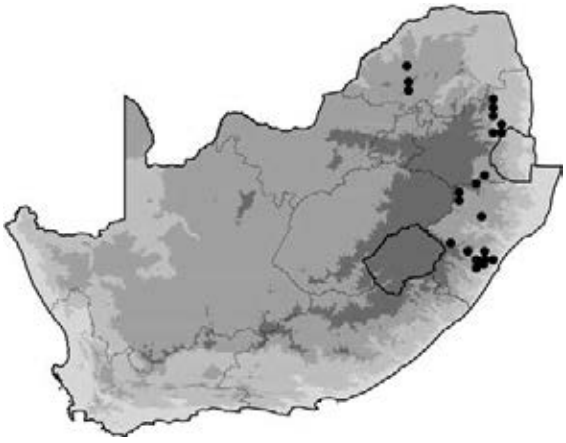
Moraea erici-rosenii R.E.Fr.: 234 (1916). Type: Zambia, Kalambo, *Fries 1345* (UPS, holo.; Z, iso.).

Moraea parviflora N.E.Br.: 346 (1929b). Type: South Africa, [Limpopo], Nylstroom, Tomson's Vlei, *Pole-Evans 19668* (K, holo.; PRE, iso.).

Plants 150–450 mm high, including leaf. *Corm* globose, 12–15 mm diam.; tunics of dark brown to black fibres. *Stem* erect or inclined, lowermost internode elongate with foliage leaf inserted well above ground, upper internodes much shorter, flexuous, few-branched, rarely simple, sheathing leaves green to dry, light brown, 25 mm long. *Foliage leaf* solitary, inserted well above ground, usually shortly exceeding stem, up to 200 mm long, narrowly channelled or terete. *Rhipidial spathes* green or becoming brown and dry above, attenuate, apices becoming lacerated, inner 25–35 mm long, outer ± 10 mm shorter. *Flowers* fugaceous, blue-mauve to violet, outer tepal limbs with yellow nectar guides edged dark mauve at bases, limbs reflexed to ± 35°; outer tepals 15–20 × ± 10 mm, claws ± $^1/_3$–$^1/_2$ as long as limbs; inner tepals linear-lanceolate, up to 15 × 4 mm. *Filaments* 4–5 mm long, united in lower 2–3 mm; anthers 4–5 mm long, yellow. *Ovary* ± ovoid, ± 4 mm long; style branches 5–6 mm long, crests ± 6 mm long. *Capsules* ovoid to club-shaped, 5–10 mm long. *Seeds* angled. *Chromosome number* 2*n* = 12. *Flowering time*: mostly November to January.

Distribution and ecology: extending in South Africa from coastal KwaZulu-Natal to higher elevations in Mpumalanga and Limpopo, also in Zambia and Zimbabwe; in open grassland, often in stony sites.

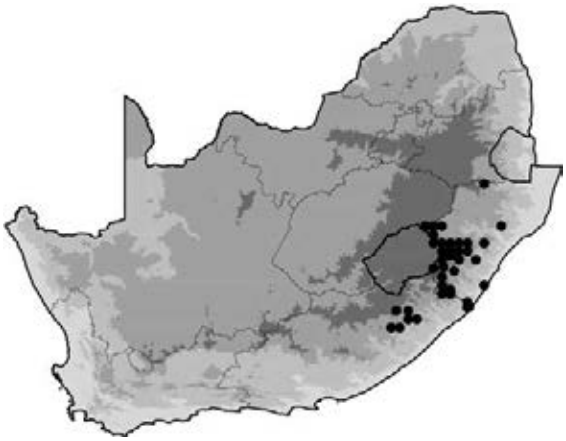
Diagnosis: with moderate-sized, blue-mauve to violet flowers, only the outer tepals with nectar guides, and well-developed style branches and crests, *Moraea natalensis* has unexceptional flowers for subg. *Polyanthes* but stands out in having a solitary foliage leaf inserted well above the ground on a stem with a long basal internode. The leaf is green at flowering and narrowly channelled, sometimes with the margins tightly inrolled and thus apparently terete. The few to several branches are short and somewhat crowded above the axil of the foliage leaf. This distinctive growth form is shared among the eastern southern African species of the subgenus only with *M. inclinata*, a taller plant, usually with darker violet flowers, green rhipidial spathes with the outer only about half as long as the inner, and nearly globose capsules. In *M. natalensis* the rhipidial spathes are often almost dry at flowering with the outer spathe only slightly shorter than the inner, and the capsules are obovoid to club-shaped. The plants from Zambia described as *M. erici-roseni* differ hardly at all from typical *M. natalensis*, but those described as *M. parviflora* from the Nylstroom area of Limpopo and currently included in *M. natalensis* are distinctive in their particularly slender habit and apparently smaller capsules.



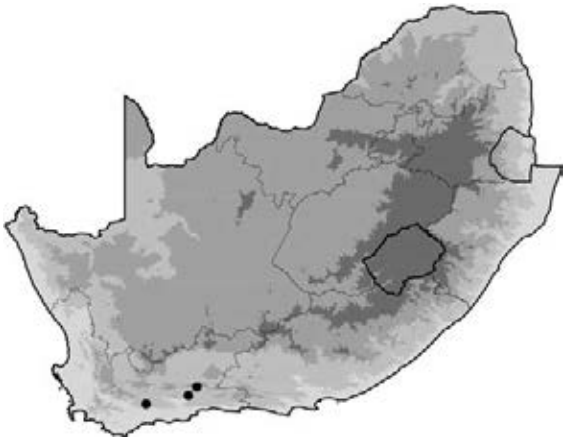
Distribution of ***Moraea natalensis***.

103. **Moraea inclinata** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 222 (1973): Goldblatt: 132 (1986a). Type: South Africa, [KwaZulu-Natal], Cathkin Park, *Galpin 11847* (BOL, holo.; PRE, iso.).

Plants 400–900 mm high, including leaf. *Corm* 10–15 mm diam.; tunics of brown fibres sometimes extending upwards in a collar around base. *Stem* slender, smooth or rarely woolly, usually inclined, with long basal internode and leaf inserted just below rhipidia; with up to 4 short branches, rarely simple, sheathing leaves 12–20 mm long, becoming dry and light brown distally. *Foliage leaf* solitary, inserted well above ground, channelled, mostly 150–400 mm long, up to 3 mm wide, sometimes seemingly terete with margins closely inrolled. *Rhipidial spathes* becoming dry and speckled brown distally; inner 34–40 mm long, outer ± $^1/_2$ as long. *Flowers* fugaceous, blue to violet, outer tepal limbs with yellow nectar guides at bases, claws ascending, limbs reflexed ± 45°; outer tepals 25–30 × 10 mm; inner tepals 20–25 × ± 6 mm. *Filaments* ± 5 mm long, united in lower $^1/_3$; anthers ± 7 mm long. *Ovary* ovoid, 4–5 mm long, style branches ± 6 mm long, up to 3 mm wide, crests 4–5 mm long. *Capsules* ± globose, 5–6 mm diam. *Seeds* angular. *Chromosome number* 2*n* = 12, 22. *Flowering time*: mostly November to February.



Distribution of ***Moraea inclinata***.



Distribution of ***Moraea lazulina***.

Distribution and ecology: extending from the southern Drakensberg near Cala in Eastern Cape, South Africa, northward to KwaZulu-Natal, eastern Free State and Lesotho; mainly montane in grassland, mostly above 1 200 m elevation.

Diagnosis: although confused in the past with *Moraea natalensis*, which has a similar habit with the leaf inserted on the stem just below the inflorescence, *M. inclinata* is taller and more robust, sometimes up to 900 mm tall, with the inner rhipidial spathes 34–40 mm long and the outer only about half as long. Other differences include the globose capsules, ± 5 mm in diam., and the larger flowers with outer tepals 25–30 mm long vs. capsules club-shaped, up to 10 mm long, and outer tepals 15–20 mm long in *M. natalensis*.

104. **Moraea lazulina** *Goldblatt & J.C.Manning* in Bothalia 43: 158 (2013). Type: South Africa, Western Cape, Oudtshoorn, Schoemanshoek, Kranskloof, eastern foot of rocky hill, in stony sandstone ground, 8 Oct. 2012, *Goldblatt & Porter 13859* (NBG, holo.; MO, PRE, iso.).

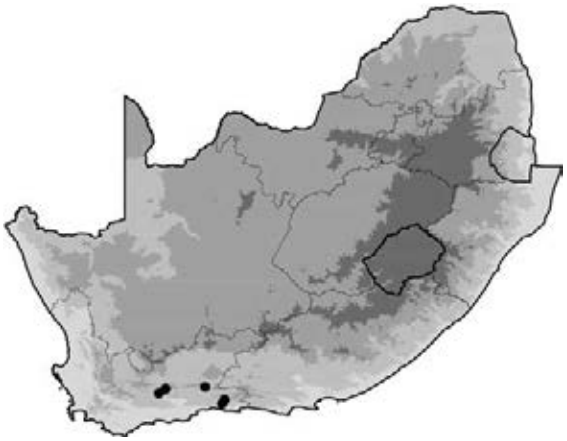
Plants 160–350 mm high. *Corm* ± conical, 12–18 mm at widest diam., with numerous small cormlets round base; tunics of medium-textured, matted, dark grey fibres. *Stem* flexuose, 1- to 5-branched, rarely simple, bearing sheathing leaves 32–38 mm long. *Foliage leaf* solitary, linear, longer than stem, erect to falcate, narrowly channelled, 2–3 mm wide opened flat. *Rhipidial spathes* with brown, attenuate tips, inner 33–45 mm long, outer ± half as long. *Flowers* fugaceous, blue, outer tepal limbs with white nectar guides at bases sometimes edged with dark blue, limbs of both whorls ± half reflexed, inner often more so than outer, unscented; outer tepals ± lanceolate, 22–27 × 8–9 mm, limbs 15–18 mm long, claws 7–8 mm long, inner tepals 17–20 × 5–7 mm. *Filaments* ± 8 mm long, united in lower half; anthers ± 5 mm long, grey-blue; pollen white or pale blue. *Ovary* ± cylindric, 5–6 mm long; style branches ± 7 × 5 mm, crests narrowly wedge-shaped, 7–8 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-September to late October; opening ± 15:00, collapsing at dusk.

Distribution and ecology: relatively widespread in the Little Karoo, from near Barrydale and the Rooiberg to De Rust east of Oudtshoorn in Western Cape, South Africa; in rocky sandstone ground, sometimes on limestone slopes near the Cango Caves.

Diagnosis: resembling a second Little Karoo species, *Moraea exiliflora*, also with a solitary, narrowly channelled basal leaf, *M. lazulina* has significantly larger flowers and is typically a taller plant, usually with a moderately branched stem. The flowers are always blue with large, white nectar guides on the outer tepals, 22–27 × 8–9 mm, whereas *Moraea exiliflora* has smaller, pale blue, mauve or white flowers with yellow (or white) nectar guides and outer tepals 14–17 × 4.5–6.0 mm. Other features of *M. lazulina* are likewise larger than in *M. exiliflora*. The shape of the flowers also differs to some extent, the tepal limbs of *M. lazulina* being reflexed more than 45°, the inner sometimes more so than the outer whereas the tepal limbs of *M. exiliflora* are laxly spreading to reflexed up to 30°.

105. **Moraea exiliflora** *Goldblatt* in Annals of Kirstenbosch Botanical Garden 14: 128 (1986a). Type: South Africa, [Western Cape], Swartberg Mtns, Ladismith, path to Towerkop, rock faces in pockets of soil, ± 1 000 m, *Esterhuysen 36122* (BOL, holo.; K, MO, NBG, PRE, S, US, WAG, iso.).

Plants 150–250 mm high. *Corm* ± obconic to subglobose, 5–8 mm diam.; tunics of fine to medium textured, dark brown to blackish fibres. *Stem* usually 3 or 4 internodes long, simple or 1- or 2-branched, branches erect, held close to main axis with rhipidia diverging; sheathing leaves 25–30 mm long, attenuate. *Foliage leaf* solitary, ± basal, slightly longer than stem, narrowly channelled, leaf halves folded together when dry, then seeming terete, ± 2–3 mm wide alive opened flat. *Rhipidial spathes* attenuate with dry brown apices, inner 22–32 mm long, outer ± $^1/_2$ as long. *Flowers* fugaceous, pale



Distribution of ***Moraea exiliflora***.

blue-grey, blue or white, outer tepals with yellow nectar guides at bases; tepals unequal, broadly oblanceolate, subobtuse, claws ascending, limbs spreading to reflexed up to 30º below horizontal, outer 14–17 × 4.5–6.0 mm, claws 5–7 mm long, < $^{1}/_{2}$ as long as limbs, inner 12–14 × ± 2 mm. *Filaments* ± 4.5 mm long, united in lower $^{2}/_{3}$; anthers 3.0–3.5 mm long, pale blue-mauve to white; pollen white. *Ovary* narrowly ovoid, 3–5 mm long, included or barely exserted; style branches ± 5 × 2 mm, crests narrowly wedge-shaped, ± 5 mm long. *Capsules* obovoid, 5–6 mm long. *Seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: late September and October; opening ± 16:00, collapsing soon after nightfall.

Distribution and ecology: extending from Towerkop in the Klein Swartberg and Touwsberg in the Little Karoo of Western Cape, South Africa, eastward to the upper Long Kloof southwest of Uniondale in Eastern Cape; on relatively dry, well-drained, rocky sandstone slopes.

Diagnosis: a slender plant with a solitary, narrow, channelled leaf and small, fugaceous flowers, *Moraea exiliflora* is recognised primarily by flower size, the outer tepals 14–17 × ± 4.5 mm and the inner 12–14 × ± 2 mm with the limbs of both whorls spreading to laxly reflexed up to 30º. The rhipidial spathes are proportionately small, the inner 22–32 mm long and, like all members of sect. *Pseudospicatae,* are long-attenuate with brown tips. *Moraea lazulina*, has similarly proportioned but larger flowers with the outer tepals 22–27 × 8–9 mm, the tepal limbs being reflexed more than 45º, the inner sometimes more so than the outer. The species is inconspicuous even when in bloom after 16:00 and may be more common than the present record indicates.

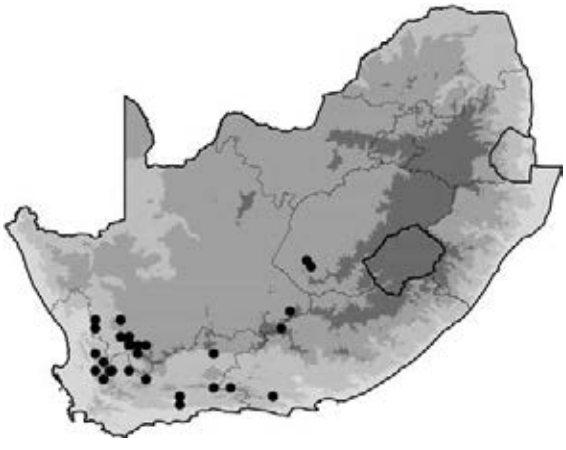
106. **Moraea crispa** *Thunb.*, Dissertatio de *Moraea* no. 13 (1787); Goldblatt: 112 (1986a). *M. undulata* Ker Gawl.: 43 (1827), illegitimate superfluous name for *M. crispa* Thunb. Type: South Africa, [Northern Cape], 'Roggeveld', *Thunberg s.n.* (UPS–THUNB 1214, holo.).

Homeria rogersii L.Bolus: sub t. 306 (1928a). Type: South Africa, [Eastern Cape], Naauwpoort, *Rogers 12078* (BOL, lecto., designated by Goldblatt: 93 (1980a); K, PRE, Z, isolecto.).

Plants usually small, 80–120(–250) mm high. *Corm* 10–20 mm diam.; tunics of tough, blackish fibres often accumulating in a thick mass, usually with small cormlets around base. *Stem* flexuose, usually with 2 to 4 branches, sheathing leaves attenuate, becoming dry, brown, 15–40 mm long. *Foliage leaf* solitary, basal, up to 250 mm long, either linear and channelled, often slightly twisted, sometimes margins undulate to crisped, or terete, then sometimes hollow. *Rhipidial spathes* becoming dry and straw-coloured above, inner 24–40 mm long, outer $^{2}/_{3}$ as long. *Flowers* fugaceous, blue-mauve (rarely white) with deep yellow (or yellow and blue) nectar guides at bases of limbs of inner and outer tepals, limbs ± spreading, claws ± 3 mm long, suberect, forming a shallow cup around base of filament column; tepals oblanceolate, outer 12–21 × 4–8 mm, inner tepals 11–18 × 5–6 mm. *Filaments* 3.5–8.0 mm long, united in slender, smooth column, free in upper $^{1}/_{4}$–$^{1}/_{2}$; anthers 2–5 mm long, diverging, yellow; pollen yellow. *Ovary* ovoid-globose, 3–6 mm long, usually exserted; style branches narrow, ascending, 2–3 mm long, reaching to ± middle anther level, forked and stigmatic apically, white or yellow; crests lacking. *Capsules* ovoid to ± globose, 6–7 × 3–4 mm. *Seeds* brown, angular. *Chromosome number* 2*n* = 12, 24, 36. *Flowering time*: late September to November, sometimes in December; opening late afternoon, mostly after 15:30, fading in early evening.

Distribution and ecology: with an unusually wide range in South Africa, extending from Free State and the Upper Karoo near Hanover in Eastern Cape, west to Nieuwoudtville and the Western Karoo in Northern Cape and through the interior mountains of Western Cape to the Baviaans Kloof near Humansdorp in the east; in relatively dry, exposed sites in stony ground.

Diagnosis: one of several species of sect. *Pseudospicatae*, *Moraea crispa* has small, pale blue-mauve flowers with small yellow nectar guides at the bases of the limbs of both inner and outer tepals, and short tepal claws



Distribution of ***Moraea crispa***.

forming a cup around the bases of the filaments. The style branches are much reduced, 2–3 mm long, appressed to and reaching only to about the middle of the anthers. The single foliage leaf is unusually variable, usually channelled and somewhat twisted, occasionally with undulate and even crisped margins (the type form from near Calvinia), sometimes ± filiform and tightly rolled with straight margins or somewhat twisted. White-flowered plants from the Baviaanskloof open at ± 18:00 in contrast to ± 16:00 for blue-flowered plants and need further investigation.

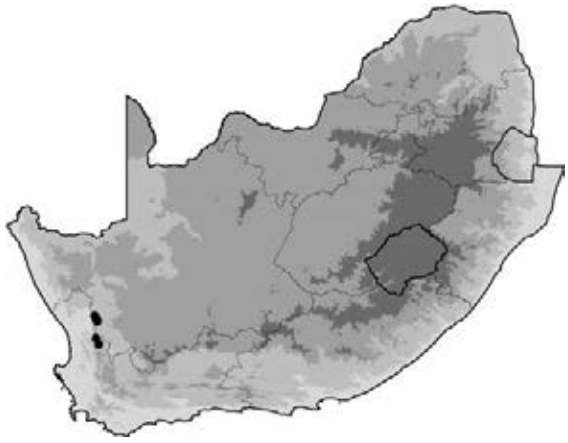
Moraea crispa is unusual in being heteroploid. Populations from the Western Karoo are mostly diploid, 2*n* =12, but tetraploid and hexaploid populations have been recorded from the Cederberg and Cold Bokkeveld and these plants have the longest anthers in the species.

107. **Moraea verecunda** *Goldblatt* in Annals of Kirstenbosch Botanical Garden 14: 116 (1986a). Type: South Africa, [Northern Cape], Nieuwoudtville, rocky outcrop west of town, *Goldblatt 7391* (MO, holo.; K, NBG, PRE, S, iso.).

Plants usually small, 150–200 mm high, occasionally growing in clumps, often with collar of fibres around base. *Corm* 12–15 mm diam.; tunics of blackish fibres often accumulating in a thick layer. *Stem* flexuose, often with 1 or 2 branches from below, rhipidia in upper axils sessile, sheathing leaves attenuate, partly to entirely dry and brown at anthesis, 15–20 mm long. *Foliage leaf* solitary, basal, up to 250 mm long, linear, narrowly channelled, margins tightly inrolled (often evidently terete but with narrow adaxial groove), often trailing distally. *Rhipidial spathes* becoming dry and straw-coloured, inner 15–20 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, violet, tepal limbs of both whorls with small yellow nectar guides at bases, ± spreading, claws ± 1.8 mm long, ascending to form a shallow cup; tepals lanceolate, outer 10–13 × 4–5 mm, inner 9–12 × ± 3 mm. *Filaments* 3–4 mm long, united below in a slender, smooth column, free and diverging near apices; anthers ± 2 mm long before dehiscence, later 1.2–1.5 mm long, suberect, yellow; pollen yellow. *Ovary* narrowly ellipsoid, 4.5–6.0 mm long, exserted; style branches ± 1.5 mm long, appressed to anthers, reaching to ± middle anther level, forked and stigmatic apically, crests lacking. *Capsules* ellipsoid, 10–12 mm, long, beaked in upper 1 mm. *Seeds* brown, ± ovoid, 1.8–2.0 mm diam. *Chromosome number* 2*n* = 12. *Flowering time*: October to late November; flowers opening late afternoon, mostly after 15:30, fading in early evening.

Distribution and ecology: poorly collected and evidently rare, occurring in the immediate area of Nieuwoudtville in Northern Cape, South Africa, but also some 80–100 km to the south in the Biedouw Valley–Wuppertal area of the northern Cederberg in Western Cape; restricted rocky sandstone ground.

Diagnosis: *Moraea verecunda* is recognised by the combination of small, pale blue-violet flowers with subequal

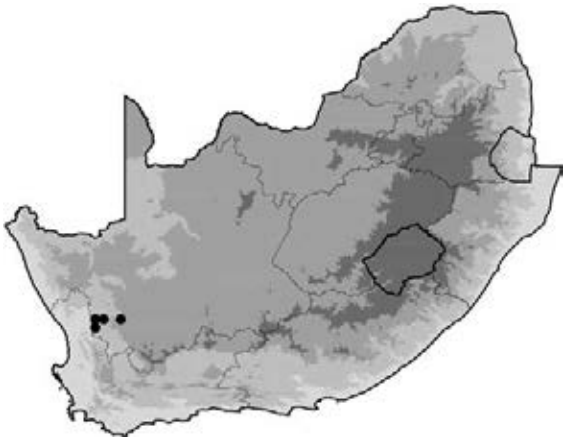


Distribution of ***Moraea verecunda***.

tepals 10–13 mm long, all bearing yellow nectar guides, and short tepal claws ± 1.8 mm long diverging to form a wide, shallow cup around the filament bases. The filaments are united in a smooth column and diverge only near the tips. In general the flowers resembles those of *M. crispa* and its close allies, both in form and in the short style branches that lack crests and are appressed to the subtending anthers but it differs from that species in having sessile lateral rhipidia and unusual capsules, ± spindle-shaped with a short sterile beak, unique in sect. *Pseudospicatae*. The solitary foliage leaf is linear, narrowly channelled and usually more-or-less trailing distally, thus typical of the section.

108. **Moraea pseudospicata** *Goldblatt* in Annals of the Missouri Botanical Garden 73: 111 (1986c); Goldblatt: 114 (1986a). Type: South Africa, [Northern Cape], Glenlyon, E of Nieuwoudtville, dry Dwyka Tillite flats, *Snijman 783* (NBG, holo.; K, MO, PRE, S, NBG, WAG, iso.).

Plants slender, 150–400 mm high, enclosed by collar of fibres around base. *Corm* 30–50 mm diam., but live corm ± 10 mm diam.; tunics of tough, blackish fibres. *Stem* simple or with 1 or 2 long branches from near base, bearing several sessile rhipidia at upper nodes, sheathing leaves dry, brown, up to 25 mm long, darker on veins. *Foliage leaf* solitary, basal, slender, apparently terete but narrowly grooved on adaxial surface with margins tightly inrolled, straight or weakly twisted. *Rhipidial spathes* subequal, dry and straw-coloured at anthesis, also darker on veins, 20–25 mm long. *Flowers* fugaceous, blue-mauve, tepal limbs of both whorls with deep yellow nectar guides at bases, claws forming a shallow cup around base of filament column, limbs spreading; tepals lanceolate, outer 15–17 × ± 3.5 mm, claw ± 2 mm, inner tepals ± 1 mm shorter than outer. *Filaments* 4.0–6.5 mm long, united entirely or free in upper $^{2}/_{3}$ but contiguous, forming a slender, smooth cylindric column; anthers 2.0–4.5 mm long, erect and contiguous, yellow; pollen yellow. *Ovary* globose, ± 2 mm long; style dividing ± opposite middle of anthers, branches vestigial, narrow, ascending, 1.0–1.5 mm long, stigmatic



Distribution of ***Moraea pseudospicata***.

apically, initially concealed by anthers, reaching to upper 1/3 or slightly exceeding anther apices; crests lacking. *Capsules* globose, 2–4 mm diam., membranous and semi-transparent, fragmenting irregularly. *Seeds* dark brown, angular, ± 1 mm long. *Chromosome number* 2*n* = 12. *Flowering time*: December to March; flowers opening ± 16:00 and fading in early evening.

Distribution and ecology: restricted to the Bokkeveld Plateau from near Nieuwoudtville south to Lokenberg and inland to the Hantamsberg at Calvinia in Northern Cape, South Africa, but poorly documented and undoubtedly with a wider range; on stony flats and slopes, in karroid bush and renosterveld.

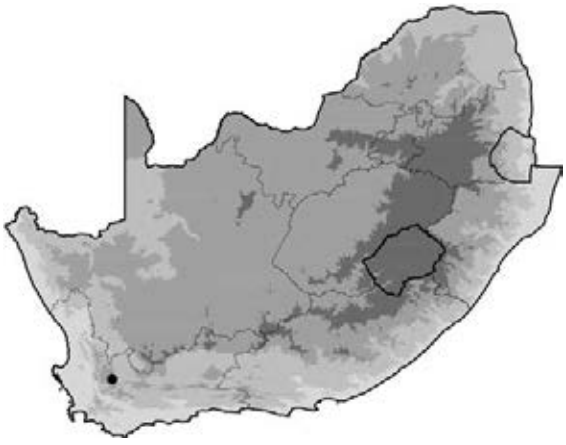
Diagnosis: resembling the more common and widespread *Moraea crispa* in both flower structure and general aspect, *M. pseudospicata* has pale blue-mauve flowers with subequal tepals with short erect claws that form a short, narrow cup including the lower part of the filament column. The anthers are nearly erect and so concealing the narrow and short style branches, whereas in *M. crispa* the anthers and style branches diverge, exposing the style branches. *Moraea pseudospicata* differs also in its taller stature, up to 400 mm high, sessile lateral inflorescences with dry, chaffy sheathing leaves and rhipidial spathes, and in its globose capsules with almost membranous walls, apparently dehiscing irregularly rather than along the locule sutures. Flowering middle to late summer in an area of summer drought, the leaves are usually dry and broken at flowering time.

109. **Moraea pearsonii** *Goldblatt & J.C.Manning* in Bothalia 39: 2 (2009). Type: South Africa, Western Cape, Farm Vrede, dry wash west of junction between Touws River and Ceres–Sutherland roads, 15 Dec. 2007, *Manning 3128* (NBG, holo.; K, MO, iso.).

Plants 200–450 mm high, with collar of fine fibres around base. *Corm* globose, 20–30 mm diam., deeply buried; tunics of coarse black fibres. *Stem* erect, usually with 1 to 4 ascending branches, dull purplish where exposed, bearing (1)4 to 6 sessile lateral flower clusters at upper nodes, sheathing leaves dry, attenuate. *Foliage leaf* solitary, basal, much longer than stem, trailing, partially or entirely dry at flowering, linear, channelled but margins inrolled when dry and appearing terete, 2–3(–4) mm wide, up to 1 m long. *Rhipidial spathes* dry and papery at flowering, pale buff-coloured or lightly flushed with purple, attenuate, inner 20–33 mm long, outer ± as long. *Flowers* fugaceous, pale lilac flushed buff-coloured on reverse; inner and outer tepal limbs with small, oblong, yellow nectar guides at bases, unscented, claws erect, clasping filament bases, 1.0–1.5 mm long, limbs spreading or slightly reflexed; outer tepals oblong-elliptic, ± 13 × 4.5–5.0 mm, inner tepals 13 × 4 mm. *Filaments* free, contiguous at base, 3.5–4.0 mm long, mauve; anthers erect, 4.5–5.0 mm long, yellow, curving inwards distally at anthesis; pollen yellow. *Ovary* ovoid, 2.5–3.0 mm long; style erect, filiform, mauve, ± 2.5 mm long, branches each divided to base into two filiform arms 3.5–4.0 mm long and spreading to ascending between anthers. *Capsules* barrel-shaped, 4–5 × 3–4 mm. *Seeds* angular, ± 1.5 mm diam., red-brown. *Flowering time*: late November to late December; flowers opening at ± 17:30 and wilting at ± 20:30.

Distribution and ecology: a narrow endemic of interior Western Cape, South Africa, known only from the roadside between Karoo Poort and the Farm Hottentotskloof at the southern end of Swartruggens; in sandy alluvium over shale in washes in open shrubland transitional between renosterveld and arid fynbos.

Diagnosis: flowering in the dry season, the solitary, long, trailing leaf up to 1 m long is dry or almost so when flowering begins. The relatively small, blue flowers are distinctive, resembling those of sect. *Hexaglottis* in having subequal tepals with short erect claws, free stamens, and style branches divided to the base into filiform arms extending between the stamens. Plastid DNA data confirm an alliance with *Moraea crispa* and *M. pseudospicata*, both of which have small, blue flowers with partly united filaments and flattened style branches forked at the tips and appressed to the subtending anthers. The leaf of *M. pearsonii* is linear and



Distribution of ***Moraea pearsonii***.

narrowly channelled when fresh, but with the margins tightly inrolled on drying so that the leaf then appears to be terete. The main stem and branches bear sessile rhipidia at the upper nodes, a pattern found in several species of the section, including *M. pseudospicata* and *M. verecunda*, both Western Karoo endemics.

110. **Moraea monticola** *Goldblatt* in Novon 8: 374 (1998), as a new name for *Roggeveldia montana* Goldblatt: 211 (1992) [not *M. montana* Schltr. (1900)]. Type: South Africa, [Northern Cape], Namaqualand, Kamiesberg near Leliefontein, *Goldblatt 6696* (NBG, holo.; K, MO, PRE, S, iso.).

Plants 100–150 mm high. *Corm* globose, 10–15 mm diam.; tunics of dark brown, coarse, wiry fibres. *Stem* ± flexuose, usually few-branched from upper nodes, sheathing leaves 25–35 mm long, dry, pale below with dark attenuate apices. *Foliage leaf* solitary, basal, terete, ± falcate to trailing distally, longer than stem, ± 1 mm diam. *Rhipidial spathes* initially green, drying and brown from apex, inner 20–25 mm long, outer ± ½ as long. *Flowers* fugaceous, blue or white, all tepal limbs spreading to slightly reflexed, with yellow nectar guides at bases; tepals subequal, outer ± 15 × 6 mm, inner 13–14 × ± 4, claws ± 1 mm long, suberect, enclosing bases of filaments. *Stamens* free, filaments ± 3.5 mm long, diverging; anthers ± 6 mm long, straight in bud, becoming incurved after anthesis, yellow. *Ovary* ovoid-elliptic, ± 3.5 mm long; style branches undivided, filiform, extending between bases of anthers, ± 3.5 mm long. *Capsules* ± broadly elliptic-ovoid, ± 9 mm long. *Seeds* angular. *Chromosome number* 2*n* = 24. *Flowering time*: October and November; flowers opening ± 16:00 and wilting at dusk, ± 19:30.

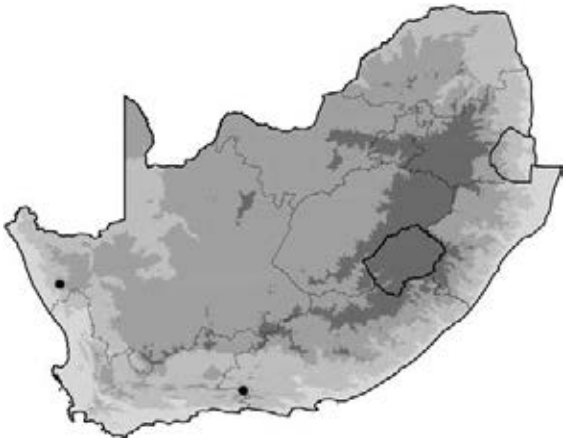
Distribution and ecology: known from two widely separated populations in South Africa, one in the Kamiesberg, Northern Cape, and the other near Willowmore at the foot of the Great Swartberg in Eastern Cape.

Diagnosis: one of three species of subg. *Polyanthes* with filiform, undivided style branches extending between the anthers, *Moraea monticola* is distinguished by the single, falcate to trailing foliage leaf with a terete blade. Related *M. marginata* has a broad, channelled leaf with thickened margins and slightly smaller flowers, the tepals 9–13 mm long vs. 13–15 in *M. monticola*.

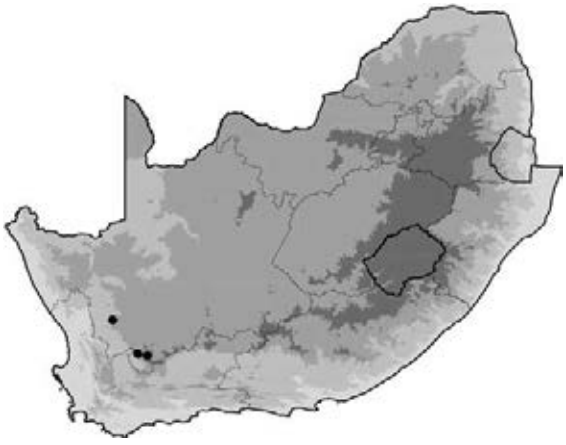
111. **Moraea marginata** *J.C.Manning & Goldblatt* in Bothalia 36: 141 (2006). Type: South Africa, Northern Cape, Sutherland, 200 m along Bo-Visrivier road south of town, Farm Tweefontein, stony flats in open karroid scrub, 15 Nov. 2005, *Manning 2997* (NBG, holo.; K, MO, iso.).

Plants 100–150 mm high. *Corm* globose, 15–20 mm diam.; tunics of coarse black fibres. *Stem* usually 1- to 4-branched at upper nodes, dull purplish where exposed, with 3 or 4 sheathing leaves ± dry and papery at flowering, imbricate, attenuate. *Foliage leaf* solitary, basal, longer than stem, trailing and slightly twisted and coiled, firm-textured, grey-green, ± dry at flowering, linear, channelled, 20–25 × 5–7 mm, margins conspicuously thickened, cartilaginous. *Rhipidial spathes* becoming dry above, inner 25–30 mm long, outer ± ½ as long. *Flowers* fugaceous, blue-violet, all tepal limbs with small, oblong, yellow nectar guides at bases, unscented; tepals oblanceolate, shortly clawed, claws erect, 1.0–1.5 mm long, clasping base of filaments, limbs spreading or slightly reflexed, inner twisted slightly counter-clockwise distally; outer 10–13 × 3.5–4.0 mm, inner 9–12 × 2.5–3.0 mm. *Stamens* free, filaments contiguous at base, 4–5 mm long, suberect, mauve; anthers erect, 4.5–5.0 mm long, yellow, curving inwards above at anthesis. *Ovary* narrowly ellipsoid, 4 mm long; style branches filiform, 4 mm long, spreading to ascending, emerging between anthers, mauve. *Capsules* barrel-shaped, 6–8 × 5 mm. *Seeds* subglobose or angled by pressure, ± 2 mm diam., reddish brown, testa surface rugulose. *Flowering time*: November; flowers opening ± 16:00 and wilting at ± 20:00.

Distribution and ecology: poorly documented and known from the foot of the Hantamsberg and from two sites at the southern end of the Roggeveld Escarpment near



Distribution of ***Moraea monticola***.



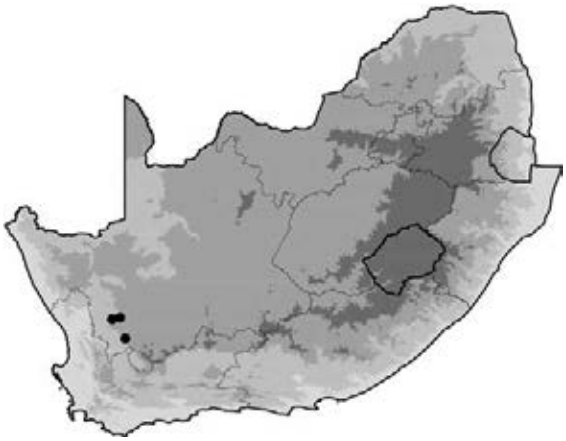
Distribution of ***Moraea marginata***.

Sutherland in Northern Cape, South Africa; in fine alluvium over shale in open, succulent karroid scrub.

Diagnosis: recognised by the combination of stellate, blue-violet flowers with subequal tepals, free stamens and undivided, filiform style branches, *Moraea marginata* also has a solitary, linear, channelled leaf with conspicuous, maroon margins that are very conspicuously thickened when dry. As with related *M. fistulosa* and *M. monticola*, the style branches are filiform, undivided and extend between the stamens. The leaves of *M. marginata* are dry and withered at flowering, and the attractive, blue-violet flowers, 20–25 mm in diam., open in early summer in the late afternoon for just a couple of hours, withering near sunset, a phenology shared with several other species of the *M. crispa* alliance.

112. **Moraea fistulosa** *(Goldblatt) Goldblatt* in Novon 8: 374 (1998). *Roggeveldia fistulosa* Goldblatt: 840 (1979b). Type: South Africa, [Northern Cape], between Calvinia and Middelpos, *Goldblatt 4163* (MO, holo.; K, NBG, iso.).

Plants 300–500 mm high. *Corm* 10–15 mm diam.; tunics of dark brown, wiry fibres. *Stem* few-branched at upper nodes, sheathing leaves 25–35 mm long, dry, pale below, with dark attenuate tips. *Foliage leaf* solitary, terete, hollow, usually straight, ± 3 mm diam., exceeding stem. *Rhipidial spathes* usually becoming dry above, attenuate, dark brown, inner 30–35 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, blue-mauve, all tepals with yellow-orange nectar guides at bases of spreading limbs; tepals subequal, 16–18 mm long, inner slightly smaller than outer, claws ± 2 mm long, ascending. *Stamens* free, filaments ± 4 mm long, suberect; anthers ± 4.5 mm long, straight in bud, becoming incurved after anthesis. *Ovary* ± 3 mm long; style branches filiform, extending between filaments, ± 2.5 mm long. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: December; flowers opening ± 16:30 and wilting at dusk, ± 19:00.



Distribution of ***Moraea fistulosa***.

Distribution and ecology: poorly collected and known only from Calvinia Distinct in the Western Karoo, Northern Cape, South Africa; in rocky flats in red, dolerite-derived clay.

Diagnosis: one of three species of the *Roggeveldia* group of sect. *Pseudospicatae, Moraea fistulosa* has the characteristic blue to violet flowers of the alliance with subequal, ± spreading tepals all bearing yellow nectar guides, free stamens, and filiform style branches extending between the stamens. Of the three species of the group, *M. fistulosa* is recognised by the straight, hollow, terete leaf blade, ± 3 mm in diam. and relatively tall stem, up to 500 mm high. The smaller *M. monticola* also has a terete leaf, but only ± 1 mm in diam., solid internally and slightly smaller flowers, the tepals 13–15 mm long (vs. 16–18 mm in *M. fistulosa*). As in allied species in sect. *Pseudospicatae*, the flowers open in the later afternoon, after 16:00 and fading and collapsing at dusk, usually between 18:00 and 19:00.

Subg. 9. **Grandiflorae**

Subg. **Grandiflorae** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 8 (1976b). Type: *Moraea spathulata* (L.f.) Klatt

Plants usually unbranched, rarely with a short branch from upper node. *Flowers* yellow (white), blue to violet pale pink; stamens united in lower half; ovary usually 3-angled; style branches well developed with prominent crests. *Capsules* large, exserted. *Seeds* flattened, usually discoid. *Basic chromosome number x* = 6.

113. **Moraea spathulata** *(L.f.) Klatt* in Conspectus Florae Africae 5: 152 (1894); Goldblatt: 250 (1973) & 207 (1986a). *Iris spathulata* L.f.: 99 (1782). *Iris spathacea* Thunb.: 17 (1782b), illegitimate superfluous name for *I. spathulata* L.f. *M. spathacea* Ker Gawl.: sub t. 1103 (1808), illegitimate superfluous name. Type: South Africa, [Eastern Cape], Wolwekraal [Long Kloof near Keurboomsrivier], *Thunberg s.n.* (UPS–THUNB 1172, holo.).

Moraea longispatha Klatt: 560 (1866). Type: South Africa, [Eastern Cape], 'Tambukiland', banks of the Kei River, *Ecklon & Zeyher Irid. 3* (MO, syn.).

Moraea spathulata subsp. *autumnalis* Goldblatt: 254 (1973). Type: South Africa, [KwaZulu-Natal], Nyameni Mouth, Port Edward, *Strey 8619* (PRE, holo.; NH, iso.).

Moraea spathulata subsp. *saxosa* Goldblatt: 254 (1973). Type: South Africa, [Mpumalanga],

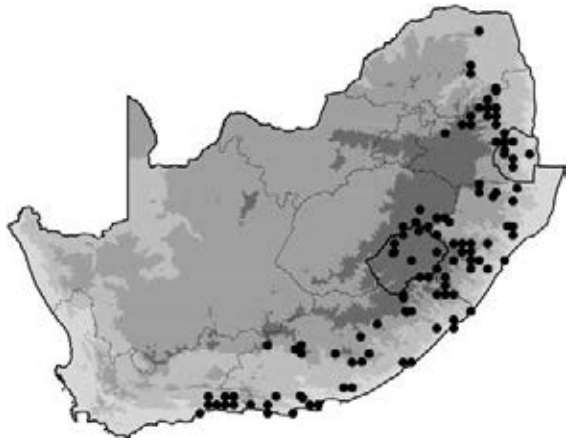
summit, Long Tom Pass, *Goldblatt 612* (BOL, holo.; PRE, iso.).

Moraea spathulata subsp. *transvaalensis* Goldblatt: 253 (1973). Type: South Africa, [Mpumalanga], near Sabie, *Goldblatt 610* (BOL, holo.; MO, iso.).

Plants up to 1 m high, usually in clumps, rarely solitary, evergreen. *Corm* 15–20 mm diam.; tunics brown, fibrous, often accumulating in a loose mass. *Stem* sheathed below by brown, sometimes netted cataphylls, simple, rarely with a sessile lateral rhipidium from penultimate node, sheathed entirely by pale green, ± inflated, sheathing leaves 90–180 mm long, tips usually dry and brown. *Foliage leaf* solitary, much longer than stem, linear, flat to shallowly channelled, 18–24 wide. *Rhipidial spathes* acute to attenuate, inner 100–180 mm long, outer slightly shorter. *Flowers* long-lasting, yellow often with dark veins, outer tepal limbs with deeper yellow to orange nectar guides at bases, reflexed to ± 45°, faintly honey-scented; outer tepals 35–50 × 20–25 mm, claws ± $^1/_3$ as long as limbs; inner tepals 30–60 mm long, suberect or curving inward distally. *Filaments* 8–16 mm long, united in lower half; anthers 7–15 mm long, purple or white. *Ovary* cylindric, 20–30 mm long, cylindric-triangular; style branches 20–30 mm long, crests erect, up to 20 mm long. *Capsules* oblong-cylindric, broadly 3-lobed, mostly 30–45 mm long. *Seeds* flattened, discoid, ± 3 mm diam. *Chromosome number* $2n = 12$. *Flowering time*: mainly November to February, sometimes later; September to November in southern Eastern Cape.

Distribution and ecology: widespread though eastern southern Africa, from George in Western Cape along the coast and interior mountains to Limpopo in South Africa, as well as Lesotho, Eswatini and eastern Zimbabwe; in more-or-less open sites in grassland or low open bush, often in rocky places.

Diagnosis: somewhat variable across its wide range, *Moraea spathulata* typically forms large tufts, thus it is not unusual to see several flowers open at once. Each flowering stem bears a single broad leaf, shallowly channelled to almost flat. The species can be distinguished by its large yellow flowers, the outer tepals up to 50 mm long, tall stems, and clump-forming habit. Plants flower in late winter and spring along the coast but in summer and autumn inland. The species comprises numerous local races, but owing to the small differences between them, it is difficult to define many of them. Four subspecies were described in Goldblatt (1973) but are not currently recognised.



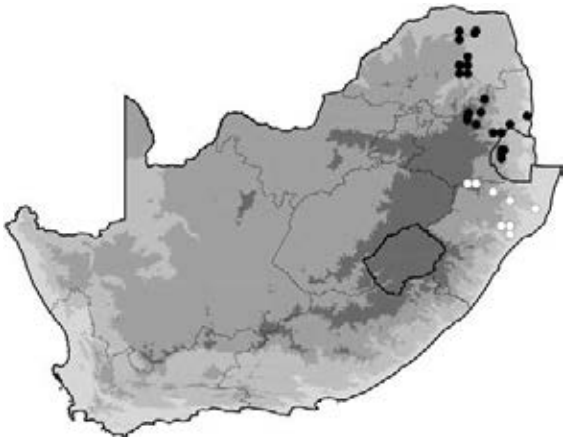
Distribution of ***Moraea spathulata***.

114. **Moraea moggii** *N.E.Br.* in Transactions of the Royal Society of South Africa 17: 346 (1929b); Goldblatt: 237 (1973). Type: South Africa, [Limpopo], probably Haenertsburg (as Struben's Farm), *Mogg s.n.* (PRE, holo.).

Plants 500–700 mm high, always solitary. *Corm* 15–20 mm diam.; tunics of matted, brown fibres. *Stem* unbranched, covered by (2)3 or 4, green sheathing leaves, not usually overlapping, apices dry, brown. *Foliage leaf* linear, channelled, exceeding stem, trailing distally, mostly 11–15 mm wide. *Rhipidial spathes* green, with acute, dry tips, inner 9–16 mm long, inner slightly shorter. *Flowers* long-lived, yellow, creamy yellow or white, outer tepal limbs with bright yellow nectar guides at bases edged with a ring of purple veins; outer tepals broadly lanceolate, obtuse, 40–75 × 30–35 mm, claws ± $^2/_3$ as long as limbs; inner tepals broadly lanceolate with tapering base, obtuse to retuse, up to 40–60 × 20–25 mm long, erect. *Filaments* ± 10 mm long, united in lower $^1/_2$; anthers ± 10 mm long. *Ovary* cylindric, 20–30 mm long; style branches 18–20 mm long, crests 10–20 mm long, erect. *Capsules* cylindric-3-lobed, 30–40 mm long. *Seeds* flattened, disc-like. *Chromosome number* $2n = 12$. *Flowering time*: mainly December to April.

Distribution and ecology: South Africa, extending from the Haenertsburg area of Limpopo along the eastern escarpment of Mpumalanga to northern KwaZulu-Natal; in open grassland.

Diagnosis: distinguished in subg. *Grandiflorae* by its solitary habit, long, narrow, channelled leaf 11–15 mm wide, often with a grey blush, and very large, pale yellow to white flowers. The outer tepals are up to 75 mm long and the inner up to 60 mm long. It is most easily confused with *M. spathulata*, some forms of which are similar, but the two can usually be distinguished by the solitary habit of *M. moggii* compared with typically clump-forming *M. spathulata,* which has broader leaves often flat or very widely channelled and usually darker yellow flowers. Apart from this, *M. moggii* is generally a late flowering species, while *M. spathulata* flowers in spring or summer, except for some southern KwaZulu-Natal populations that also flower late in the season. Two subspecies are recognised, northern subsp. *moggii*, with pale yellow flowers, and southern subsp. *albescens* which typically has white or creamy yellow flowers.



Distribution of ***Moraea moggii*** subsp. ***moggii***, ●; subsp. ***albescens***, ○.

Key to subspecies

1a Flowering in late February to April; flowers pale yellow; Limpopo, Mpumalanga and Eswatini . . . . . 114a. subsp. *moggii*

1b Flowering in December or January, occasionally later; flowers usually white, sometimes creamy yellow; southern Mpumalanga and northern KwaZulu-Natal . . . . . 114b. subsp. *albescens*

114a. subsp. **moggii**

Cataphylls: uppermost rarely < 150 mm long. *Foliage leaf* grey-green, glaucous, 4–10 mm wide, not ribbed when fresh. *Flowers* yellow, veined purple-brown; style branches and crests ± uniformly coloured. *Flowering time*: late February to April.

Distribution and ecology: extending from Haenertsburg in Limpopo through the Mpumalanga Escarpment to central Eswatini; in short, montane grassland.

Geographically separated from subsp. *albescens*, subsp. *moggii* has a narrower, glaucous foliage leaf 4–10 mm wide and not obviously ribbed, particularly well-developed cataphylls, the uppermost usually exceeding 15 mm, and uniformly yellow flowers. Late flowering, subsp. *moggii* blooms from late February to April, later than subsp. *albescens,* which typically flowers from December to February.

114b. subsp. **albescens** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 239 (1973). Type: South Africa, [Mpumalanga], Wakkerstroom, Tafelkop, *Mauve & Tölken 4524* (PRE, holo.; BOL, iso.).

Cataphylls: uppermost usually < 100 mm long (rarely > 150 mm). *Foliage leaf* 10–15 mm wide, light green to slightly glaucous, veins often prominent even in fresh material. *Flowers* white to creamy yellow, veined green, purple or brown; style branches and crests often suffused with purple. *Flowering time*: December to February, occasionally later.

Distribution and ecology: extending from Wakkerstroom in southern Mpumalanga to Melmoth and Stanger in KwaZulu-Natal; in well-watered montane and coastal grassland.

Diagnosis: subsp. *albescens* can only with some difficulty be distinguished from subsp. *moggii* and even subspecies rank may be undeserved. The white to creamy yellow, slightly smaller flowers, shorter cataphylls, and a broader foliage leaf 10–15 mm long, relatively prominently veined separate it from subsp. *moggii*. Associated with these features is flowering time from December to February, with subsp. *moggii* flowering later, mainly March and April, occasionally in February.

115. **Moraea huttonii** *(Baker) Oberm.* in Flowering Plants of Africa 40: t. 1581 (1970a); Goldblatt: 256 (1973). *Dietes huttonii* Baker: t. 6174 (1875). Type: South Africa, [Eastern Cape], without precise locality, *Hutton s.n.* (K, holo.).

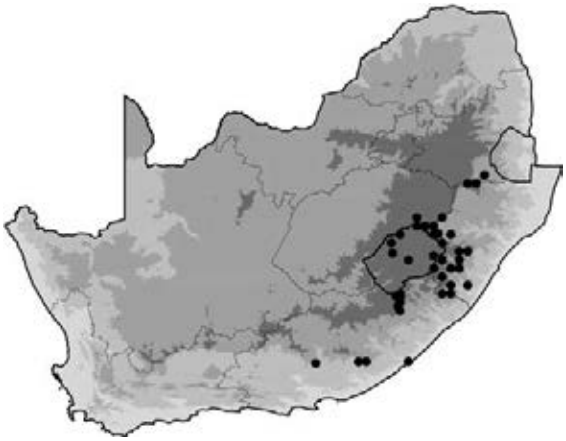
Moraea baurii Baker: 50 (1892). Type: South Africa, [Eastern Cape], Baziya, along streams, *Baur 247* (K, holo.).

Moraea rivularis Schltr.: 90 (1907). Type: South Africa, [KwaZulu-Natal], Ifafa, *Rudatis 100* (B, holo.).

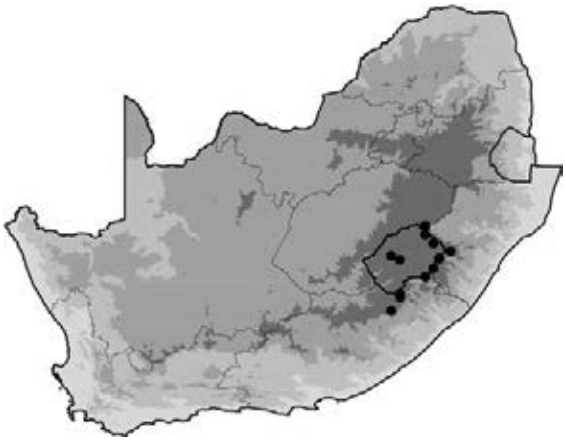
Plants 0.8–1.1 m high, growing in clumps. *Corm* ± 15–20 mm diam.; tunics, soft, ± entire or ± fibrous, brown. *Stem* sheathed by brown cataphylls rarely becoming fibrous distally, simple or bearing 1 or 2 short to ± sessile branches held close to main axis; sheathed entirely or almost so by 5 or 6 sheathing leaves, these green with dry, brown tips. *Foliage leaf* solitary, linear, usually exceeding stem, 5–10(–25) mm wide, ± flat to widely or rarely narrowly channelled. *Rhipidial spathes* green, with dry acute tips, inner 80–140 mm long, outer ± $^{3}/_{4}$ as long. *Flowers* long-lived, yellow, outer tepal limbs with large, deep yellow nectar guides at bases and a dark, brown to purple crescent at bases of style crests, sweetly scented; outer tepals oblanceolate, 45–55 × ± 20 mm, claws ± $^{1}/_{3}$ as long as limbs, inner tepals lanceolate 40–45 mm long, erect. *Filaments* ± 13 mm long, united in lower $^{1}/_{3}$–$^{1}/_{2}$; anthers 7–9 mm long. *Ovary* ± 15 mm long, ± cylindric; style branches ± 15 × 8 mm, crests 10–13 mm long. *Capsules* oblong-cylindric, ± 30 mm long. *Seeds* flattened, triangular to discoid. *Chromosome number* $2n = 12$. *Flowering time*: spring to early summer.

Distribution and ecology: widespread in eastern southern Africa, extending from the Boschberg and Winterberg to Kentani in Eastern Cape, South Africa, through Lesotho and KwaZulu-Natal to extreme southern Mpumalanga, also in eastern Free State; in wet places along streams and the edges of marshes.

Diagnosis: apart from its unusual habitat, *Moraea huttonii* is distinguished among the several yellow-flowered



Distribution of ***Moraea huttonii***.



Distribution of ***Moraea alticola***.

species of the subgenus by the conspicuous purple to brown blotches on the style crests. The flowers are typical of subg. *Grandiflorae* in their large size, yellow colour and well-developed style branches and crests. Plants typically grow in clumps, as does the related *M. spathulata*, but *M. huttonii* usually has narrower leaves mostly 4–10 mm wide (rarely to 25 mm) and usually deeply channelled. Unlike most species of the subgenus, stems of *M. huttonii* are occasionally branched from the upper nodes.

116. **Moraea alticola** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 255 (1973); Goldblatt: 210 (1986a). Type: South Africa, [KwaZulu-Natal], Drakensberg, Mont-aux-Sources, *Schweickerdt s.n.* (PRE [28588], holo.; NH, iso.).

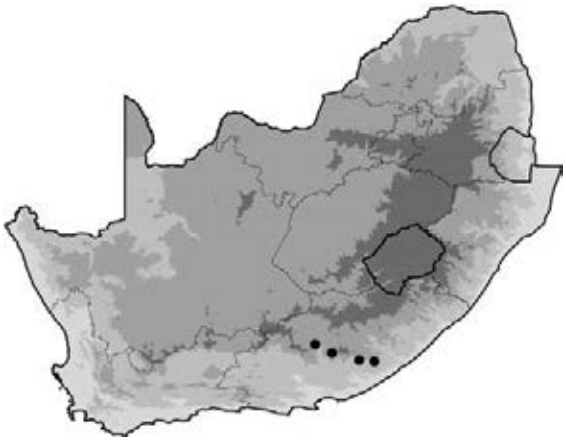
Plants up to 1 m high, forming clumps, evergreen. *Corm* 15–20 mm diam.; tunics of coarse, brown fibres. *Stem* sheathed by brown cataphylls, uppermost forming a pale, well-developed fibrous network, simple or with 1 or 2 short branches or sessile rhipidia at upper nodes, enclosed by 3 to 5 overlapping sheathing leaves 140–180 mm long, green with dry, light brown tips. *Foliage leaf* exceeding stem, flat or shallowly channelled, 14–25 mm wide, erect below, trailing distally, margin often thickened and hyaline. *Rhipidial spathes* green, usually with dry, brown apices, inner 120–150 mm long, outer ± equal or slightly shorter. *Flower* long-lived, pale, watery yellow, outer tepal limbs with small darker yellow nectar guides at bases, reflexed to ± 40°; outer tepals 50–80 × 25–40 mm, claws 20–30 mm long, ± erect, inner tepals 50–70 mm long, ± erect. *Filaments* ± 20 mm long, united in lower half, anthers ± 15 mm long, pale yellow; pollen white. *Ovary* cylindric, 20–30 mm long; style branches 18–20 mm long, crests ± 15 mm long. *Capsules* ± cylindric-3-lobed, 30–45 mm long. *Chromosome number* 2*n* = 12. *Flowering time*: mainly December to February, occasionally from October to March.

Distribution and ecology: restricted to the plateau and upper slopes of the Drakensberg in KwaZulu-Natal and Eastern Cape, South Africa, and Lesotho; in rocky grassland.

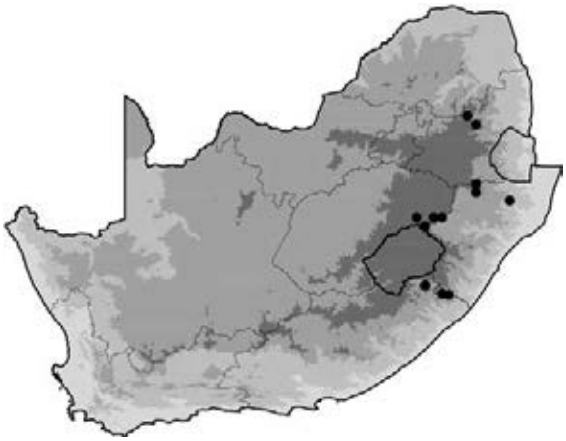
Diagnosis: a clump-forming species, *Moraea alticola* is distinguished by its habit and broad, more-or-less plane foliage leaf 14–15 mm wide, both features shared with *M. spathulata*. Despite its occurrence in an alpine area, at high elevations in the Drakensberg, it is easily the largest, most robust species in the genus. Although size alone makes *M. alticola* easy to recognise it is also distinctive in its uppermost cataphyll, which forms a well developed, pale, basket-like network well above the ground. Similar net-like cataphylls are found in some other species of subg. *Grandiflorae* but never as well developed. The pale, watery yellow flowers have rather narrow nectar guides on the outer tepals, unlike the large, yellow to orange nectar guides of most of the many forms of *M. spathulata*.

117. **Moraea reticulata** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 249 (1973); Goldblatt: 212 (1986a). Type: South Africa, [Eastern Cape], Katberg Pass, Mar. 1972, *Goldblatt 682* (BOL, holo.; MO, PRE, iso.).

Plants 450–700 mm high, solitary, rarely in small clumps, possibly evergreen. *Corm* up to 20 mm diam.; tunics of medium-textured fibres. *Stem* sheathed below by pale fibrous cataphyll up to 200 mm long forming a basket-like network, unbranched (rarely with a sessile lateral rhipidium), covered by 3 or 4 overlapping sheathing leaves, 120–150 mm long, green or becoming dry distally. *Foliage leaf* solitary, linear, channelled to ± flat, much exceeding stem, 12–15 mm wide, suberect, later trailing distally. *Rhipidial spathes* green with dry brown tips, inner 120–150 mm long, outer slightly shorter. *Flowers* long-lived, bright yellow, outer tepal limbs with large, orange nectar guides at bases, reflexed to ± 45°; outer tepals 65–70 × 25 mm; inner tepals 50–60 × 15 mm, ± erect. *Filaments* ± 13 mm long, united in lower $^1/_2$; anthers ± 15 mm long, white; pollen white. *Ovary* cylindric, 20–30 mm long; style branches ± 20 mm long, crests 15–18 mm long. *Capsules* cylindric-3-lobed, 30–40 mm long. *Seeds* flattened, discoid. *Flowering time*: March to May.



Distribution of ***Moraea reticulata***.



Distribution of ***Moraea robusta***.

Distribution and ecology: restricted to central Eastern Cape, South Africa, in the Amatole, Hogsback and Elandsberg Mtns, from Bedford to near Cathcart; on seasonally moist grassy slopes.

Diagnosis: allied to the widespread *Moraea spathulata*, the flowers of *M. reticulata* are almost identical in size and general aspect but the plants themselves differ in being almost invariably solitary. *Moraea spathulata* occurs in the same areas as *M. reticulata* but blooms from November to January, whereas *M. reticulata* flowers later, from March to May. The species is also recognised by the distinctive cataphylls, the uppermost of which extends well above the ground as a grey or brown basket-like network around the base of the leaf and stem. Occasionally also seen in *M. spathulata*, the cataphylls are never as prominently developed.

118. **Moraea robusta** *(Goldblatt) Goldblatt* in Annals of the Missouri Botanical Garden 69: 368 (1982); Goldblatt: 214 (1986a). *M. galpinii* subsp. *robusta* Goldblatt: 248 (1973). Type: South Africa, [KwaZulu-Natal], Utrecht, Naauwhoek, *Devenish 109* (PRE, holo.).

Plants up to 400 mm high, solitary or in small clumps. *Corm* 10–18 mm diam.; tunics of coarse, brown fibres. *Stem* sheathed below by dark brown to black, fairly rigid vertical fibres often reaching above ground, unbranched, enclosed by 3 to 8 overlapping sheathing leaves 70–100 mm long. *Foliage leaf* solitary, ultimately much exceeding stem and trailing distally, channelled to flat, 4–10 mm wide or with margins tightly inrolled, then narrowly channelled adaxially, and 2.5–3.0 mm diam. (± 5 mm wide when opened flat), much exceeding stem but ultimately trailing distally. *Rhipidial spathes* green with dry brown tips, slightly inflated, inner 90–120 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* lasting 3 days, pale yellow to ± white, outer tepal limbs with yellow nectar guides at bases, laxly spreading, sweetly scented; outer tepals 55–65 × 22–26 mm, limbs up to 40 mm long, acute; inner tepals lanceolate, 50–58 × 12–15 mm long, ± retuse, limbs laxly spreading to half reflexed. *Filaments* 10–15 mm long, united in lower $^{2}/_{3}$; anthers 10–14 mm long, yellow or white. *Ovary* cylindric, 12–16 mm long; style branches ± 15 mm long, crests 7–18 mm long. *Capsules* narrowly ellipsoid, 25–45 × ± 10 mm, tapering and narrowed in upper 4 mm into a beak. *Seeds* angular-prismatic, 2.5–3.0 mm at longest axis, in two rows per locule. Flowering time: August to November, later at higher elevations.

Distribution and ecology: South Africa, extending from Machadodorp to Wakkerstroom in Mpumalanga through eastern Free State to southern KwaZulu-Natal; on rocky mountain slopes up to 2 500 m elevation.

Diagnosis: like its apparent close relative, *Moraea galpinii*, *M. robusta* has distinctive coarsely fibrous corm tunics forming a collar around the stem base but it differs from *M. galpinii* in its larger, white or pale yellow flowers with the limbs of both the inner and outer tepals at length spreading to laxly reflexed, the outer tepals 55–65 mm long vs. ± 40 mm in *M. galpinii*. The leaf is channelled and wider than in *M. galpinii,* 4–10 mm wide but in some populations the margins are closely inrolled. Populations on the slopes of The Sentinel in the northern KwaZulu-Natal Drakensberg have the upper portion dry and broken suggesting emergence before winter, whereas the lower portions are green, evidently having emerged in the spring. The narrowly ellipsoid capsules are up to 45 mm long and up to 10 mm at the widest. The capsules contain numerous angular seeds arranged in two rows per locule. The narrow capsules with a prominent beak and angular seeds stand in marked contrast to the ± ovoid capsules and flattened, discoid seeds of *M. spathulata* and other species of the subgenus for which these characters are known.

119. **Moraea galpinii** *(Baker) N.E.Br.* in Transactions of the Royal Society of South Africa 17: 346 (1929b); Obermeyer: t. 1582 (1970b); Goldblatt: 246 (1973); Goldblatt: 213 (1986a). *M. spathacea* var. *galpinii* Baker: 14 (1896). Type: South Africa, [Mpumalanga], Saddleback Range, *Galpin 459* (K, holo.; BOL, PRE, iso.).

Plant up to 300 mm high, solitary or forming small clumps. *Corm* 15–18 mm diam.; tunics of coarse, dark brown fibres, often accumulating in a dense mass. *Stem* sheathed below by dark brown cataphylls, with age forming a collar of ± black, rigid vertical fibres around base, unbranched, enclosed by (2)3(4), ± overlapping sheathing leaves 50–70 mm long, green with dry, brown tips. *Foliage leaf* absent or emergent at flowering time, ultimately exceeding stem, narrowly channelled with margins tightly folded together, seeming terete but with narrow adaxial groove, ± 2.5–3.5 mm diam. *Rhipidial spathes* green with dry, brown tips, inner 90–110 mm long, outer ± ¾ as long. *Flowers* long-lived, yellow, outer tepal limbs with orange-gold nectar guides at bases, reflexed to ± 40º; outer tepals lanceolate, ± 40– 50 × 18–22 mm, claws suberect, ± ⅔ as long as limbs; inner tepals narrowly lanceolate, erect, ± 35 × 10 mm, obtuse to retuse. *Filaments* up to 8 mm long, united in lower ⅔; anthers 7–9 mm long. *Ovary* cylindric, ± 10 mm long; style branches ± 7 mm long, crests 10–15 mm long. *Capsules* cylindric-3-lobed, up to 25 mm long. *Seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: August to early October.

Distribution and ecology: a narrow endemic of the northern Mpumalanga Drakensberg in the Mt Anderson area, South Africa; on stony slopes, flowering late in the dry season when the single, narrow foliage leaf is just emerging from the ground.

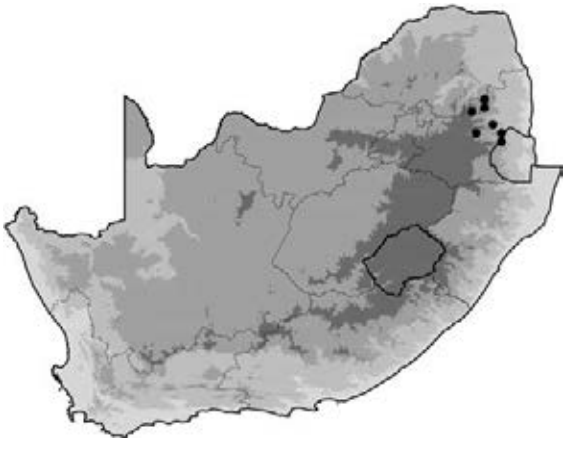
Diagnosis: the rare *M. galpinii* is distinguished by the single, slender foliage leaf, usually barely emergent at flowering time but ultimately exceeding the stem. The blade appears at first to be terete but has a narrow adaxial groove separating the two closely appressed leaf halves. The flowers, fairly typical of subg. *Grandiflorae*, are bright yellow and have outer tepals 40–50 mm long with spreading limbs and erect inner tepals ± 35 mm long. Particularly distinctive is the collar of hard, blackish vertical fibres enclosing the base of the stem and extending a short distance above ground. This feature is shared with *M. robusta,* which is distinguished by paler, larger flowers with erect to spreading inner and outer tepal limbs. Young plants not yet of flowering age have rather soft, unbroken ± membranous cataphylls.

120. **Moraea muddii** *N.E.Br.* in Transactions of the Royal Society of South Africa 27: 346 (1929b); Goldblatt: 239 (1973) & 198 (1986a). Type: South Africa, [Mpumalanga], MacMac Creek, *Mudd s.n.* (K, holo.).

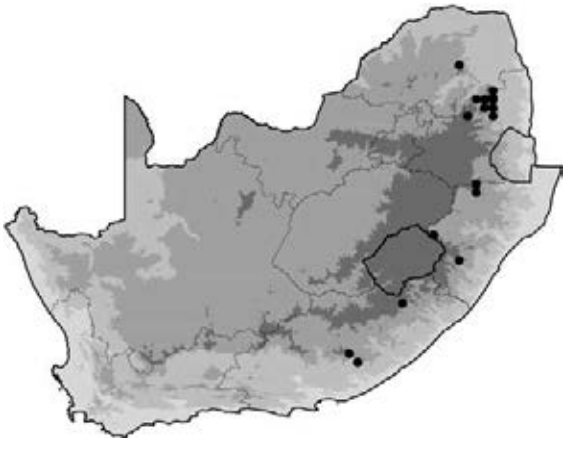
Plants 150–450(–700) mm, solitary. *Corm* ± 15 mm diam.; tunics brown, softly fibrous. *Stem* sheathed by irregularly broken, brown cataphylls, unbranched, enclosed by 2 or 3 ± overlapping sheathing leaves 80–120 mm long, green with dry, brown tips. *Foliage leaf* solitary, linear, channelled, mostly 5–6 mm wide, ultimately exceeding stem. *Rhipidial spathes* green with dry, brown tips, inner 70–120 mm long, outer ± ⅔ as long. *Flowers* long-lived, pale yellow, outer tepal limbs with deeper yellow nectar guides at bases, spreading to half reflexed; outer tepals 35–50 × 12–20 mm, claws 15–20 mm long; inner tepals lanceolate, erect, 35–40 × 5–7 mm. *Filaments* ± 10 mm long, united in lower ⅔; anthers ± 9 mm long, white; pollen white. *Ovary* ± cylindric, ± 15 mm long; style branches ± 13 mm long, crests erect, ± 10 mm long. *Capsules* ovoid-oblong, 18–22 mm long, on elongate pedicels up to 300 mm long. *Seeds* flattened, disc-shaped, with spongy testa, in a single row per locule. *Chromosome number* unknown. *Flowering time*: October to December, sometimes later.

Distribution and ecology: occurring in the mountains of summer-rainfall eastern South Africa, extending from Haenertsburg in Limpopo through Mpumalanga to KwaZulu-Natal, with isolated populations in the Amatole Mtns of Eastern Cape; on grassy slopes and flats.

Diagnosis: one of the smallest of the yellow-flowered species of subg. *Grandiflorae, Moraea muddii* stands 150–600 mm tall and is normally a solitary plant with soft, brown, irregularly broken cataphylls. The pale yellow flowers have tepals up to 50 mm long, thus of moderate size for the subgenus. Similar *M. unibracteata* is also of relatively low stature but has slightly smaller



Distribution of ***Moraea galpinii***.



Distribution of ***Moraea muddii***.

flowers and is easily distinguished by its single sheathing leaf inserted in the upper part of the stem, leaving the lower half visible vs. two or three overlapping sheathing leaves in *M. muddii*.

Plants from Eastern Cape flowering somewhat later in the season and currently included in *M. muddii* probably represent a separate subspecies or even species but too little is known about them to permit an informed decision about their status. The leaves stand out in having a V-shaped keel instead of the rounded keel elsewhere in subg. *Grandiflorae*.

121. **Moraea ardesiaca** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 243 (1973); Goldblatt: 202 (1986a). Type: South Africa, [KwaZulu-Natal], Royal Natal National Park, *Trauseld 84* (PRE, holo.).

Plants 500–700 mm high, usually solitary. *Corm* ± 15 mm diam.; tunics of medium-textured, netted fibres. *Stem* sheathed below by light brown, broken cataphylls, unbranched, partly covered by sheathing leaves 2(3), ± 100 mm long, lower part often exposed. *Foliage leaf* linear, channelled, usually exceeding stem, 5–10(–25) mm wide. *Rhipidial spathes* grey-green with light brown tips, inner 90–140 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* long-lived, slate-blue to pale blue-mauve, outer tepal limbs with linear, pale yellow nectar guides at bases, half reflexed; outer tepals 65–75 × 25–35 mm, limb 45–50 mm long; inner tepals 50–60 mm long. *Filaments* 8–10 mm long, united in lower half; anthers 10–12 mm long, as long or longer than filaments. *Ovary* cylindric, up to 25 mm long; style branches ± 15 mm long, crests 15–20 mm long. *Capsules* cylindric-3-lobed, ± 20 mm long, shortly beaked. *Seeds* unknown. *Flowering time*: November to January.

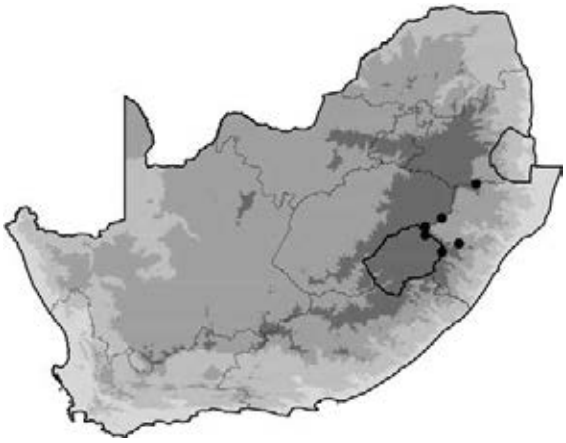
Distribution and ecology: restricted to the northern Drakensberg of KwaZulu-Natal and adjacent Free State, South Africa, from Van Reenen to Lotheni and with an outlying population in the vicinity of Utrecht; occurring along streams and drainage lines at elevations of 1 800–2 200 m.

Diagnosis: the only blue-flowered member of subg. *Grandiflorae* in southern Africa, *Moraea ardesiaca* is immediately recognised by the large flowers either slate-blue to blue-mauve. Confusion with *M. carnea* is possible but this species has pale pink flowers with darker pink to purple style crests and smaller, narrower tepals 55–60 mm long vs. 65–70 mm in *M. ardesiaca*. *Moraea carnea* also occurs along streams on open slopes at relatively high elevations, usually above 2 300 m, whereas *M. ardesiaca* is generally found at lower elevations along streams and drainage lines.

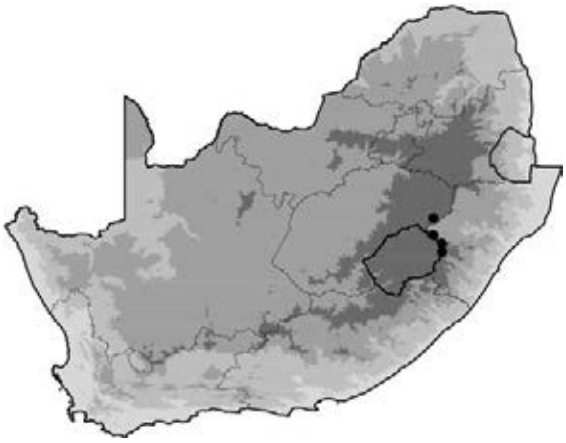
122. **Moraea carnea** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 242 (1973); Goldblatt: 200 (1986a). Type: South Africa, [KwaZulu-Natal], Giants Castle, *Trauseld 481* (PRE, holo.; CPF, NU, iso.).

Plants 400–500 mm high, solitary. *Corm* ± 15 mm diam.; tunics of moderately fine fibres. *Stem* sheathed below by irregularly broken brown cataphylls, unbranched, bearing 3 or 4 overlapping sheathing leaves 40–80 mm long, green with dry acuminate apices. *Foliage leaf* linear, longer than stem, 5–6 mm wide, channelled, erect or bent and trailing distally. *Rhipidial spathes* green with brown attenuate tips, inner 70–100 mm long, outer ± $^{2}/_{3}$ as long. *Flower* long-lived, yellowish pink to creamy pink with dark pink to brown veins, outer tepal limbs with yellow nectar guides at bases edged with dark pink and style crests uniformly deep pink to purple; outer tepals 55–60 × 20–25 mm, claws ± 25 mm long, limbs laxly spreading; inner tepals 45–50 × 10 mm, suberect. *Filaments* 10–12 mm long, united in lower $^{2}/_{3}$, diverging above; anthers ± 10 mm long. *Ovary* ± cylindric, ± 20 mm long; style branches 15–17 mm long, crests up to 15 mm long. *Capsules* cylindric-3-lobed, ± 25 mm long, shortly beaked. *Seeds* unknown. *Flowering time*: mainly November and December.

Distribution and ecology: a narrow endemic of the northern and central KwaZulu-Natal Drakensberg, South Africa, and adjacent Lesotho, recorded from Witsieshoek to Sani Pass; at relatively high elevations, mostly above 2 000 m in grassland and cliffs along streams.



Distribution of ***Moraea ardesiaca***.



Distribution of ***Moraea carnea***.

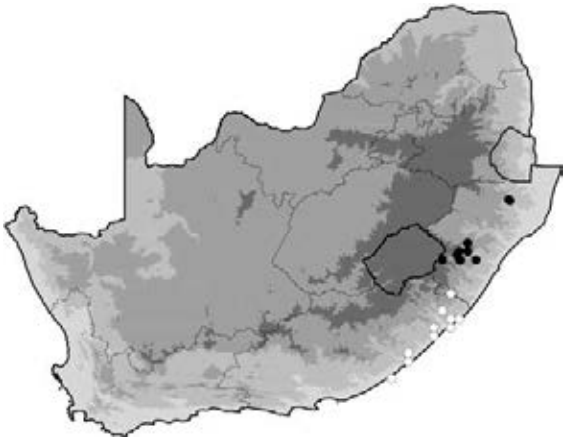
Diagnosis: among the smallest of the southern Africa species of subg. *Grandiflorae*, *Moraea carnea* stands no more than 500 mm high. It is also the only pink- to creamy pink-flowered species of the subgenus and is also unusual in having darker pink to purple style crests and sometimes darker inner tepals. *Moraea ardesiaca* is a larger plant up to 700 mm tall with larger, slate-blue to blue-mauve flowers. The two species also differ in relative anther length, shorter than the filaments in *M. carnea* but longer than the filaments in *M. ardesiaca*.

123. **Moraea graminicola** *Oberm.* in Flowering Plants of Africa 39: t. 1526 (1968); Goldblatt: 244 (1973); Goldblatt: 203 (1986a). Type: South Africa, [KwaZulu-Natal], Clovelly Farm, Mooi River, *Mauve 4466* (PRE, holo.; BOL, iso.).

Plants 250–600 mm high, solitary. *Corm* up to 15 mm diam.; tunics of medium-textured fibres, sometimes extending upward in a collar around base. *Stem* sheathed below by light brown cataphylls, simple (rarely branched in subsp. *notata*), enclosed by 1 or 2 (subsp. *graminicola*) or 3 (subsp. *notata*), overlapping, green, attenuate sheathing leaves 120–150 mm long. *Foliage leaf* usually shortly exceeding stem at flowering time, linear, channelled, 7–25 mm wide. *Rhipidial spathes* green entirely or with dry brown apices, inner 140–180 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* long-lived, pale yellow to grey conspicuously veined with mauve, especially on crests, these sometimes mauve at base, outer tepal limbs with yellow nectar guides at bases; outer tepals ovate with narrow, tapering claws, 60–75 × ± 30 mm, claws ± $^{2}/_{3}$ as long as limbs, inner tepals lanceolate, 40–45 × ± 15 mm, erect. *Filaments* 8–12 mm long, united in lower half; anthers ± 13 mm long. *Ovary* cylindric, ± 20 mm long; style branches ± 20 mm long, crests erect, 10–15 mm long, erect. *Capsules* cylindric-3-lobed, 25–30 mm long. *Seeds* flattened, discoid. *Chromosome number* 2*n* =12. *Flowering time*: August to November (subsp. *graminicola*), September to December (January) (subsp. *notata*).

Distribution and ecology: occurring at middle elevations from Ngome in northern KwaZulu-Natal to near East London in Eastern Cape, South Africa; in open grassland, flowering early in the season.

Diagnosis: *Moraea graminicola* is recognised by its solitary habit and relatively large flowers with the outer tepals 60–75 mm long. Populations from KwaZulu-Natal are usually only 250–400 mm high and the stem bears a single sheathing leaf but Eastern Cape populations, treated as subsp. *notata*, are usually taller, up to 600 mm high, with two or three sheathing leaves, and the style crests stained with mauve near the bases, thus bicoloured. Subsp. *graminicola* may be confused with *M. unibracteata* which also has a single sheathing leaf and flowers early in the season but in *M. unibracteata* the foliage leaf is 2–10 mm wide, the sheathing leaf is inserted close to the base of the inflorescence, leaving the lower part of the stem visible, and the flowers are smaller than those of subsp. *graminicola*, the lower tepals 30–45 mm long and anthers 7–9 mm long vs. ± 13 mm in *M. graminicola*.



Distribution of ***Moraea graminicola*** subsp. ***graminicola***, ●; subsp. ***notata***, ○.

Key to subspecies

1a Sheathing leaves 1 or 2; style crests uniformly yellow; occurring in KwaZulu-Natal . . . . . 123a. subsp. *graminicola*

1b Sheathing leaves 3; style crests darkly blotched at base; occurring in Eastern Cape. . . . .123b. subsp. *notata*

123a. subsp. **graminicola**

Plants seldom exceeding 450 mm. *Stem* unbranched, bearing 1 or 2 overlapping bract leaves. *Flowers* pale yellow to grey, veined with mauve; style crest sometimes flushed a pale mauve, but not darkly marked at the base. *Flowering time*: August to November.

Distribution and ecology: restricted to central KwaZulu-Natal, from Ngome in the north to Nottingham Road and Underberg in the south.

123b. subsp. **notata** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 245 (1973). Type: South Africa, [Eastern Cape], Transkei, east of Libode, *Codd 10691* (BOL, holo.; PRE, iso.).

Plants 400–600 mm high, more robust than subsp. *graminicola*. *Stem* usually simple, occasionally branched, bearing 3 sheathing leaves. *Flowers* pale yellow to creamy white; style crest marked dark brown to mauve at base. *Flowering time*: September to January.

Distribution and ecology: Eastern Cape, mainly northern parts but extending from Umtata and Port St Johns south to East London.

Resembling subsp. *graminicola* in most features, particularly the pale, truncate, submembranous cataphylls and pale yellow, darkly veined tepals, subsp. *notata* usually flowers later in the year, is more robust and has unusual dark markings at the bases of the style crests. More investigation is needed before its taxonomic status is confirmed. There is an unusual break in the range

of *M. graminicola*, with subsp. *graminicola* occurring in northern and central KwaZulu-Natal and subsp. *notata* restricted to Eastern Cape south of Umtata and Port St Johns.

124. **Moraea hiemalis** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 248 (1973); Goldblatt: 204 (1986a). Type: South Africa, [KwaZulu-Natal], Lions River, *Obermeyer s.n.* (PRE [33562], holo.).

Plants mostly 380–450 mm high, solitary. *Corm* ± 10 mm diam.; tunics not known. *Stem* sheathed below by brittle, entire, or irregularly broken cataphylls ribbed silver and purple below, unbranched, covered by (3)4 or 5 usually overlapping sheathing leaves 12–14 mm long. *Foliage leaf* solitary, exceeding stem, terete with narrow adaxial groove, ± 5 mm diam. *Rhipidial spathes* green with dry, brown tips, inner 80–140 mm long, outer ± as long or slightly shorter. *Flowers* probably long-lived, deep yellow, tepals often ± darkly veined, outer tepal limbs with darker yellow nectar guides at bases; outer tepals 45–50 × ± 24 mm, claws ± $^{2}/_{3}$ as long as limbs; inner tepals ± 40 × 15 mm long, ascending to erect. *Filaments* ± 8 mm long, united in lower $^{2}/_{3}$; anthers ± 10 mm long, yellow. *Ovary* cylindric, ± 15 mm long; style branches ± 13 mm long, crests ± 10 mm long. *Capsules* cylindric-3-lobed, 20–25 mm long. *Chromosome number* unknown. *Flowering time*: July and August.

Distribution and ecology: restricted to central KwaZulu-Natal, South Africa; in dry grassland.

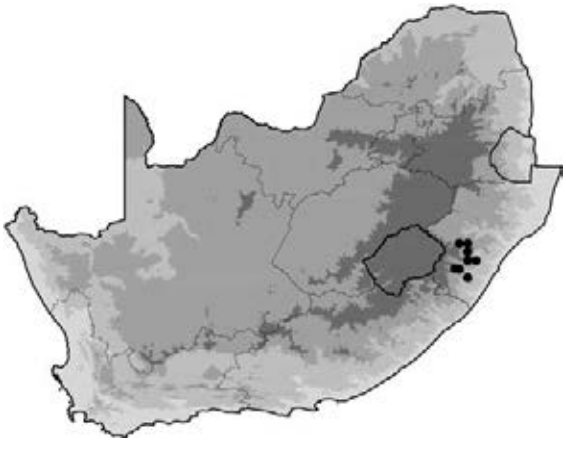
Diagnosis: a particularly distinctive member of the *Moraea spathulata* complex, *M. hiemalis* is unusual in flowering in winter, July and August. It is distinguished by its cylindrical leaf with the margins tightly inrolled, and its solitary habit. The plants are also generally smaller in most features than typical *M. spathulata* and its immediate allies, the outer tepals 45–50 mm long and the inner ± 40 mm long.

125. **Moraea unibracteata** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 241 (1973); Goldblatt: 200 (1986a). Type: South Africa, [KwaZulu-Natal], Nottingham Road, *Galpin 9457* (PRE, holo.; CPF, NU, iso.).

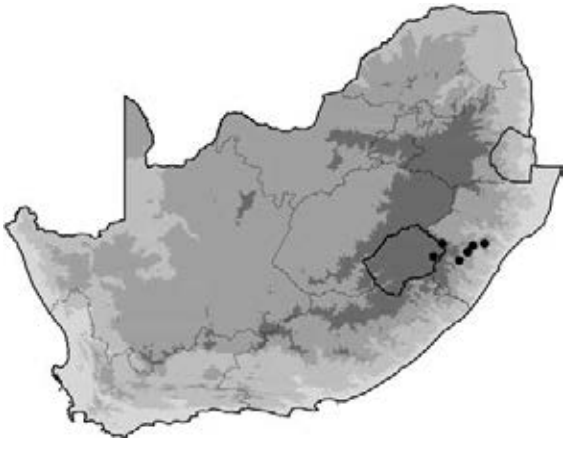
Plants up to 350 mm high, solitary. *Corm* ± 10 mm diam.; tunics of fine, pale fibres. *Stem* sheathed below by brown cataphylls, unbranched, bearing a single, green sheathing leaf inserted in upper part of stem, often overlapping rhipidial spathes, lower part of stem exposed. *Foliage leaf* solitary, shortly exceeding stem, channelled, (2–)4–10 mm wide. *Rhipidial spathes* green, apices dry and brown, inner spathe 60–80 mm long, outer ± $^{3}/_{4}$ as long. *Flowers* ?long-lived, pale yellow to nearly white (sometimes drying pale blue), when dry veined with purple, outer tepal limbs with darker yellow nectar guides at bases, spreading to half reflexed; outer tepals lanceolate, 30–45 mm long, claws suberect, ± $^{2}/_{3}$ as long as limbs; inner tepals 30–40 mm long, narrowly lanceolate, ± erect. *Filaments* ± 8 mm long, united in lower half; anthers 7–9 mm long, yellow. *Ovary* 15–18 mm long; style branches ± 10 mm long, crests 10–13 mm long. *Capsules* and *seeds* unknown. *Chromosome number* unknown. *Flowering time*: October to November.

Distribution and ecology: restricted to the Midlands and lower elevations of the Drakensberg in KwaZulu-Natal, South Africa; in montane grassland.

Diagnosis: poorly known, *Moraea unibracteata* is one of the smallest members of subg. *Grandiflorae.* It can always be recognised by the stem bearing a single sheathing leaf, this inserted in the upper half of the stem and usually reaching or overlapping the rhipidial spathes. The pale yellow to almost white flowers are unremarkable in the subgenus, although relatively small, with outer tepals 30–45 mm long and anthers 7–9 mm long. The tepals are reported to have dark veins, especially evident when dry.



Distribution of ***Moraea hiemalis***.



Distribution of ***Moraea unibracteata***.

Subg. 10. **Vieusseuxia**

Subg. **Vieusseuxia** *(D.Delaroche) Baker*, Handbook of the Irideae: 48 (1892). *Vieusseuxia* D.Delaroche: 31 (1766). Type: *V. spiralis* D.Delaroche, lecto., designated by Goldblatt: 8 (1976b) = *Moraea bellendenii* (Sweet) N.E.Br.

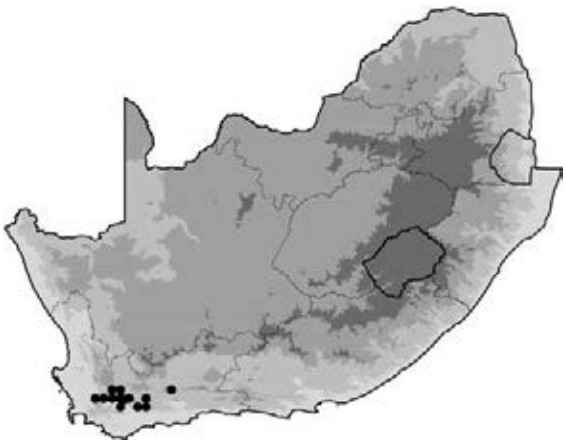
Sect. 11. **Integres** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 39 (2013). Type: *Moraea thomasiae* Goldblatt

Plants often unbranched. *Foliage leaf* solitary, basal. *Flowers* yellow, inner tepals spathulate, entire; filaments free or barely united at base; style branches united to style only near base.

126. **Moraea thomasiae** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 20 (1976b); Goldblatt: 138 (1986a). Type: South Africa, [Western Cape], Worcester, Karoo Garden, *Goldblatt 2422* (NBG, holo.; BOL, K, MO, PRE, S, iso.).

Plants slender, 150–300 mm high. *Corm* ± 10 mm diam.; tunics of firm, pale to dark brown fibres. *Stem* mostly 3 internodes long, rarely with 1 branch, sheathing leaves green with dry attenuate tips, 35–40 mm long. *Foliage leaf* solitary, ± basal, linear, channelled, 3–6 mm wide, exceeding stem, ± erect or trailing distally. *Rhipidial spathes* green with dry, brown attenuate apices, inner 35–60 mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, pale yellow often with conspicuous dark veins, outer tepal limbs with large deep yellow nectar guides at bases, usually edged dark brown, half reflexed; outer tepals 26–35 mm long, claws narrow, 12–15 mm long; inner tepals narrowly lanceolate, initially erect, limbs later spreading, 18–22 mm long. *Filaments* 4–5 mm long, free almost to base; anthers ± 6 mm long, brown; pollen yellow. *Ovary* narrowly ovoid, 8–11 mm long; style branches 12–15 mm long, crests ± linear, 7–10 mm long. *Capsules* ellipsoid, 12–15 mm long. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: August to middle September.

Distribution and ecology: a fairly narrow endemic of Western Cape, South Africa, extending from the foothills of the Brandwag Mtns near Worcester eastward to Robertson and from the Waboomsberg near Koo to Barrydale; typically on cooler and moister south-facing shale and clay slopes.



Distribution of ***Moraea thomasiae***.

Diagnosis: superficially like *Moraea angusta* (subg. *Monocephalae*) in its pale yellow flowers with lanceolate, entire inner tepals, stamens united only near the base, and unbranched stem, *M. thomasiae* otherwise has a single channelled leaf inserted near the stem base and long-lasting flowers. These two features, as well as the chromosome number, 2*n* = 12, accord best with subg. *Vieusseuxia* and molecular phylogenetic studies also place *M. thomasiae* among the species of this subgenus but without close relatives. Most other species of the subg. *Vieusseuxia* have reduced inner tepals, most often with 3-lobed limbs, sometimes a linear cusp, or even lacking. On the basis of the entire inner tepals and yellow flowers, also unusual in the subgenus, *M. thomasiae* is placed in a separate section.

Sect. 12. **Vieusseuxia** *(D.Delaroche) Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 39 (2013). *Vieusseuxia* D.Delaroche: 31 (1766). Type: *Moraea bellendenii* (Sweet) N.E.Br.

Foliage leaf usually solitary (not *M. fergusoniae,* some *M. tripetala* subsp. *violacea*). *Flowers* mostly blue to violet or purple, sometimes pink, orange, maroon, white, rarely yellow; inner tepals often tricuspidate, hair-like and linear, sometimes absent, or entire; filaments usually united in lower half to entirely, barely united at base or rarely free.

127. **Moraea incurva** *G.J.Lewis* in South African Gardening and Country Life 23: 167 (1933a); Goldblatt: 144 (1986a). Type: South Africa, [Western Cape], between Wellington and Tulbagh, *K. Stanford s.n.* (BOL [20185], holo.).

Plants slender, 250–400 mm high, often with fibrous collar around base. *Corm* ± 15 mm diam.; tunics of dark brown fibres. *Stem* usually unbranched, 3 or 4 internodes long, sheathing leaves, green with dry attenuate apices, 40–45 mm long. *Foliage leaf* solitary, basal, linear, narrowly channelled or margins inrolled and sometimes seeming terete, ± 2 mm diam. (± 3.5 mm wide when opened flat), longer than stem and trailing distally.

Rhipidial spathes with dry, attenuate apices; inner 40–70 mm long, outer ± $^1/_2$ as long. *Flower* long-lasting, pale blue-mauve to violet, outer tepal limbs with yellow nectar guides at bases edged dark blue, reflexed ± 45°, curling inward near tips; outer tepals lanceolate, 25–32 × 9–11 mm long, claws ascending, 10–12 mm long, velvety, limb ± 20 mm long, inner tepals either ± lanceolate and entire, attenuate or 3-lobed with rounded lateral lobes and linear central lobe, 18–20 × 4–6 mm, ± erect, curving inward distally. *Filaments* 10–13 mm long, united in a slender, almost smooth or puberulous column, free in upper ± 2 mm; anthers 3–4 mm long, slightly exceeding stigma lobes, displayed above tepal limbs, violet; pollen orange. *Ovary* narrowly ovoid, ± 10 mm long, sometimes included; style branches ± 4 mm long, crests ± 4 mm long, erect. *Capsules* ellipsoid, 15–17 mm long. *Seeds* angular, prismatic. *Flowering time*: October to November, as late as January at higher elevations.

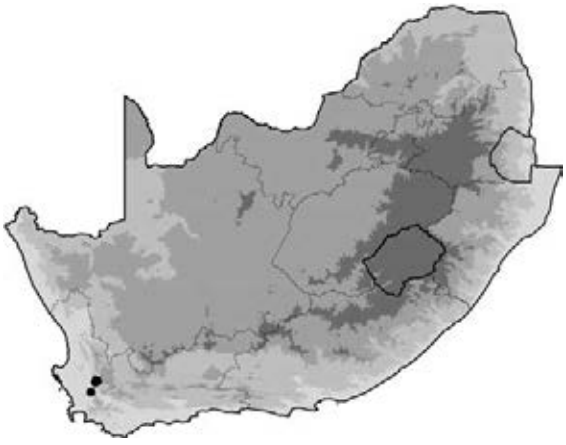
Distribution and ecology: a narrow endemic of the upper Tulbagh Valley and Klein Winterhoek Mtns in Western Cape, South Africa (rare and poorly documented); on rocky slopes in loamy sandstone ground at elevations up to 1 800 m.

Diagnosis: *Moraea incurva* has blue to violet flowers with the inner tepals either 3-lobed with the inner lobe linear and 18–20 mm long, or entire and thus exceptional but not unknown in subg. *Vieusseuxia*. The inner tepal limbs are abruptly curved inward (hence the name *incurva*) on suberect claws. The species otherwise conforms to subg. *Vieusseuxia* in the solitary basal leaf, modest size of the flowers, and in the filaments united in a slender column with only the tips free. The filament column, 10–11 mm long, raises the anthers above the bases of the inner tepal limbs and the orange anthers are thus prominently displayed. The immediate relationships of *M. incurva* are uncertain but molecular studies place it close to *M. unguiculata* and *M. tripetala*. The entire to 3-lobed inner tepals with incurved limbs and long filament column recall *M. barkerae* and the two species may be, on this basis, closely related. A relationship with *M. tripetala* seems less likely in view of the nearly free filaments and reduced inner tepals of that species.

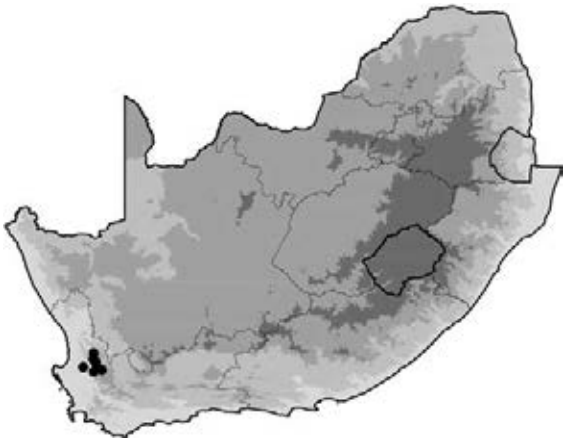
128. **Moraea barkerae** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 757 (1976a); Goldblatt: 144 (1986a). Type: South Africa, [Western Cape], Cederberg, above Algeria Forest Station on trail to Middelberg, 1 400 m, *Goldblatt 3245* (MO, holo.; K, NBG, PRE, S, iso.).

Plants mostly 200–400 mm high, with fibrous collar around base. *Corm* 12–20 mm diam.; tunics of coarse, grey to light brown fibres, often with thickened vertical members. *Stem* usually simple or with 1 branch, 2 or 3(4) internodes long, sheathing leaves (25–)35–60 mm long, with dry, brown attenuate apices. *Foliage leaf* solitary, basal, linear, ± as long as stem or up to 100 mm longer, suberect to falcate, but often trailing distally, narrowly channelled or leaf halves folded together thus blade seeming terete, 1.0–2.5 mm wide opened flat. *Rhipidial spathes* green with dry, dark brown, attenuate apices; inner spathe 33–70 mm long, outer ± half as long. *Flowers* long-lived, opening pale pink fading to almost white, outer tepal limbs with white or pink nectar guides at bases edged at both ends with broad purple margins, spreading to slightly reflexed; outer tepals 24–30 × 8–10 mm, lanceolate-attenuate, claws 6–10 mm long, lightly hairy; inner tepals 18–25 × 4–6 mm, ± erect, apex attenuate entire or obscurely 3-lobed. *Filaments* 10–15 mm long, united in lower $^1/_2$–$^2/_3$ in a smooth column; anthers 5 mm long, apiculate, purple, slightly exceeding stigma lobes; pollen red. *Ovary* ± cylindric, 7–10 mm long, exserted or initially partly included; style branches ± 10 × 2 mm, crests narrowly wedge-shaped to linear, 5–10 mm long. *Capsules* ovoid-ellipsoid, 13–17 mm long. *Seeds* angular, prismatic. *Chromosome number* 2*n* = 12. *Flowering time*: late September to November or early December at higher elevations.

Distribution and ecology: a montane species, occurring at middle to upper elevations in the Cederberg, Cold Bokkeveld Mtns and Piketberg in Western Cape, South Africa; on well-drained, rocky sandstone slopes.



Distribution of ***Moraea incurva***.



Distribution of ***Moraea barkerae***.

Diagnosis: *Moraea barkerae* is unusual in subg. *Vieusseuxia* in the pale pink (sometimes almost white) flower, the outer tepals with white or pink nectar guides with broad purple edges, and the unusually long filaments, united in a slender column 10–15 mm long and free for 5 mm, thus raising the anthers well above the tepal limbs so that the bright, orange-red pollen is clearly visible. The well-developed inner tepals, ± 15 mm long, are held almost erect, the limbs curving inward and with attenuate apices or sometimes obscurely 3-lobed, with the central lobe particularly prominent and the lateral lobes no more than small obtuse lateral projections. The slender, typically unbranched stem and often nearly entire inner tepals suggest a possible relationship with violet-flowered *M. incurva*, which shares these features, as well as having unusually long filaments and the anthers prominently displayed above the outer tepal limbs.

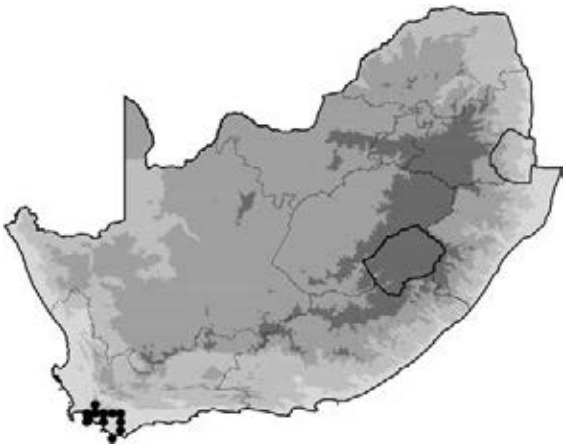
129. **Moraea lurida** *Ker Gawl.* in The Botanical Register 4: t. 312 (1818); Goldblatt: 762 (1976a); Goldblatt: 174 (1986a). *Vieusseuxia lurida* (Ker Gawl.) Sweet: 395 (1826a). *Phaianthes lurida* (Ker Gawl.) Raf.: 31 (1838). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 312 (1818).

Moraea montana Schltr.: 92 (1900). Type: South Africa, [Western Cape], Onrus River Mouth, *Schlechter 9494* (B, holo.; BOL, GRA, K, PRE, iso.).

Moraea fusca Baker: 24 (1906). Type: South Africa, [Western Cape], Caledon, *Penther 762* (K, holo.; BOL, iso.).

Plants mostly 250–350 mm high. *Corm* 10–15 mm diam.; tunics of coarse, often ± woody fibres. *Stem* usually 2- or 3-branched, branches diverging from the axis, sheathing leaves green with dry, brown attenuate apices, 40–50 mm long. *Foliage leaf* solitary, basal, linear, channelled, exceeding stem, often trailing distally, 3–5 mm wide. *Rhipidial spathes* green with dry, brown attenuate apices, inner (35–)40–55(–70) mm long, outer ± 1.2 as long. *Flowers* long-lived, often dark maroon, or partly yellow, rarely entirely creamy yellow, outer tepal limbs often with a pale spot near base, ± spreading, claws ascending and margins overlapping, forming a deep cup enclosing stamens, foul-smelling; outer tepals 22–30 × 10 mm, claws broad, 13–17 mm long, lightly papillate; inner tepals either entire with limbs short, apiculate or ± 3-lobed, 12–15 mm long, spreading. *Filaments* 5–6 mm long, united in a smooth column, free and diverging in upper ± 1 mm; anthers 4–6(–8) mm long, brown, apiculate; pollen orange. *Ovary* ± cylindric, 8–9 mm long; style branches up to 6 × ± 2 mm, crests 2–3 mm long, triangular. *Capsules* club-shaped, 12–15 mm long. *Seeds* angular, prismatic. *Chromosome number* 2*n* = 12. *Flowering time*: October to November.

Distribution and ecology: centred in the Caledon District of Western Cape, South Africa, but extending from the Hottentots Holland Mtns in the west to the Bredasdorp Mtns in the east; largely montane, on rocky, sandstone slopes, rarely blooming except after fire.



Distribution of ***Moraea lurida***.

Diagnosis: variable in flower colour and to some extent in tepal shape, the perianth of *Moraea lurida* is typically an unusual dark liverish maroon and unpleasantly scented but is sometimes marked with yellow, through orange, violet, brown to creamy white. Both the dark and the lighter coloured flowers, the latter evidently unscented, seem equally attractive to muscid, dung and game flies that visit them in large numbers and are likely the legitimate pollinators. Also unusual in *Moraea*, the bases of the tepal claws lack discrete nectaries and nectar is secreted over the claw surface along vein lines. While the outer tepals are fairly uniform in shape, with the limbs shorter than the claws, the inner tepal limbs vary from fairly broad and entire to truly tricuspidate with a fairly long coiled central cusp and shorter, obtuse lateral lobes. *Moraea lurida* is probably most closely allied to *M. insolens*, a local endemic of the southern slopes of Caledon Swartberg, as well as to *M. cantharophila*, also endemic to the Caledon District.

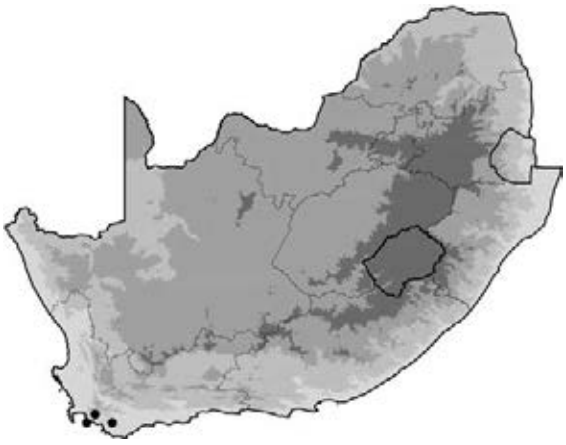
130. **Moraea cantharophila** *Goldblatt & J.C.Manning* in Novon 12: 353 (2002). Type: South Africa, Western Cape, Sandy's Glen, Farm Vredehoek, loamy clay slope, 16 Sept. 2000, *P. Goldblatt & J.C. Manning 11542* (NBG, holo.; K, MO, PRE, iso.).

Plants 200–450 mm high. *Corm* globose, 15–20 mm diam.; tunics of coarse, pale straw-coloured, netted fibres. *Stem* straight or flexed at nodes, arching outward below inflorescence, 2 or 3 internodes long, sheathing leaf 45–55 mm long, green with ± dry, attenuate apex, simple or with 1(2) branches. *Foliage leaf* solitary, linear, channelled, arching outward, overtopping the stem and often dry distally, mostly 2.5–3.5 mm wide, ± basal. *Rhipidial spathes* green with dry attenuate apices, inner 45–65 mm long, outer ± $^2/_3$ as long. *Flowers* long-lived, white or cream-coloured, darkly veined on reverse of tepals, outer tepal limbs with a yellow or orange nectar guide outlined in dark purple at bases, claws mostly yellow, inner tepals each with a broad, dark purple-brown central band and pinkish edge, tepal limbs spreading ± horizontally or the tips curving upward,

claws ascending, forming a cup ± 12 mm wide at mouth, enclosing filament column and anther bases; outer tepals larger than inner, limbs obovate, (15–)18–20 × 14–19 mm, claws ± 10 mm long, smooth or papillate; inner tepal limbs 8–15 × 5–11 mm. *Filaments* 4–5 mm long, united almost to apices in a smooth, cylindric column, free in upper 0.5–1.0 mm, greenish to dark purple; anthers ± 6 mm long, purple; pollen orange. *Ovary* oblong–3-lobed, 7–12 mm long, exserted; style branches 6–7 × ± 3 mm, ascending, yellow to pink, crests triangular, uniformly salmon-pink, ± erect, 2.5–4.0 mm long. *Capsules* ± ovoid-ellipsoid, 16–18 mm long. *Seeds* unknown. *Chromosome number* unknown. *Flowering late* August and September, rarely early October.

Distribution and ecology: restricted to the southwestern corner of Western Cape, South Africa, between the foot of Sir Lowry's Pass near Somerset West and Sandy's Glen in the Bredasdorp Mtns near Napier; on loamy clay slopes, flowering well only after fire.

Diagnosis: *Moraea cantharophila* has the solitary, long, channelled foliage leaf and branched stem typical of the subg. *Vieusseuxia* but unlike most species of the subgenus the inner tepals are not tricuspidate but broadly lanceolate with an entire, acute apex. The filaments are united to the apex, also uncommon in the subgenus. The dark central streak on the inner tepals is distinctive and is directly related to the pollination by hopliine beetles. *Moraea cantharophila* is evidently most closely related to *M. lurida* and *M. insolens*, both of which also have entire inner tepals with well-developed limbs. Fly-pollinated *M. lurida* typically has dark maroon flowers in which both the inner and outer tepals produce nectar over the entire inner surface of the claws, and the outer tepals are usually without contrasting markings. It has relatively long tepal claws, 13–17 mm that exceed the limbs, compared to claws ± 10 mm in *M. cantharophila*, thus shorter than the limbs. The tepal cup is thus deeper in *M. lurida* and includes both stamens and style branches, whereas the anthers are partly exserted in *M. cantharophila*.



Distribution of ***Moraea cantharophila***.

There is considerable variation in *M. cantharophila*, the type population from Sandy's Glen with larger inner tepals, 12–15 × 9–11 mm, with a broad brown central band on the claws, whereas plants from Sir Lowry's Pass have smaller inner tepals, 8–9 × 5–6 mm, and lack the prominent band of colour on the claws. Possible hybrids between *M. cantharophila* and *M. lurida* have been recorded near Elgin.

131. **Moraea insolens** *Goldblatt* in Flowering Plants of Africa 41: t. 1639 (1971b); Goldblatt: 176 (1986a). Type: South Africa, [Western Cape], Caledon, Drayton Siding, *Goldblatt 570* (BOL, holo.; K, PRE, iso.).

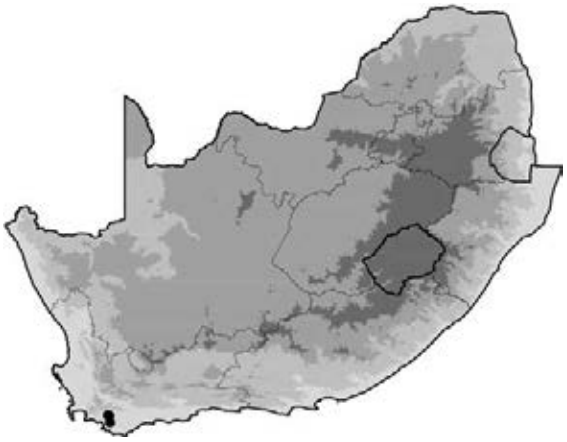
Homeria maculata Klatt: 627 (1866) [not *M. maculata* Sessé & Moc. (1893)]. Type: South Africa, [Western Cape], 'Langehoogte, Boontjieskraal', Caledon, *Ecklon & Zeyher Irid. 38* (B, lecto., designated by Goldblatt: 763 (1976a); S, isolecto.).

[*Vieusseuxia auranticata* Eckl.: 13 (1827), invalid name without description.]

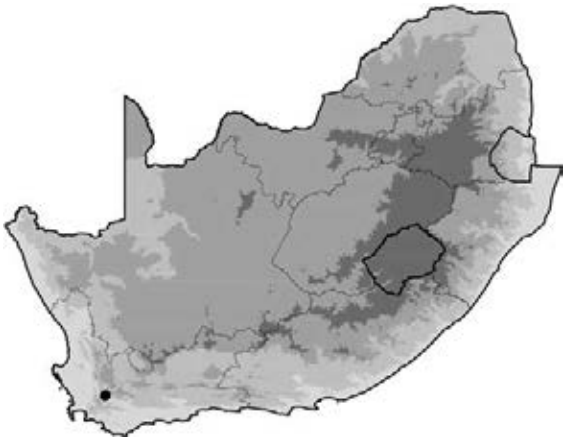
Plants mostly 270–400 mm high, sometimes in small clumps, often with collar of fibres around base. *Corm* ± 10 mm diam.; tunics of coarse, brown fibres extending upwards in a collar around base. *Stem* 2 or 3 internodes long, usually 2- or 3-branched, sheathing leaves 50–60 mm long, green with dry, brown attenuate tips. *Foliage leaf* solitary, linear, channelled, as long or shortly exceeding stem, erect below, often trailing distally, 3–4 mm wide. *Rhipidial spathes* with dry, attenuate apices, inner spathe 50–60 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* long-lived, 45–50 mm diam., either bright orange or creamy green, limbs of all tepals with narrow yellow band edged brown distally and claws uniformly brown; outer tepals 26–30 × 20 mm, limbs spreading ± horizontally, claws poorly differentiated from limbs, 6–7 mm long; inner tepals similar but smaller, 23–25 × ± 15 mm. *Filaments* ± 4 mm long, united below in a slender column, free and diverging in distal 0.4 mm; anthers 6–8 mm long, exceeding style crests, brown; pollen orange. *Ovary* ± cylindric, ± 10 mm long; style branches 4 × 1–2 mm, narrow, brown, crests short, ± 1.5 mm long, triangular, orange. *Capsules* club-shaped to elliptic, 12–15 mm long. *Seeds* angled, prismatic. *Chromosome number* $2n = 12$. *Flowering time*: late September and October.

Distribution and ecology: a narrow endemic of the Caledon District of Western Cape, South Africa, currently known from two sites, one at the western end of Caledon and the other at Drayton Siding east of Caledon (its original range was somewhat wider, possibly extending the length of the Swartberg, some 20 km); on lower, south-trending slopes of Caledon Swartberg in loamy clay-gravel, flowering well after fire.

Diagnosis: with its open, poppy-like flowers, either bright orange-red or creamy green with a brown centre, *Moraea insolens* is one of the most striking species in the genus. The filaments are united in a smooth, dark brown column and the large anthers, ± 8 mm long



Distribution of ***Moraea insolens***.



Distribution of ***Moraea worcesterensis***.

are closely appressed to and exceed the narrow style branches with their tiny crests. The inner tepals closely resemble the outer in colour and orientation and are only slightly smaller. *Moraea insolens* is probably most closely related to *M. lurida*, a species of sandstone soils which usually has dark maroon flowers, sometimes with contrasting white markings, and similarly reduced style branches and crests but smaller inner tepals often with 3-lobed limbs. The two species share an unusual karyotype, unique in sect. *Vieusseuxia.*

132. **Moraea worcesterensis** *Goldblatt* in Annals of the Missouri Botanical Garden 73: 115 (1986c); Goldblatt: 142 (1986a). Type: South Africa, [Western Cape], sandstone flats at Worcester West, *Goldblatt & Snijman 6977A* (NBG, holo.; K, MO, PRE, S, US, iso.).

Plants 120–250 mm high, with fibrous collar around base. *Corm* globose, 15–20 mm diam.; tunics of brown, coarse fibres, often thickened into claw-like ridges, eventually accumulating in a dense mass. *Stem* simple or 1-branched, straight or flexed at upper nodes, sheathing leaves green in lower half, becoming dry and brown distally, attenuate, 30–40 mm long. *Foliage leaf* solitary, basal, linear, channelled, ± as long to ± twice as long as stem, ± 2.5 mm wide. *Rhipidial spathes* dry and dark brown above, attenuate, inner 28–35 mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, dark violet-purple, limbs of all tepals with small yellow nectar guides at bases, spreading horizontally; outer tepals 15–17 × ± 9 mm, claws diverging, ± 3 mm long; inner tepals 13–15 × 4–5 mm, claws diverging. *Filaments* 5–6 mm long, purple, united below, free in upper 2 mm; anthers ± 4 mm long, exceeding style branches, purple; pollen yellow. *Ovary* ± 5 mm long, ± cylindric, tapering toward base; style branches narrow, < 1 mm wide, diverging, appressed to opposed anther, bilobed apically, crests vestigial. *Capsules* narrowly obovoid, ± 10 mm long. *Seeds* angular, prismatic. *Chromosome number* 2*n* = 12. *Flowering time*: September.

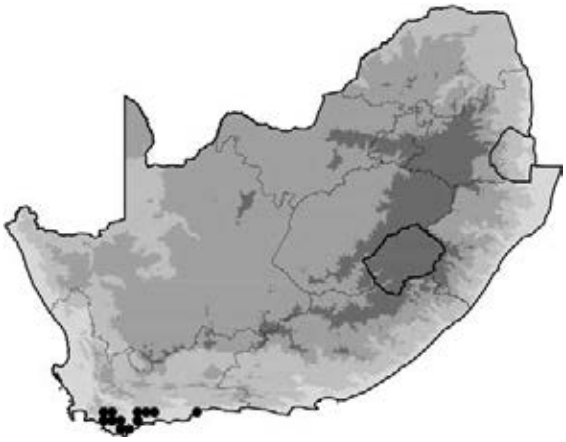
Distribution and ecology: a rare and evidently threatened species of Western Cape, South Africa, currently known from only two sites in the low hills north of Worcester; in dry sites on stony, clay slopes and flats.

Diagnosis: a remarkable member of subg. *Vieusseuxia*, *Moraea worcesterensis* has small, star-like, violet-purple flowers with spreading outer and inner tepals both with small yellow nectar guides at the limb bases. The style branches, held well above the tepals, are much reduced, < 1 mm wide and ± as wide as the anthers, and lack true crests. The purple filaments are united in a cylindric column but free distally and the purple anthers slightly exceed the style branches. The relationships of *M. worcesterensis* are uncertain but molecular studies confirm its assignment to subg. *Vieusseuxia,* originally placed there on the basis of the solitary leaf, long-lived flower and chromosome number of 2*n* = 12 (basic chromosome number in the subgenus is *x* = 6).

133. **Moraea fergusoniae** *L.Bolus* in South African Gardening and Country Life 19: 294 (1929b); Goldblatt: 64 (1986a). Type: South Africa, [Western Cape], Riversdale, *Ferguson s.n.* (BOL [18970], holo.).

Moraea fimbriata Klatt: 561 (1866), illegitimate homonym, not *M. fimbriata* Loisel (1822). Type: South Africa, [Western Cape], Caledon, *Ecklon & Zeyher Irid. 42* [SAM, lecto., designated by Goldblatt: 697 (1976a)].

Plants 100–200 mm high. *Corm* 5–15 mm diam.; tunics of pale medium fibres. *Stem* usually 2- to 4-branched from base, rarely simple, mostly (1)2 internodes long, sheathing leaves 1 per branch, green with dry, brown apices, 16–22 mm long. *Foliage leaves* 3 to 6, basal, shallowly channelled, shorter to ± as long as stem, 5–10 mm wide, dark green, falcate or loosely twisted, margins ciliate, undulate to crisped. *Rhipidial spathes* with dry, brown, attenuate apices, inner 26–38 mm long, outer ± half as long. *Flowers* long-lived, white to creamy white or blue, often flushed purple to brown outside, outer tepal limbs with yellow nectar guides at bases, spreading to half reflexed; outer tepals lanceolate, ± 20 mm long, claws ascending, slightly shorter than limbs; inner tepals



Distribution of ***Moraea fergusoniae***.

erect, 8–12 mm long, either entire, narrowly lanceolate or 3-lobed with a long central cusp and 2 small, rounded lateral lobes. *Filaments* ± 4 mm long, united or free in upper 1 mm; anthers 3 mm long, yellow; pollen yellow. *Ovary* ellipsoid, ± 5 mm long; style branches 3–5 mm long, crests linear, 5–7 mm long. *Capsules* club-shaped, ± 7 mm long. *Seeds* angular, prismatic. *Chromosome number* 2*n* = 12. *Flowering time*: late July and August.

Distribution and ecology: relatively widespread in southern Western Cape, South Africa, from near Bot River east to Robinson's Pass near Mossel Bay; typically on clay soils in renosterveld.

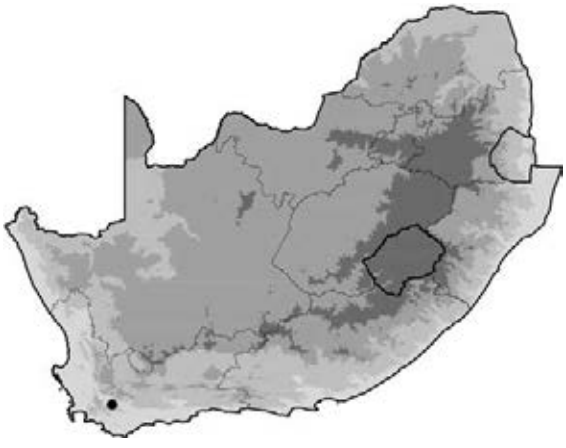
Diagnosis: unique in subg. *Vieusseuxia,* the diminutive *Moraea fergusoniae* has 3 to 6 foliage leaves, all basal, and the short stems consist of only one or two aerial internodes. The flowers are usually white to creamy white but very attractive blue-flowered populations occur in the vicinity of Swellendam. The flowers are long-lived and have either entire and lanceolate or 3-lobed inner tepals, then with a longer acute central cusp and short lateral lobes. Because of the multiple foliage leaves *M. fergusoniae* was long thought to be allied to species of subg. *Moraea*, in particular *M. papilionacea*, but this now appears incorrect. Both the long-lived flower and often 3-lobed inner tepals accord with subg. *Vieusseuxia* as does the chromosome number, 2*n* = 12, and molecular phylogenetic studies place the species in that subgenus among a cluster of species with solitary leaves. The presence of multiple leaves in *M. fergusoniae* thus presumably represents a striking evolutionary reversal to the ancestral state in *Moraea.* In the subgenus only *M. helicoidea* also consistently has more than one leaf, and flowers similar in shape and size to those of *M. fergusoniae*, and the two are evidently immediately related.

134. **Moraea helicoidea** *Goldblatt & J.C.Manning* in South African Journal of Botany 99: 70 (2015). Type: South Africa, Western Cape, Farm Droogeriviersberg, SE of Worcester, in Breede Shale Renosterveld, 500 m, 14 Sept. 2014, *Manning & Le Roux 1172* (NBG, holo.; K, MO, iso).

Plants ± 50–150 mm high. *Corm* ± globose, 7–10 mm diam.; tunics of pale brown, netted fibres. *Stem* consisting of 2 aerial internodes, simple or 1-branched from aerial node, solitary sheathing leaf green with dry, brown apices, 9–15 mm long, sometimes reaching almost to base of inflorescence, with cataphylls forming collar around base. *Foliage leaves* 2, subequal, inserted at base, suberect, exceeding stem, blades narrow, apparently terete with narrow adaxial groove, ± 1 mm diam. when opened flat, distal half of blade loosely coiled to almost straight in shade. *Rhipidial spathes* green with dry brown, acute tips, inner 16–25 mm long, outer entirely sheathing, ± half as long. *Flowers* long-lived, largely white, speckled outside with brown spots, outer tepal limbs spreading, with large yellow nectar guide at bases and brown inner tepals, with light, fruity scent; tepals unequal, outer ± 16–18 mm long, limb ± broadly obovate-orbicular, 10 × 10 mm, claws suberect, ± 7 mm long, inner 8–9 mm long, limbs much reduced, ± 4 mm long, ± deltoid to obscurely 3-lobed with longer central lobe curving inward. *Filaments* ± 4.5 mm long, united in lower 3 mm in a cylindric column enclosing style, free and diverging above; anthers ± 3 mm long, pale mauve; pollen white. *Ovary* ellipsoid, ± 5 mm long; style branches 4.5–5.0 mm long, suberect, crests erect, ± 5 mm long. *Capsules* ± ellipsoid, 7–8 × 5 mm. *Seeds* unknown. *Flowering time*: late August and September.

Distribution and ecology: extremely local and known only from the Farm Droogeriviersberg, ± 30 km SW of Worcester in Western Cape, South Africa; in a transition zone between the Witteberg- and Dwyka geological groups, in renosterveld.

Diagnosis: *Moraea helicoidea* is immediately distinguished in subg. *Vieusseuxia* by the presence of two subequal foliage leaves inserted near the base and loosely coiled in corkscrew fashion. More than one foliage leaf is rare in the subgenus and consistent only in *M. fergusoniae*, which has three to six foliage leaves, the blades channelled, shorter than the stem and 3–10 mm wide, slightly twisted and with undulate, minutely ciliate margins. *Moraea tripetala* subsp. *violacea* sometimes



Distribution of ***Moraea helicoidea***.

has two foliage leaves but very different flowers with inner tepals represented by minute cusps. Flowers of *M. helicoidea* are predominantly white with outer tepals bearing large, deep yellow nectar guides at the limb bases and with small dark spots on the reverse. The brown inner tepals have reduced, 3-lobed limbs, common in the subgenus, and are comparable in shape to those of *M. fergusoniae* which has either pale blue or white flowers. Branching in *M. fergusoniae* is usually basal whereas branches in *M. helicoidea*, when present, are cauline, borne at the first aerial node.

135. **Moraea unguiculata** *Ker Gawl.* in Curtis's Botanical Magazine 16: t. 593 (1802a); Goldblatt: 759 (1976a); Goldblatt: 155 (1986a). Type: South Africa, without precise locality, illustration in Ker Gawl.: t. 593 (1802a).

Iris tricuspis var. *minor* Jacq.: t. 222 (1792). Type: South Africa, without precise locality, illustration in Jacq.: t. 222 (1792).

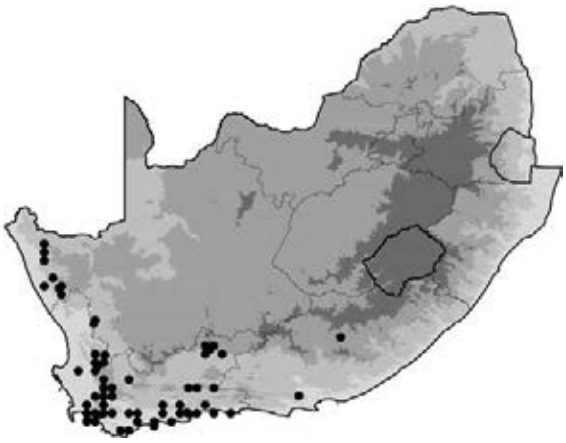
Moraea tenuis Ker Gawl.: t. 1047 (1807). *Vieusseuxia tenuis* (Ker Gawl.) Roem. & Schult.: 491 (1817). Type: South Africa, without precise locality, illustration in Ker Gawl.: t. 1047 (1807).

Iris gracilis Licht. ex Roem. & Schult.: 477 (1817). *Moraea gracilis* (Licht. ex Roem. & Schult.) A.Dietr.: 478 (1833). Type: South Africa, without precise locality, *Lichtenstein s.n.* (Type unknown, identity based on description).

Moraea ceresiana G.J.Lewis: 57 (1941), as a new name for *M. violacea* L.Bolus: 116 (1928b), illegitimate homonym, not *M. violacea* Baker (1900). Type: South Africa, [Western Cape], Ceres, *Cook s.n.* (BOL 17020], holo.).

[*Vieusseuxia gracilis* Eckl.: 12 (1827), invalid name without description.]

Plants 150–600 mm high. *Corm* 10–18 mm diam.; tunics light brown to dark grey, fine to coarse fibres. *Stem* usually few branched, usually 3 internodes long, bearing green, attenuate sheathing leaves 40–55 mm long. *Foliage leaf* solitary, basal, linear, up to half again as long as stem, erect below, trailing distally, channelled, glabrous, glaucous-grey, 2–3(–4) mm wide. *Rhipidial spathes* green, becoming dry and dark brown near tips, attenuate, inner spathe 30–40 mm long, outer ± half as long. *Flowers* long-lived, white, creamy to dull yellow, brown or deep blue, outer tepal limbs with yellow to brown nectar guides at bases, sometimes speckled brown or purple over surface, half to fully reflexed, inner tepals often darkly speckled; outer tepals lanceolate, 12–20 mm long, claw ± half as long as limb, densely hairy; inner tepals ± erect, 7–12 mm long, usually tricuspidate with long, central, symmetrically incurved cusp and 2 short obtuse lateral lobes (rarely ± linear, filiform or expanded in middle). *Filaments* 4–6 mm long, united almost to apex; anthers 3–4 mm long, apiculate, usually white. *Ovary* ± ellipsoid-ovoid, 7–9 mm long; style branches ± 5 mm long, crests 2.5–4.0 mm long.



Distribution of ***Moraea unguiculata***.

Capsules ± club-shaped, 13–15 mm long. *Seeds* small, angular. *Chromosome number* 2*n* = 12. *Flowering time*: late August to early December.

Distribution and ecology: widespread throughout the South African winter-rainfall region, from Steinkopf in Namaqualand, Northern Cape, south through Western Cape to Grahamstown in Eastern Cape in the east and with isolated populations in the mountains of the Great and Upper Karoo (absent from the Western Cape Atlantic Coast and Cape Peninsula); usually on clay soils but also on granite-derived or sandy gravels.

Diagnosis: *Moraea unguiculata* is a slender plant with one of the smallest flowers in subg. *Vieusseuxia*, the outer tepals typically 12–18 mm long with limbs ± 8–10 mm long. Flowers are unusually varied in tepal orientation and colour. The most common morph has outer tepal limbs half reflexed and white to creamy yellow, darkly speckled near the base, but populations in the Ceres area of the Western Cape have attractive dark blue-violet tepals. A second morph, corresponding to the synonym, *M. tenuis*, has the outer tepal limbs fully reflexed and the tepals dull pinkish brown with pale yellow, velvety nectar guides. These morphs may represent separate taxa but so far attempts to refer all herbarium collections to one or other morph have failed owing to the presence of apparent intermediates. Plants consistently have filaments united in a slender, smooth column with only their tips free, comparatively narrow style branches, short narrow crests, and 3-lobed inner tepal limbs, the longer central lobe linear and symmetrically coiled inward. Evidently closely related, *M. bellendenii* and *M. tricuspidata* have larger flowers, also with 3-lobed inner tepals but with the central lobe asymmetrically coiled. Also easily confused with *M. unguiculata*, *M. rivulicola* has somewhat larger flowers of very similar structure but with outer tepals up to 24 mm long, unbearded tepal claws, and a larger ovary and capsule, the latter 25–32 mm long vs. 13–15 mm in *M. unguiculata*. The two species co-occur at some sites in Namaqualand in slightly different habitats.

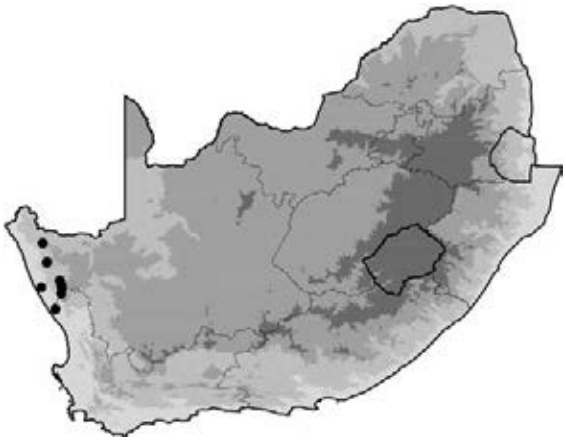
An odd variant of *Moraea unguiculata* from the Kamiesberg of central Namaqualand has linear, filiform inner tepals but otherwise seems to conform to the species. Typical *M. unguiculata* with 3-lobed inner tepals also occurs in the Kamiesberg.

136. **Moraea rivulicola** *Goldblatt & J.C.Manning* in Novon 5: 262 (1995). Type: South Africa, [Northern Cape], Springbok District, streambed at eastern end of Spektakel Pass, 11 Sept. 1993, *Goldblatt & Manning 9710* (NBG, holo.; K, MO, PRE, WAG, iso.).

Plants 500–900 mm high. *Corm* globose, 14–18 mm diam.; tunics of pale, coarse vertical fibres connected by fine cross strands. *Stem* of 4(5) internodes, simple or usually 1- to 3-branched, sheathing leaves 50–65 mm long, with dry, attenuate-filiform apices. *Foliage leaf* solitary, basal, ± twice as long as stem, channelled, 3–10 mm wide (when opened flat). *Rhipidial spathes* with dry brown attenuate apices, inner 55–70(–90) mm long, outer 45–65 mm long. *Flowers* long-lived, cream-coloured, yellow-green or ± beige, outer tepal limbs with large, darkly spotted dull yellow nectar guides at bases, claws similarly dotted, inner tepals light to reddish brown; outer tepals 20–28 × 10–13 mm, claws ascending, channelled, 7–14 mm long, with large basal nectary opposed by a lobe ± 2 mm long, limbs 14–19 mm long, reflexed 45°–60°, inner tepals 13–19 × 4–5 mm, ascending, channelled below, usually trilobed, median lobe linear, curving inward, laxly asymmetrically coiled, lateral lobes rounded, obtuse, up to 2 mm long, or limb ovate-attenuate. *Filaments* 8–12 mm long, united in lower ± 5.5–10.0 mm, diverging in upper 1.8–2.5 mm; anthers 4–6 mm long, shortly exceeding stigma lobes, orange. *Ovary* ellipsoid-3-lobed, 11–14 mm long, exserted; style branches ± 6 × 2 mm, diverging, crests lanceolate, 3–5 mm long. *Capsules* cylindric, 25–32 mm long. *Seeds* angular. *Flowering time*: mid-August to late September.

Distribution and ecology: a fairly rare endemic of Namaqualand, Northern Cape, South Africa, with a scattered range extending from the Spektakel Mtns west of Springbok in the north to the Kamiesberg and the heights south of Kotzesrus in the south; usually along the banks and beds of seasonal streams, in drainage lines and seasonal marshes.

Diagnosis: resembling *Moraea unguiculata*, *M. rivulicola* has larger, pale, creamy green, yellow-green or beige flowers, the outer tepals up to 28 mm long with limbs typically held at 60° below horizontal and smooth claws. The inner tepals are also distinctive in having the central lobe of the typically 3-lobed limb drawn into a slender, obliquely coiled cusp, while the lateral lobes are rounded and very short. The ovary is oblong-cylindric and 11–14 mm long, and gives rise to large cylindric capsules 25–32 mm long. *Moraea unguiculata* has smaller flowers with the outer tepals seldom exceeding 16 mm and with densely pubescent or bearded claws. The inner tepals, 7–10 mm long, are also 3-lobed but



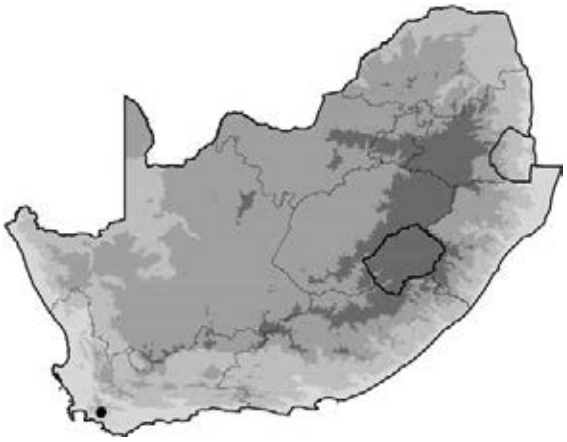
Distribution of ***Moraea rivulicola***.

the long central cusp is coiled inward symmetrically. Flower colour in *M. unguiculata* ranges from white to creamy white, brownish, and even blue, and the outer tepal limbs may be half reflexed or, in some populations outside Namaqualand, may be completely reflexed.

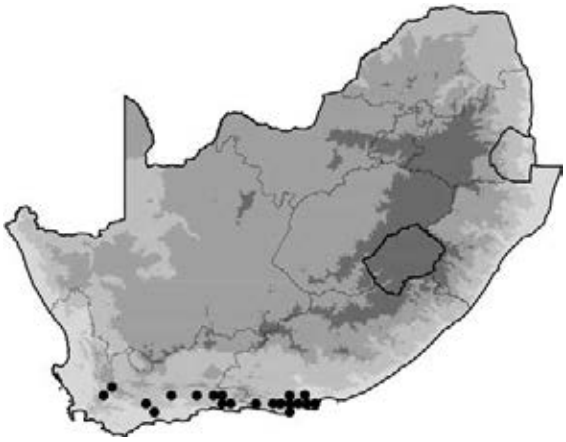
A population from the rocky hills west of Bitterfontein and south of Kotzesrus stands out in the particularly large flowers with the inner tepals ± 19 mm long, and with an ovate-attenuate limb. Other organs are also larger, with the filaments united in a column up to 10 mm long and free for an additional 2.5 mm and the anthers are 5.5–6.0 mm long. This population represents a significant variant and distinctive race, perhaps deserving of infraspecific recognition.

137. **Moraea atropunctata** *Goldblatt* in Annals of the Missouri Botanical Garden 69: 362 (1982); Goldblatt: 172 (1986a). Type: South Africa, Caledon District, Farm Vleitjies, Eseljacht Mtns, *Goldblatt 5635* (MO, holo.; K, NBG, PRE, S, US, iso.).

Plants 150–200 mm high. *Corm* 9–12 mm diam.; tunics of light brown, netted fibres. *Stem* erect, simple or 1-branched, usually consisting of only 2 internodes, bearing long-attenuate sheathing leaves 25–40 mm long, dry and brown above. *Foliage leaf* solitary, basal, linear, channelled, margins ciliate-hairy, 4–8 mm widest, usually erect, slightly longer than to twice as long as stem. *Rhipidial spathes* long-attenuate, brown above, inner 45–65 mm long, outer ± half as long. *Flowers* dull creamy white, red-brown on reverse of outer tepals, spotted dark brown or blue towards base of outer tepal limbs on yellow background, tepals claws brown; outer tepals 20–24 mm long, claw 5–7 mm, bearded, limbs spreading, 17–25 mm wide; inner tepals 9–15 mm long, 3-lobed, inner lobe longest, acute, straight or twisted, lateral lobes short, obtuse, yellow, speckled brown. *Filaments* ± 5 mm long, united in a smooth column, free in upper 0.5 mm; anthers ± 4 mm long, purple-brown; pollen orange. *Ovary* 10–14 mm long; style ± 5 mm long, branches ± as long as anthers, crests ± 4 mm long, dull



Distribution of ***Moraea atropunctata***.



Distribution of ***Moraea algoensis***.

orange. *Capsules* oblong, 25–35 mm long, somewhat inflated. *Seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: mid-August to late September.

Distribution and ecology: known only from a small area of the Eseljacht Mtns in the Caledon District in Western Cape, South Africa; on stony clay ground.

Diagnosis: a striking and unusual species both in flower and vegetative morphology, *Moraea atropunctata* has dull coloured flowers with broad outer tepal limbs reddish brown outside, and 3-lobed inner tepals with the longer median lobe laxly spreading. The nectar guides consist of small dark spots at the bases of the outer tepals while the claws are dark brown. The leaves are relatively short, not or hardly exceeding the stems, and unusually broad, with prominently ciliate-hairy margins. Although evidently related to the *M. tricuspidata* and *M. unguiculata* groups in general, the foliage and flowers easily separate it from the several species of these alliances. The unusually large, inflated capsules, 25–35 mm long, are also unusual for these two groups and recall the *M. villosa* species group.

138. **Moraea algoensis** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 226 (1973); Goldblatt: 750 (1976a); Goldblatt: 140 (1986a). Type: South Africa, [Eastern Cape], Port Elizabeth, *Batten 7* (NBG, holo.).

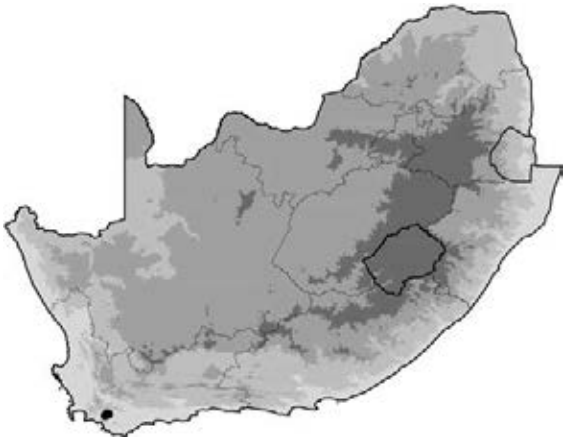
Plants 200–400 mm high. *Corm* 10–15 mm diam.; tunics of medium to coarse, netted fibres. *Stem* 2- to 4-branched, branches flexed away from axis and often all facing to one side, sheathing leaves 35–40 mm long, with dry, brown, long attenuate tips. *Foliage leaf* solitary, linear, ± basal, channelled, exceeding stem and trailing distally, mostly 2.5–3.5 mm wide. *Rhipidial spathes* attenuate, with brown membranous margins and tips, inner 40–50 mm long, outer spathe ± $^1/_2$ as long. *Flowers* dark blue to violet, outer tepal limbs with yellow nectar guides at bases, ± half reflexed; outer tepals 25–28 × 9–10 mm, claws slightly shorter than limbs, inner tepals blue to purple to brown, 6–10 mm long, with ovate or broadly 3-lobed limbs ± 3 mm long. *Filaments* ± 4 mm long, united in lower 3 mm, diverging in upper 1 mm; anthers ± 4 mm long; pollen usually orange-red. *Ovary* ± ellipsoid, ± 6 mm long; style branches ± 5 mm long, crests linear, 6–8 mm long. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: August and September, rarely in June or July.

Distribution and ecology: extending from the hills near Worcester in Western Cape, South Africa, to Humansdorp and Port Elizabeth in Eastern Cape; mostly on stony slopes in loamy clay, often on the interface between sandstone and shale substrates.

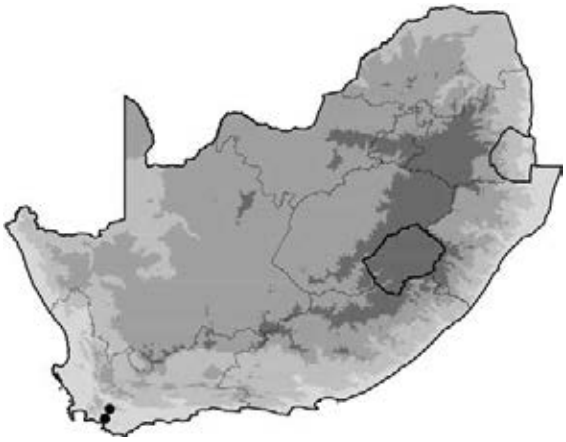
Diagnosis: with relatively small, blue to violet flowers and orange-red pollen, *Moraea algoensis* is distinguished primarily by the characteristic inner tepals, often dark violet to brown, with a broad, relatively short limb, sometimes entire or 3-lobed with a long, incurved central lobe. The filaments are united in the lower $^2/_3$ in a slender, smooth column, arching outward distally, and bearing pale blue anthers with bright orange pollen. Flowers of some populations may be confused with *M. unguiculata*, but that species rarely has blue flowers and more strongly reflexed outer tepal limbs, the inner tepals darkly speckled on a yellow to white background, and a consistently trilobed inner tepal limb with the longer, narrow central cusp coiled inward. Bright red to orange pollen is not known in *M. unguiculata*.

139. **Moraea longiaristata** *Goldblatt* in Annals of the Missouri Botanical Garden 69: 360 (1982); Goldblatt: 140 (1986a). Type: South Africa, [Western Cape], Caledon Swartberg above the Gardens, *Goldblatt 5883* (MO, holo.; C, E, K, NBG, PRE, S, US, WAG, iso.).

Plants 150–300 mm high. *Corm* 8–12 mm diam.; tunics of pale, coarse fibres. *Stem* simple or 1-branched, with 3 aerial internodes, sheathing leaves 30–40 mm long, with dry, attenuate apices. *Foliage leaf* solitary, basal, erect, channelled, exceeding stem, often dry near apex, ± 2 mm wide. *Rhipidial spathes* attenuate, apices dry



Distribution of ***Moraea longiaristata***.



Distribution of ***Moraea barnardii***.

and brown, inner 45–55 mm long, outer ± 1/2 as long. *Flowers* long-lived, white, outer tepal limbs with white nectar guides ringed in dark blue near bases, with faint, dark blue radiating veins, half reflexed, margins undulate; outer tepals 23–30 mm long, limbs 11–14 × 11–16 mm, claws 12–16 mm long, suberect, slightly longer than limbs; inner tepals 13–15 mm long, linear, < 1 mm wide, erect, curving inward toward apex. *Filaments* 12–15 mm long, united in lower 1/2–2/3; anthers 3–4 mm long, dark blue-purple; pollen red. *Ovary* ± cylindric, 8–10 mm long, entirely or partly enclosed; style branches ± 10 mm long, crests ± 5 mm long. *Capsules* and *seeds* unknown. *Chromosome number* unknown. *Flowering time*: September to mid-October.

Distribution and ecology: a local endemic of the Caledon Swartberg above the town of Caledon in Western Cape, South Africa; on rocky slopes in coarse sandy ground, flowering well after fire or when the surrounding vegetation is cleared.

Diagnosis: *Moraea longiaristata* and *M. barnardii* have a superficially similar flower but the inner tepals of *M. longiaristata* are linear and erect, ± 15 mm long and the outer tepals have claws 12–16 mm long, whereas *M. barnardii* lacks inner tepals entirely, and the outer tepal claws are ± 7 mm long and shorter than the tepal limbs. Associated with the longer tepals claws, the filaments of *M. longiaristata* are up to 15 mm long but only 8–9 mm long in *M. barnardii*. In other respects, including broad, white outer tepal limbs with undulate margins, nectar guides consisting of dark blue spots, the short, purple anthers and red pollen, the two species are very alike.

140. **Moraea barnardii** *L.Bolus* in Journal of Botany, British and foreign 71: 122 (1933); Goldblatt: 150 (1986a). Type: South Africa, [Western Cape], top of Shaw's Pass, Caledon, *Barnard s.n.* (BOL [20067], holo., NBG, SAM, iso.).

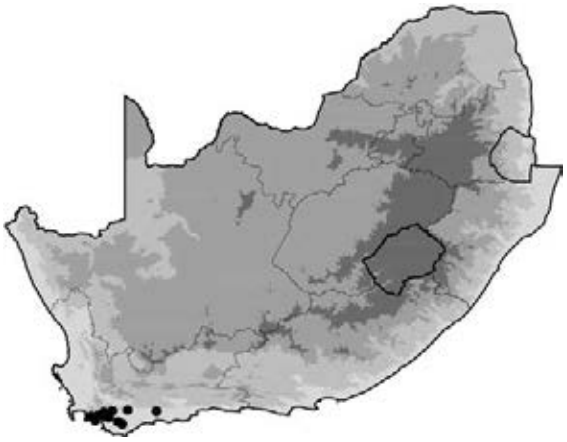
Plants slender, rarely exceeding 300 mm high. *Corm* ± 10 mm diam.; tunics of brown, coarse fibres. *Stem* usually simple or 1-branched, 3 internodes long, sheathing leaves 25–40 mm long, attenuate. *Foliage leaf* solitary, linear, channelled, usually exceeding stem or trailing distally, ± 1.5 mm wide. *Rhipidial spathes* attenuate, dry and brown in upper half, inner ± 45 mm long, outer up to 25 mm long. *Flowers* long-lived, white, outer tepal limbs with dark blue nectar guides at bases edged with radiating blue lines, spreading to weakly reflexed; outer tepals ± 20 mm long, limbs 12–13 mm long and ± as wide, margins undulate; inner tepals lacking. *Filaments* 8–9 mm long, united in lower 1/3, free and diverging above; anthers oblong, 3–4 mm long, dark blue; pollen orange-red. *Ovary* narrowly elliptic, 7–9 mm long, red, exserted; style branches ± 6 mm long, crests 6–7 mm long. *Capsules* club-shaped, usually flushed red, ± 10 mm long. *Seeds* angular, prismatic. *Chromosome number* 2*n* = 12. *Flowering time*: mid-September and early October.

Distribution and ecology: a rare local endemic of the Caledon District of Western Cape, South Africa, on Shaw's Mtn and possibly near Gansbaai and to the west at Palmiet River Mouth (both latter records in need of confirmation); in outcrops of sandstone rocks, flowering best after fire.

Diagnosis: a slender species standing up to 300 mm tall, *Moraea barnardii* is immediately distinguished by the white flowers faintly blue-veined on the underside, with broad, spreading to laxly reflexed outer tepal limbs with undulate margins and nectar guides consisting of a ring of dark blue edged with radiating blue lines. Flowers lack inner tepals and have short filaments 8–9 mm long, united in the lower third, dark blue anthers and red pollen. Plants are usually unbranched. The immediate relationships of *M. barnardii* are with the Caledon Swartberg endemic *M. longiaristata* and the several differences between then are discussed under that species.

141. **Moraea debilis** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 21 (1976b); Goldblatt: 146 (1986a). Type: South Africa, [Western Cape], clay slopes SW of Caledon, *Goldblatt 673* (BOL, holo.; K, MO, PRE, S, iso.).

Plants slender, 150–400 mm high. *Corm* ± 10 mm diam.; tunics of light brown, relatively fine fibres. *Stem* 2 or



Distribution of ***Moraea debilis***.

3 internodes long, laxly 1- to 3-branched, rarely simple, sheathing leaves becoming dry at flowering, 45–60 mm long. *Foliage leaf* solitary, basal, linear, softly hairy on abaxial surface, exceeding stem and trailing distally, 2.5–3.5 mm wide, margins ciliate. *Rhipidial spathes* becoming dry and brown near tips, long attenuate, sometimes ± lacerated, inner 40–55 mm long, outer ± half as long. *Flowers* long-lived, ± violet fading to pale mauve and becoming speckled, outer tepal limbs with white nectar guides with purple central spot at bases, ± half reflexed; outer tepals ± lanceolate, ± 20 mm long, claws ± $^1/_2$ as long, velvety; inner tepals ± 10 mm long, erect, slender, usually 3-lobed distally with central cusp much exceeding lateral lobes. *Filaments* ± 4.5 mm long, united in lower half; anthers ± 5 mm long, pale mauve; pollen yellow. *Ovary* ± cylindric, 6–8 mm long; style branches ± 7 mm long, crests ± 3 mm long. *Capsules* narrowly ovoid-club-shaped, 10–12 mm long. *Seeds* small, angled. *Chromosome number* 2*n* = 12. *Flowering time*: September to October.

Distribution and ecology: restricted to the Caledon District of Western Cape, South Africa, from Bot River to the Ruens near Bredasdorp; in clay soils among low shrubs in renosterveld.

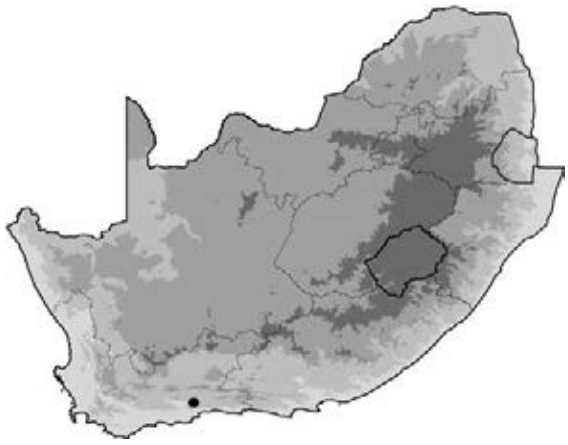
Diagnosis: a slender plant, *Moraea debilis* has small flowers initially violet, fading to pale blue-mauve and becoming mottled, spreading to reflexed outer tepal limbs and trilobed inner tepals. The filaments are united for half their length in a column ± 2.5 mm long. Somewhat unusual in sect. *Vieusseuxia*, the linear leaf is softly hairy on the outer surface and the margins are usually ciliate.

142. **Moraea lilacina** *Goldblatt & J.C.Manning* in Novon 12: 355 (2002). Type: South Africa, Western Cape, northern foothills of the Langeberg, near Perdebont, Farm Graskloof, 23 Sept. 1999, *Goldblatt & Nänni 11587* (NBG, holo.; K, MO, iso.).

Plants 200–350 mm high. *Corm* ± globose, 12–16 mm diam.; tunics of light brown, netted fibres. *Stem* usually unbranched, with 3 aerial internodes, sheathing leaves 40–45 mm long, with dry, attenuate apices. *Foliage leaf* solitary, ± basal, linear, narrowly channelled, ± 1.5 mm wide, trailing and often dry distally. *Rhipidial spathes* with dry, attenuate apices, inner 40–45 mm long, outer ± $^2/_3$ as long. *Flowers* long-lived, pale pink, fading darker pink, outer tepal limbs with bright yellow nectar guides at bases, flushed lilac-pink on reverse, reflexed at ± 45°; outer tepals 27–30 mm long, claws ± 10 mm long, yellow, densely hairy; inner tepals 16–18 mm long, 3-lobed with linear, suberect central lobe ± 9 mm long, lateral lobes short, obtuse. *Filaments* 7–8 mm long, united in lower $^2/_3$ in a cylindric column, smooth or papillate, free and diverging above; anthers ± 3.5 mm long, pink. *Ovary* oblong, 7–8 mm long, exserted; style branches diverging, ± 5 × 2 mm, crests slender, erect, 5–8 mm long. *Capsules* and *seeds* unknown. *Flowering time*: September.

Distribution and ecology: known from just one site in the northern foothills of the Langeberg northwest of Robinson's Pass in Western Cape, South Africa; in sandy loam, mostly wedged in crevices in sandstone outcrops.

Diagnosis: *Moraea lilacina* is recognised by the pink to lilac flowers with outer tepals 27–30 mm long, and 3-lobed inner tepals 16–18 mm long. The inner tepals have a narrow, channelled claw but the 3-lobed limb consists of an erect central cusp ± 9 mm long and shorter rounded lateral lobes. The filaments are 7–8 mm long with a papillate or smooth column, The species is clearly allied to the widespread southern African winter-rainfall *M. unguiculata*, a remarkably variable species, both as regards perianth colour and size, but its critical features are inner tepals 10–12 mm long and trilobed with the central cusp linear and coiled inward, filaments usually 3–5 mm long with the column lightly to densely papillate, and the outer tepals are typically 12–16 mm long, rarely up to 24 mm long in northern Namaqualand populations. The stems in *M. unguiculata* are almost always branched unless depauperate due to environmental conditions but typically unbranched in *M. lilacina*. The outer tepals of *M. unguiculata* may be white to cream-coloured, brown, violet, or even dull yellow and usually have a contrasting mark at the base



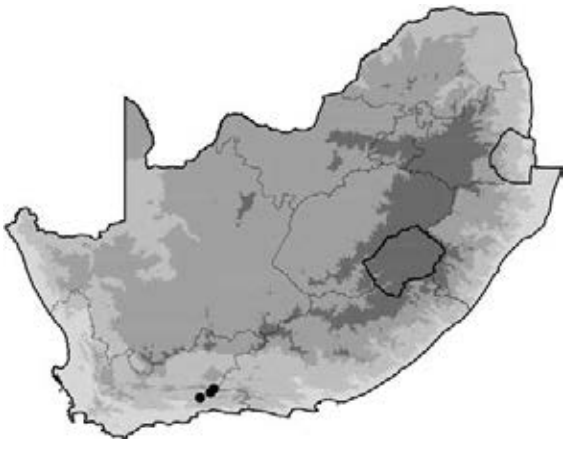
Distribution of ***Moraea lilacina***.

of the limb, and the style branches are narrow and spreading as in *M. lilacina*, but with erect crests 2.0–4.0(–5.5) mm long vs. 5–8 mm in *M. lilacina*.

143. **Moraea regalis** *Goldblatt & J.C.Manning* in Novon 5: 266 (1995). Type: South Africa, [Western Cape], Little Karoo, De Rust, rocky hillside near old cemetery, 19 Sept. 1994, *J.A. Vlok & A.L. Schutte 345* (NBG, holo.; K, MO, PRE, WAG, iso.).

Plants 180–350 mm high. *Corms* globose, 12–14 mm diam.; tunics of medium to coarsely textured, light brown, netted fibres. *Stem* 3 internodes long, ± straight, usually unbranched, sheathing leaves green with dry, attenuate tips, 25–40 mm long. *Cataphylls* dry and brown. *Foliage leaf* solitary, basal, up to twice as long as stem, linear, channelled, ± 3 mm wide (when opened flat), erect below, trailing distally. *Rhipidial spathes* green with dry brown attenuate tips, inner 45–65 mm long, outer ± $^1/_2$ as long. *Flowers* violet (? or pale blue), outer tepal limbs with small triangular, minutely pubescent, white nectar guides at bases outlined with dark purple, fully reflexed, claws densely dark violet pubescent, scentless; outer tepals (26–)30–40 mm long, claws ascending, ± $^1/_3$ as long as limbs; inner tepals erect, ± 24 mm long, linear to wider just below the midline, then with 2 obscure rounded lateral lobes 1–2 mm long and central, linear cusp ± 10 mm long, 20–24 mm long. *Filaments* 12–15 mm long, united below in a cylindric column 9–10 mm long, diverging in upper 3–5 mm; anthers 6–9 mm long, sometimes exceeding stigma lobes; pollen orange. *Ovary* cylindric-3-lobed, 8–10 mm long, exserted; style branches 10–12 × 2 mm, diverging, crests narrowly lanceolate-linear, 5–8 mm long. *Capsules* ellipsoid-oblong, 12–16 mm long. *Seeds* angular, prismatic, ± 1.5 mm long. *Flowering time*: mid-August to mid-September.

Distribution and ecology: a local endemic known with certainty only from south-trending slopes of a rocky hill south of De Rust in the Little Karoo, Western Cape, South Africa, but possibly also from south of Oudtshoorn; on red, sandy ground derived from Enon Conglomerate.



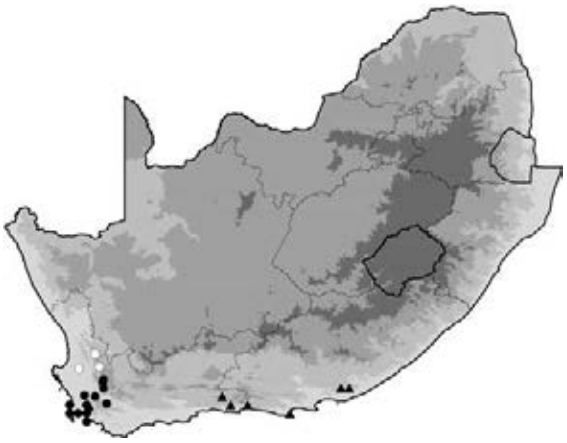
Distribution of ***Moraea regalis***.

Diagnosis: *Moraea regalis* is distinguished in subg. *Vieusseuxia* by the comparatively large, dark violet-purple flowers, the outer tepals 26–40 mm long with unusually long claws 10–12 mm long, and narrow, either ± linear or 3-lobed inner tepals. It is closely related to *M. unguiculata*, which has smaller flowers and almost always trilobed inner tepals with a large incurved central cusp and small but broadly obtuse lateral lobes. The slender filament column and narrow style branches are also characteristic of the *M. unguiculata* group of species. Typical plants south of De Rust have violet flowers but a collection from south of Oudtshoorn with pale blue flowers may also belong here.

144. **Moraea tricuspidata** *(L.f.) G.J.Lewis* in Journal of South African Botany 14: 89 (1948); Goldblatt 63: 765 (1976b); Goldblatt: 167 (1986a); Goldblatt et al.: 70 (2015). *Iris tricuspidata* L.f.: 98 (1782). *I. tricuspis* Thunb.: 14 (1782b), illegitimate superfluous name for *I. tricuspidata* L.f. *M. tricuspis* Ker Gawl.: 19: t. 696 (1803b), illegitimate superfluous name. *Vieusseuxia tricuspis* Fisch. ex Spreng., illegitimate superfluous name: 165 (1824); *Moraea tricuspis* Willd.: 691 (1809), illegitimate superfluous name. Type: South Africa, [Western Cape], probably foot of Devil's Peak, *Thunberg s.n.* [UPS–THUNB 1183, lecto., designated by Goldblatt 63: 765 (1976a)].

Plants 250–1 200 mm high. *Corms* 10–20 mm diam.; tunics of pale to dark brown, medium to coarse fibres. *Stem* simple or more often branched from upper axil, branches slender, held away from main axis, sheathing leaves with dry, brown, long attenuate tips, 50–70 mm long. *Foliage leaf* solitary, basal, channelled, 4–7 mm wide, exceeding stem, often trailing distally, sometimes with a large axillary cormlet. *Rhipidial spathes* green, sometimes brown in upper half, with dry attenuate apices, inner (30–)40–70 mm long, outer ± half as long. *Flowers* long-lived, white to pale creamy yellow, outer tepal limbs with brown to yellow-speckled nectar guides at bases, spreading, outer tepal claws yellow-speckled ± black, inner tepals ± brown, faintly vanilla-scented; outer tepals 17–30 × ± 15 mm, claws ± > $^1/_2$ as long as limbs, 3–5 mm wide at midpoint, pubescent, inner tepals 10–12 mm long (excluding central cusp), 3-lobed, lateral lobes obtuse, central lobe slender, obliquely coiled inward, 3–5 mm long. *Filaments* 6–7 mm long, united in lower $^2/_3$ to almost entirely in minutely papillate column; anthers ± 5 mm long. *Ovary* ± ellipsoid-ovoid, 8–12 mm long; style branches 4–7 mm long, crests 4–7 mm long. *Capsules* club-shaped, (12–)18–25 mm long. *Seeds* angular, prismatic. *Chromosome number 2n* = 12, 24. *Flowering time*: September to mid-November.

Distribution and ecology: relatively widespread in southwestern South Africa, extending from the Cederberg and Cape Peninsula to Caledon in Western Cape and from the Kammanassie Mtns in the Little Karoo through the Long Kloof to Grahamstown in Eastern Cape; usually on clay or loamy soils; flowering is stimulated by fire or clearing of surrounding vegetation. The disjunction in



Distribution of ***Moraea tricuspidata*** subsp. ***tricuspidata***, ●; subsp. ***cormifera***, ▲; subsp. ***parviflora***, ○.

the range between the western and eastern populations appears to be a true one.

Diagnosis: *Moraea tricuspidata* is readily distinguished in sect. *Vieusseuxia* by the comparatively large, white or sometimes pale creamy yellow flowers with spreading, comparatively broad tepal limbs forming a wide cup. The inner tepal limbs are 3-lobed with rounded lateral lobes and a slender central lobe up to 5 mm long, usually obliquely coiled inward (sometimes straight in subsp. *parviflora*). Closely allied to *M. bellendenii* and sometimes barely distinguishable from it without knowledge of flower colour, *M. tricuspidata* is a shorter plant, rarely exceeding 500 mm in height, whereas *M. bellendenii* has deep yellow flowers and is a taller, more slender species, 500–1 000 mm high. Slight but apparently consistent differences in size of floral parts can usually be relied upon to distinguish them. Although they have somewhat different habitat preferences and flowering times, the two occasionally grow close to one another at sites on the Cape Peninsula, where hybrids between the two occur, these intermediate in height and with pale yellow flowers.

Three subspecies are recognised. The northwestern populations, assigned to subsp. *parviflora*, have smaller flowers, sometimes pale yellow, and are often taller, standing up to 1.2 m high with up to six branches at each aerial node. The eastern populations, subsp. *cormifera*, were first mistakenly assigned to *M. bellendenii* as subsp. *cormifera*, and are distinguished by the presence of a cormlet in the axil of the foliage leaf and often slightly smaller flowers. Subsp. *cormifera* is tetraploid, $2n = 24$ (based on two population counts), while subsp. *tricuspidata* is diploid, $2n = 12$ (based on plants from the Cape Peninsula).

Subsp. *cormifera* has outer tepals ± 25 mm long (vs. up to 30 mm in subsp. *tricuspidata*) and somewhat shorter filaments, 4–5 mm long united almost entirely (vs. 6–7 mm long and united in the lower two thirds) and style branches ± 4 mm long (vs 6–7 mm).

Key to subspecies

1a Outer tepals 17–22 mm long with limbs ± elliptic, < $^1/_2$ as wide as long, 10–13 × 6–10 mm; anthers 3.5–4.0 mm long; plants of the Cederberg, Cold Bokkeveld and Piketberg. . . . . 144b. subsp. *parviflora*

1b Outer tepals 23–30 mm long with limbs ± orbicular, ± as wide as long, 13–15 × 13–15 mm; anthers ± 5 mm long; plants of the southern Western Cape and southern Eastern Cape:

2a Foliage leaf axil without with an axillary cormlet; style branches 6–7 mm long; filaments 6–7 mm long, united below, free in upper $^1/_3$. . . . . 144a. subsp. *tricuspidata*

2b Foliage leaf axil usually bearing a solitary cormlet; style branches 4–6 mm long; filaments 4–6 mm long, united ± entirely 144c. subsp. *cormifera*

144a. subsp. **tricuspidata**

Moraea confusa G.J.Lewis: 89 (1948). Type: South Africa, without precise locality or collector, illustration in Ker Gawl: t. 696 (1803b).

Plants 250–600 mm high. *Stem* simple or more often branched from upper axils. *Rhipidial spathes*: inner (30–)40–70 mm long, outer ± half as long. *Flowers* white to creamy white, outer tepal limbs with brown to yellow-speckled nectar guides at bases, outer tepal claws yellow-speckled ± black, inner tepals ± brown; outer tepals 25–30 × ± 15 mm, limbs orbicular, nearly as wide as long, claws 3–5 mm wide at midpoint, pubescent, inner tepals 10–12 mm long (excluding central cusp), central lobe of limb slender, obliquely coiled inward, 3–5 mm long. *Filaments* 6–7 mm long, united in lower $^2/_3$ to almost entirely; anthers ± 5 mm long. *Ovary* ± ellipsoid-ovoid, 8–12 mm long; style branches 4–7 mm long, crests 4–7 mm long. *Capsules* 18–25 mm long. *Chromosome number* $2n = 12$.

Distribution: restricted to the extreme southwest, from Malmesbury to Caledon.

Diagnosis: subsp. *tricuspidata* has mostly larger flowers with outer tepals up to 30 mm long and with orbicular limbs about as wide as long, and inner tepals with the central lobe 3–5 mm long and obliquely coiled inward.

144b. subsp. **parviflora** *Goldblatt & J.C.Manning* in Goldblatt et al. in South African Journal of Botany 99: 70 (2015). Type: South Africa, Western Cape, Piketberg, southern end of plateau, burned sandstone slope, 655 m, 9 Oct. 2014, *Goldblatt & Porter 14064* (NBG, holo.; K, MO, PRE, iso.).

Plants 500–1 200 mm high. *Stem* several branched, branching at all 3 or 4 aerial nodes with 2 to 6 branches at each node, branches slender, ± erect, sheathing leaves with dry, brown, long attenuate tips, 50–70 mm long. *Rhipidial spathes*: inner 40–50 mm long, outer ± half as long. *Flowers* white to creamy white, outer tepal limbs pale yellow at bases, claws darkly speckled on

pale yellow ground, inner tepals brown with yellow tips; outer tepals 17–22 mm long, claws 6–10 mm long, ascending, limbs elliptic, 10–13 × 6–10 mm, inner tepals 8–12 mm long, narrow central lobe 1–3 mm, straight or twisted. *Filaments* 3.5–5.5 mm long, free in upper 1–2 mm; anthers ± 3.5 mm long. *Style* branches ± 3 mm long, crests 4–6 mm long. *Capsules* 12–14 mm long.

Distribution and ecology: restricted to the northwestern mountains of Western Cape, occurring at the southern end of the Piketberg, the Cederberg and Cold Bokkeveld; mostly on stony sandstone slopes, flowering well after fire.

Diagnosis: subsp. *parviflora* is distinguished by the relatively small, white or pale yellow flowers with outer tepals 17–22 mm long, the spreading limb 6–10 mm wide (less than half as wide as long), filaments united almost to the apex in a column, and short style branches ± 3 mm long. The inner tepals are brown with yellow tips and shortly trilobed with a slender central cusp 1–3 mm long.

Subsp. *parviflora* bears some resemblance to *M. unguiculata* in its small flower size and tepal shape but not in the style branches nor the inner tepals, 7–12 mm long, which although similar in length have a long slender inner cusp that is usually curved inward and never twisted. The style branches of subsp. *parviflora* likewise do not accord with those of *M. unguiculata.* Apart from differences in height and floral organs, subsp. *parviflora* has capsules 12–16 mm long, also smaller than those of subsp. *tricuspidata*, mostly 18–24 mm long.

144c. subsp. **cormifera** *(Goldblatt) Goldblatt & J.C.Manning* in Goldblatt et al. in South African Journal of Botany 99: 72 (2015). *Moraea bellendenii* subsp. *cormifera* Goldblatt: 236 (1973). Type: South Africa, [Eastern Cape], Albany Division, Atherstone, *Jacot-Guillarmod 6706* (GRA, holo.; GRA, iso.).

Plants 250–350 mm high. *Stem* few-branched, at the 2 or 3 aerial nodes with 1 to 3 branches at each node, bearing a single large cormlet at foliage leaf axil. *Rhipidial spathes*: inner 30–60 mm long, outer ± half as long. *Flowers* white to creamy white, outer tepal limb bases and claws speckled brown to gold; outer tepals 23–30 mm long, limbs orbicular, 13–15 × 13–15 mm; inner tepals 11–15 mm long, 3-lobed with narrow inner lobe incurved or spirally coiled. *Filaments* united to base of anthers, 4–6 mm long; anthers ± 5 mm long. *Style branches* 4–6 mm long, crests 5–6 mm long. *Capsules* 12–13 mm long. *Chromosome number 2n* = 24. *Flowering time*: late September and October.

Distribution and ecology: extending from the Kammanassie foothills in Western Cape to Port Elizabeth and Grahamstown in Eastern Cape, mainly along the coast; mostly on sandy loam in grassland.

Diagnosis: subsp. *cormifera* is immediately distinguished by the single, relatively large cormlet in the axil of the single foliage leaf, a feature rare in subg. *Vieusseuxia* and not otherwise known in *Moraea tricuspidata.* The white to creamy white flowers are similar to those of subsp. *tricuspidata* in size and shape, the outer tepal limbs orbicular, 13–15 × 11–15 mm, thus as wide as long or almost so. The filaments, somewhat shorter than in subsp. *tricuspidata*, are united for their entire length, whereas they are free apically elsewhere in the species. Capsules of subsp. *cormifera*, so far as known, are smaller than in subsp. *tricuspidata*, 12–13 mm long (vs. 18–25 mm). The disjunction in the ranges of subsp. *cormifera* and subsp. *tricuspidata* appears true and not an artifact of inadequate collecting.

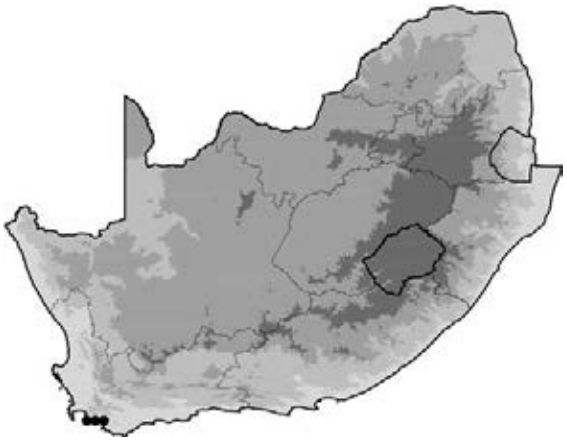
We note that at least populations of subsp. *cormifera* are tetraploid, $2n = 24$ (two counted, including the type population), whereas subsp. *tricuspidata* on the Cape Peninsula is diploid, $2n = 12$ (Goldblatt & Manning 2013).

145. **Moraea deltoidea** *Goldblatt & J.C.Manning* in Novon 10: 16 (2000a). Type: South Africa, Western Cape, Klein River Mtns, Vogelgat Nature Reserve, near Mainstream, 23 Nov. 1996, *Hanekom s.n.* (NBG, holo.; MO, PRE, iso.).

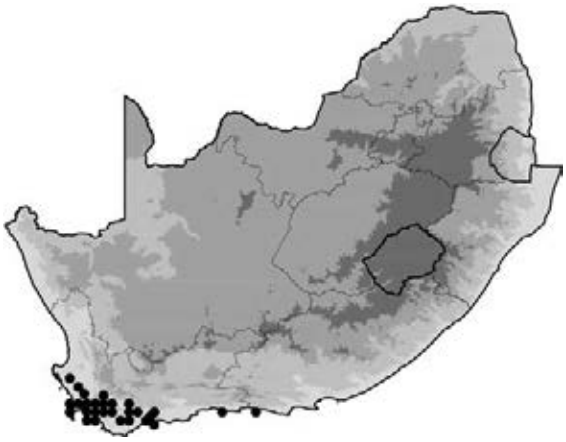
Plants 300–400 mm high. *Corm* globose, 8–14 mm diam.; tunics of light brown, fine fibres. *Stem* usually flexed outward at nodes, usually 3 internodes long, several-branched, with up to 3 branches per node, sheathing leaves 35–45 mm long, with dry, attenuate tips. *Foliage leaf* solitary, linear, channelled, exceeding stem, usually trailing above, 1.5–2.2 mm wide. *Rhipidial spathes* attenuate, dry and brown toward apices, inner 45–50 mm long, outer ± $^1/_2$. *Flowers* long-lived, pale creamy yellow, outer tepal limbs with dark spots at bases and on claws, slightly reflexed, claws diverging at ± 60°, forming a wide cup including stamens and style branches; outer tepals broadly obovate, 19–21 × 8–9 mm, claws ± 9 mm long; inner tepals oblanceolate, ± 14 × 4 mm. *Filaments* 4–5 mm long, united in lower $^2/_3$ in a slender column, free and diverging in upper ± 1.5 mm; anthers 4–6 mm long, diverging, slightly exceeding style branches and sometimes crests, creamy white; pollen orange. *Ovary* ± cylindric, ± 4 mm long, included or partly exserted; style branches slightly wider than anthers, 5–6 mm long, crests broadly deltoid, slightly < 1 mm long. *Capsules* club-shaped to ellipsoid, 8–10 mm long, well exserted. *Seeds* narrowly angular-prismatic, ± 2 mm long. *Flowering time*: October and November.

Distribution and ecology: restricted to the southern coast of Western Cape, South Africa, so far recorded only near Kleinmond and in the Klein River Mtns near Hermanus; on stony sandstone slopes, flowering well only after fire.

Diagnosis: a slender plant with solitary, narrow leaf, 1.5–2.0 mm wide, *Moraea deltoidea* is allied to *M. unguiculata* and *M. tricuspidata* and significant differences between them are restricted to the flowers. *Moraea deltoidea* has



Distribution of ***Moraea deltoidea***.



Distribution of ***Moraea bellendenii***.

oblanceolate inner tepals with a broad claw and short, somewhat attenuate limb extending outward or reflexed to the same degree as the outer tepal limbs. In *M. unguiculata* the inner tepals consistently have a fairly narrow claw and trilobed limb consisting of two shorter, obtuse lateral lobes and a slender, tapering central lobe that coils inward. The style crests of *M. unguiculata* are usually well developed and lanceolate, thus longer than wide whereas in *M. deltoidea* they are deltoid, thus wider than high. *Moraea deltoidea* may also be confused with *M. tricuspidata*, which has larger, creamy white flowers with 3-lobed inner tepals in which the lateral lobes are fairly broad and obtuse and the narrow central lobe curves inward obliquely.

146. **Moraea bellendenii** *(Sweet) N.E.Br.* in Bulletin of Miscellaneous Information Kew 1929: 139 (1929a); Goldblatt: 767 (1976a); Goldblatt: 170 (1986a). *Vieusseuxia bellendenii* Sweet: 395 (1826a), as a new name for *M. tricuspis* var. *lutea* Ker Gawl.: t. 772 (1804e). *M. pavonia* var. *lutea* (Ker Gawl.) Baker: 59 (1892). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 772 (1804e).

Vieusseuxia spiralis D.Delaroche: 31 (1766). Type: South Africa, without precise locality or collector, illustration in D.Delaroche: 31 (1766) [not *Moraea spiralis* L.f. (1782)].

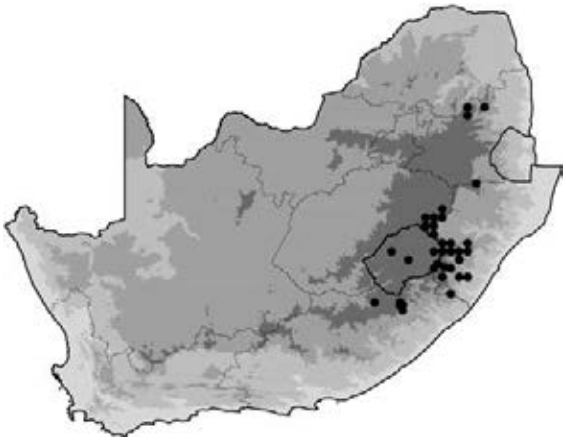
Plants slender, 500–1000(–1200) mm high. *Corms* 14–20 mm diam.; tunics of medium to coarse, light brown fibres. *Stem* several-branched mostly from upper nodes, branches slender, upright, sheathing leaves with dry, brown, attenuate apices, 60–100 mm long. *Foliage leaf* solitary, basal, linear, 5–10 mm wide, exceeding stem, erect below, trailing distally. *Rhipidial spathes* long attenuate, with dry, brown tips, inner 50–70 mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, yellow, darkly speckled on tepal claws, outer tepal limbs with speckled markings at bases, ± spreading, curving upward distally; outer tepals 22–33 × 14–18 mm, claw 9–13 mm long, broad, veined and speckled, limb ± as long as wide, inner tepals 3-lobed, 8–10 mm long (excluding inner cusp), usually ± 4 mm at widest, lateral lobes short and obtuse, inner linear, 2–4 mm long, coiled inward obliquely. *Filaments* 3–5 mm long, united in a column, diverging in upper 1 mm; anthers 4–5 mm long, dull yellow-brown; pollen yellow. *Ovary* ± cylindric, 8–10 mm long, exserted; style branches ± 6 mm long, crests 3–5(–8) mm long, narrowly triangular. *Capsules* club-shaped, 12–15 mm long. *Seeds* angular, prismatic. *Chromosome number* 2*n* = 12. *Flowering time*: October to November.

Distribution and ecology: relatively widespread in southwestern South Africa, extending from Darling on the Western Cape Atlantic Coast eastward to Knysna and Keurbooms River in Eastern Cape; most often on gravelly, granite-derived ground, but occasionally on heavy clay soils.

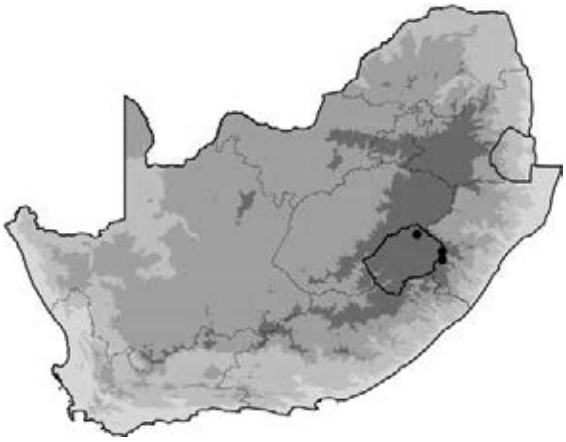
Diagnosis: closely allied to *Moraea tricuspidata* and often difficult to distinguish from it as dry specimens, *M. bellendenii* is a taller plant often exceeding 1 m in height with yellow flowers darkly spotted in the centre. The flowers have broad outer tepal limbs laxly spreading and curving upward distally, and 3-lobed inner tepals. As in white- to pale creamy yellow-flowered *M. tricuspidata*, the inner tepals have short, obtuse lateral lobes and a linear central cusp-like lobe that curves inward obliquely. The inner tepals of *M. bellendenii* are 8–10 mm long, whereas those of *M. tricuspidata* are 10–12 mm long. The two may also be distinguished by the filaments, 6–7 mm long in *M. tricuspidata* vs. 3–5 mm in *M. bellendenii.*

147. **Moraea trifida** *R.C.Foster* in Contributions from the Gray Herbarium 114: 40 (1936), as a new name for *M. rogersii* N.E.Br.: 344 (1929b), illegitimate homonym, not *M. rogersii* Baker (1892); Goldblatt: 233 (1973); Goldblatt: 156 (1986a). Type: South Africa, [Mpumalanga], Pilgrims Rest, *Rogers s.n.* (K, holo.).

Moraea culmea Killick: 436 (1954). Type: South Africa, [KwaZulu-Natal], Cathedral Peak, *Killick 1558* (PRE, holo.; BOL, K, LD, NBG, NU, P, iso.).



Distribution of ***Moraea trifida***.



Distribution of ***Moraea dracomontana***.

Plants mostly 250–500 mm high. *Corm* 10–20 mm diam.; tunics of medium-textured, straw-coloured fibres. *Stem* simple or several branched, branches suberect, sheathing leaves 1 or 2(3), 50–60 mm long, with dry, brown, attenuate apices. *Foliage leaf* solitary, inserted well above ground; varying in length at flowering, ultimately up to 600 mm long, linear, channelled, 3–4 mm wide. *Rhipidial spathes* with dry, brown, apices, inner 40–70 mm long, outer 10–20 mm shorter. *Flowers* long-lived, pale yellow to creamy white, dotted brown to green; outer tepals lanceolate, 15–20 × 5–10 mm, limb 8–10 mm long reflexed to 60º, claws suberect; inner tepals up to 15 mm long, 3-lobed, lateral lobes, short, obtuse, inner linear, ± erect, 5–7 mm long. *Filaments* 7–9 mm long, free in upper 1.5 mm; anthers ± 4 mm long, often exceeding style branches, brown; pollen yellow. *Ovary* ± cylindric, 7–10 mm long; style branches ± 4 mm long, crests ± linear, up to 4 mm long. *Capsules* ovoid-elliptic, 18–20 mm long. *Seeds* angular prismatic. *Chromosome number* 2*n* = 12. *Flowering time*: mostly November to March.

Distribution and ecology: widespread in eastern South Africa, from Qacha's Nek in Eastern Cape to Pilgrim's Rest in northern Mpumalanga, also in Lesotho; on grassy slopes, up to 2 800 m.

Diagnosis: one of several eastern southern African species of sect. *Vieusseuxia* with 3-lobed inner tepals, *Moraea trifida* is distinguished by the dull-coloured, pale yellow to creamy brown flowers, dotted brown to green. The outer tepal limbs are strongly reflexed and the foliage leaf is distinctive in being inserted well above ground. The dull flower colouring recalls some morphs of the winter-rainfall species, *M. unguiculata,* but the resemblance is superficial. The foliage leaf in *M. unguiculata* is basal and the flowers are usually smaller.

148. **Moraea dracomontana** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 231 (1973); Goldblatt: 164 (1986a). Type: South Africa, [KwaZulu-Natal], Giant's Castle, Langalibalele Pass, *Trauseld 500* (PRE, holo.; CPF, NU, iso.).

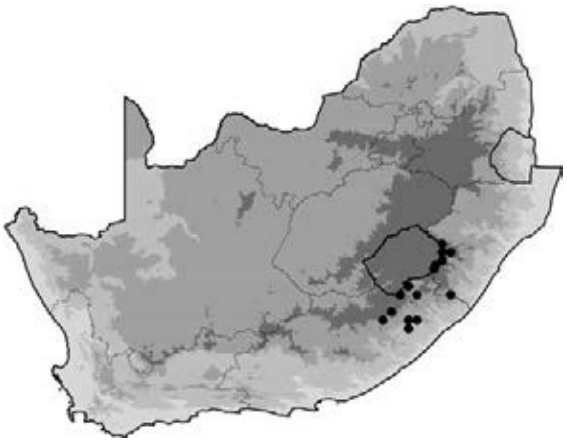
Plants 200–300 mm high, often with a collar of fibres around base. *Corm* ± 10 mm diam.; tunics of fine, light brown fibres. *Stem* simple, rarely 1-branched, 3 internodes long, sheathing leaves 2, with dry, brown, attenuate apices, 35–55 mm long. *Foliage leaf* solitary, basal, linear, narrowly channelled, sometimes appearing ± terete but with adaxial grove, ± as long as stem, 2–3 mm wide. *Rhipidial spathes* with dry, brown, attenuate apices, inner ± 50 mm long, outer slightly < $^{1}/_{2}$ as long. *Flowers* long-lived, purple, outer tepal limbs with yellow nectar guides at bases, half reflexed; outer tepals 25–30 mm long, limb 16–18 mm long, claws ± $^{2}/_{3}$ as long; inner tepals 5–10 mm long, 3-lobed, lateral lobes linear with expanded apex, obtuse, inner lobe linear, acute, either shorter or longer than lateral lobes. *Filaments* 5–6 mm long, united in lower half; anthers ± 6 mm long, mauve; pollen yellow. *Ovary* cylindric-ellipsoid, 6–9 mm long; style branches ± 8 mm long, crests lanceolate, 5–6 mm long. *Capsules* ellipsoid, 9–11 mm long. *Seeds* angular-prismatic. *Flowering time*: December to January.

Distribution and ecology: restricted to high elevations in the central Drakensberg of KwaZulu-Natal, South Africa, and adjacent Lesotho; usually in moist sites, often near streams or in the shelter of rock outcrops.

Diagnosis: *Moraea dracomontana* is distinctive among the eastern southern African species of sect. *Vieusseuxia* in its attractive dark purple flowers with yellow nectar guides, and 3-lobed inner tepals, the linear central lobe shorter or sometimes longer than the lateral lobes which have rounded, expanded tips.

149. **Moraea albicuspa** *Goldblatt* in Annals of the Missouri Botanical Garden 60: 230 (1973); Goldblatt: 163 (1986a). Type: South Africa, [KwaZulu-Natal], Drakensberg, source of Tina River, Mar. 1904, *Galpin 6846* (BOL, holo.; PRE, SAM, iso.).

Moraea jarmilae J.J.Halda: 69, fig. 79 (2002). Type: Lesotho, Drakensberg, vicinity of Ox Bow, ± 3 100 m, 10 Mar. 1989, *J.J. & J. Halda s.n. PR4710* (PR, holo.).



Distribution of ***Moraea albicuspa***.

Plants 400–600 mm high, often with fibrous collar around base. *Corm* 14–20 mm diam.; tunics of brown fibres. *Stem* simple or 1- or 2-branched, sheathing leaves 3 or 4, with dry brown, attenuate apices, 40–60 mm long. *Foliage leaf* solitary, basal, channelled, linear, exceeding stem, often dry and broken distally. *Rhipidial spathes* with dry, brown, attenuate apices, inner 50–70 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* long-lived, white to creamy yellow, outer tepal limbs with narrow, deep yellow nectar guides at bases, spreading or laxly reflexed; outer tepals 30–35 × ± 15 mm, limb 15–20 mm long, claws as long to slightly shorter, darkly speckled, smooth; inner tepals vestigial, 5–7 mm long, hair-like, sometimes obscurely 3-lobed distally. *Filaments* ± 7 mm long, united below, free and diverging in upper 1 mm; anthers 5–6 mm, white; pollen white. *Ovary* ± cylindric, 7–9 mm long; style branches ± 7 mm long, crests ± linear, 7–8 mm long. *Capsules* and *seeds* unknown. *Flowering time*: January to March.

Distribution and ecology: relatively widespread, extending from Ox Bow in Lesotho south though interior KwaZulu-Natal, South Africa, to the Drakensberg of Eastern Cape above Engcobo; in rocky sites.

Diagnosis: *Moraea albicuspa* is readily distinguished by its relatively large white to pale yellow flowers, the outer tepals with narrow, deep yellow nectar guides, and the much reduced inner tepals, hair-like cusps just 5–7 mm long, usually entire, or obscurely 3-lobed at the apex. One of the taller species of eastern southern African species of sect. *Vieusseuxia*, it stands up to 600 mm high.

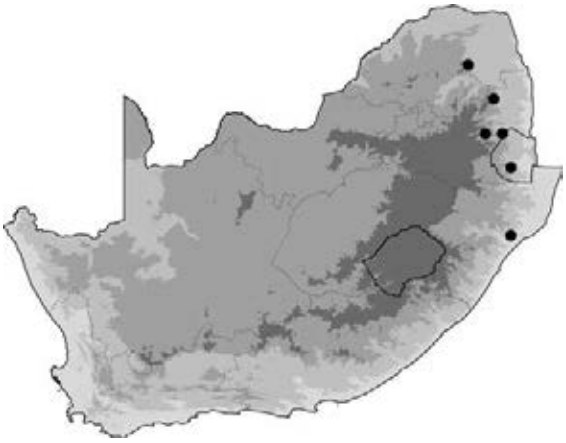
150. **Moraea marionae** *N.E.Br.* in Transactions of the Royal Society of South Africa 17: 347 (1929b); Goldblatt: 235 (1973); Goldblatt: 159 (1986a). Type: South Africa, [Limpopo], Woodbush, *Blenkiron sub Moss 15565* (K, holo.).

Moraea exilis N.E.Br.: 348 (1929b). Type: South Africa, [Mpumalanga], Saddleback, *Galpin 467* (K, holo.; PRE, iso.).

Plants small, mostly 200–300 mm high, often with a collar of fibres around base. *Corm* ± 10 mm diam.; tunic of pale straw-coloured fibres. *Stem* slender, simple, 2 internodes long, sheathing leaves green with dry, brown, attenuate apices, 24–45 mm long. *Foliage leaf* lacking or emergent at flowering, solitary, ultimately exceeding stem, terete. *Rhipidial spathes* with attenuate, brown apices, inner 33–50 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* long-lived, white to pale blue, marked with lilac veins, outer tepal limbs with deep yellow nectar guides at bases, reflexed to 30–50°, claws speckled with purple spots on a broad median yellow band; outer tepals 10–20 × 6.5–7.5 mm, lanceolate, claws ascending, slightly shorter than limbs; inner tepals 7.5–12.0 mm long, erect, 3-lobed, lateral lobes short, ovoid, obtuse, inner cusp-like, linear, 3–4 mm long, curving inward, brown-dotted. *Filaments* 4–5 mm long, united or free in upper 0.5 mm; anthers 3–4 mm long, shortly exceeding style branches. *Ovary* club-shaped, ± 5 mm long; style branches diverging, ± 4 mm long, crests slender, 2–3 mm long. *Capsules* barrel-shaped, up to 10 mm long. *Seeds* unknown. *Flowering time*: August to October.

Distribution and ecology: South Africa, extending from the Woodbush near Haenertsburg in Limpopo through Mpumalanga and Eswatini to eastern KwaZulu-Natal near Eshowe; usually in montane grassland.

Diagnosis: spring-flowering *Moraea marionae* is an inconspicuous plant and even in bloom the small, white to pale blue flowers are difficult to spot in the resprouting grass. As a result it remains poorly documented over its relatively wide range. The outer tepals are only 10–20 mm long, the limbs rarely longer than 12 mm, and the inner tepals are 3-lobed with small, rounded lateral lobes and a linear central cusp that is coiled inward. The terete leaf is often absent or just emergent at flowering time and attains its full length during the summer after the capsules have ripened. No plants with fully developed leaves are known. Its relationships are most likely with *M. trifida*, also of eastern southern Africa but with larger, brown to greenish flowers, also with 3-lobed inner tepals, but a channelled leaf present at flowering.



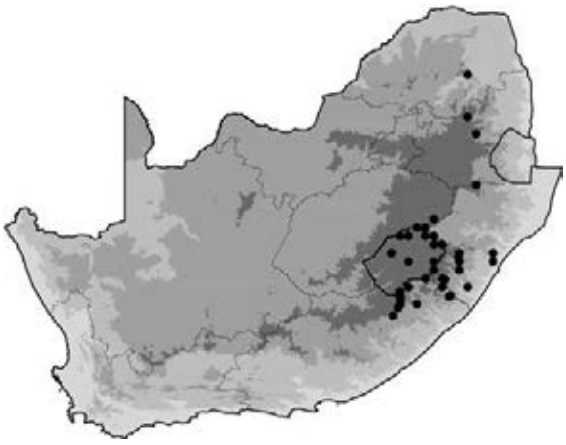
Distribution of ***Moraea marionae***.

151. **Moraea modesta** *Killick* in Bothalia 6: 437 (1954); Goldblatt: 232 (1973); Goldblatt: 166 (1986a). Type: South Africa, [KwaZulu-Natal], Cathedral Peak Forest Station, *Killick 1028* (PRE, holo.).

Plants small, mostly 100–200 mm high, with fibrous collar around base. *Corm* ± 10 mm diam.; tunics of very fine, light brown fibres. *Stem* slender, rarely branched, mostly with 2(3) aerial internodes, sheathing leaves with dry, brown attenuate apices, 40–50 mm long. *Foliage leaf* solitary, basal, usually dry at flowering or absent, new leaf sometimes emergent, ultimately exceeding stem, evidently terete but with narrow adaxial groove. *Rhipidial spathes* with dry brown apices, inner 30–50 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* long-lived, white to pale mauve, veined with purple, style branches and crests dark purple, outer tepal limbs with small, pale yellow nectar guides at bases, spreading; outer tepals 20–27 × 12–15 mm, limbs 12–15 mm long; inner tepals minute, 5–6 mm long, linear or trifid with inner cusp ± 1 mm long. *Filaments* 3–6 mm long, usually united for ± half their length, rarely ± free to base or free only in upper ± 0.5 mm; anthers ± 6 mm long. *Ovary* ± cylindric, 7–8 mm long, style branches ± 7 mm long, narrow, crests linear, ± 6 mm long. *Capsules* obovoid-ellipsoid, 10–12 mm long. *Seeds* angular. *Flowering time*: mainly September to November.

Distribution and ecology: occurring in Lesotho and South Africa where it extends from Machadodorp and Wakkerstroom in Mpumalanga, through eastern Free State to Mount Fletcher in Eastern Cape, especially common in KwaZulu-Natal; mainly in montane grassland at elevations of 1 500–3 000 m, most often flowering after fire.

Diagnosis: readily recognised by its small, predominantly white flowers with outer tepals up to 27 mm long, and dark purple style branches and crests, *Moraea modesta* is a low-growing species, seldom reaching more than 200 mm in height. The vestigial inner tepals are 5–6 mm long, either hair-like cusps or obscurely 3-lobed at the apex. It is one of several species that flower after the foliage leaf, produced the previous summer, is dry and dead. The leaf is sometimes retained at flowering, still attached to the base of the flowering stem but more often has decayed and is no longer evident. A new, emergent leaf is sometimes present at flowering, extending well above the stem later in the growing season.



Distribution of ***Moraea modesta***.

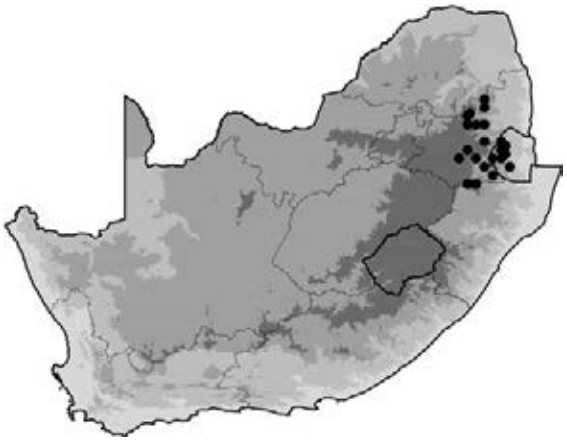
Populations from near Machadodorp in central Mpumalanga have more-or-less free filaments, unusual for the species, and require additional study. In other populations the filaments are united for at least half their length.

152. **Moraea pubiflora** *N.E.Br.* in Transactions of the Royal Society of South Africa 17: 348 (1929b); Goldblatt: 227 (1973) & 160 (1986a). Type: Swaziland, Hlatikulu, *Stewart s.n.* (K, holo.; PRE, iso.).

Plants mostly 450–600 mm high. *Corm* 14–20 mm diam.; tunics of dark brown netted fibres. *Stem* with 2 or 3 aerial internodes, up to 10-branched, rarely simple, sheathing leaves with dry brown, attenuate apices, 50–80 mm long. *Foliage leaf* solitary, ± basal, linear, channelled, 3–4 mm wide, either exceeding stem or trailing distally. *Rhipidial spathes* with dry, attenuate apices, inner 60–80 mm long, outer ± $^{1}/_{2}$ as long. *Flowers* long-lived, white to pale blue or lilac, outer tepal limbs with nectar guides of small brown dots at bases, lanceolate, half reflexed, inner tepals and style branches dotted green or brown; outer tepals 25–30 mm long, claws ascending, ± as long as limbs, velvety on inner surface, velvety to scabrid outside; inner tepals 3-lobed, lobes laxly spreading, subequal, ± linear, 5–7 mm long, obtuse. *Filaments* 13–15 mm long, united in a slender column, free in upper ± 2 mm; anthers 5–6 mm long, often exceeding stigma lobes, yellow; pollen white to yellow. *Ovary* ± cylindric, 6–8 mm long, usually exserted; style branches ± 6 mm long, crests linear, 4–5 mm long. *Capsules* club-shaped, 9–11 mm long. *Seeds* angular-prismatic. *Flowering time*: December to March.

Distribution and ecology: occurring in northeastern southern Africa along eastern the Escarpment, from Dullstroom in Mpumalanga south through Eswatini to Wakkerstroom; in stony grassland and low bush.

Diagnosis: up to 600 mm tall, *Moraea pubiflora* is a fairly robust species of sect. *Vieusseuxia* and most easily distinguished by inner tepals divided into 3 subequal slender, spreading, brown-speckled lobes, the outer two expanded at the tips and obtuse, and the inner slender with a ± acute apex and curving upward distally. The outer tepal limbs are typically white but the claws, inner tepals and style branches and crests are densely dotted with dark brown on a pale yellow to greenish background. A particularly unusual feature of the species is the scabrid to velvety surface of the outside of the outer tepals. Similar in flower structure, although smooth or



Distribution of ***Moraea pubiflora***.

papillate on the outside of the outer tepals, *M. brevistyla* has similarly coloured but much smaller flowers, the outer tepals 18–20 mm long and the filaments just 5–7 mm long compared with outer tepals 25–30 mm long and filaments 13–15 mm long in *M. pubiflora*.

153. **Moraea brevistyla** *(Goldblatt) Goldblatt* in Annals of Kirstenbosch Botanical Garden 14: 162 (1986a). *M. pubiflora* subsp. *brevistyla* Goldblatt: 229 (1973). Type: South Africa, [KwaZulu-Natal], Cathkin Park, *Galpin s.n.* (BOL [30823], holo.).

Plants mostly 250–500 mm high. *Corm* ± 15 mm diam.; tunics of dark brown, relatively fine, netted fibres. *Stem* of 2 to 4 aerial internodes, several-branched, sheathing leaves with dry brown, attenuate apices, 35–70 mm long. *Foliage leaf* solitary, ± basal, linear, channelled, 2–4 mm wide, ± erect, exceeding stem, trailing distally. *Rhipidial spathes* with dry, attenuate apices, inner 40–75 mm, outer ± $^1/_2$ as long. *Flowers* long-lived, predominantly white, sometimes flushed blue to mauve with age, tepals grey to pale purple on reverse, outer tepal limbs with nectar guides of small brown dots at bases, lanceolate, spreading to half reflexed, claws smooth or papillate, inner tepals and style branches yellow finely dotted green or brown; outer tepals 16–30 mm long, claws ascending, ± as long as claws, bearded on inner surface, papillate or smooth on outer surface; inner tepals 3-lobed, lateral lobes slender, laxly spreading, lateral lobes slender, 4–10 mm long, obtuse, erect, inner lobe linear, acute, 4–6 mm long, arching outward. *Filaments* 5–7 mm long, united in a slender column, free in upper 0.5–3.0 mm; anthers 4–5 mm long, often exceeding stigma lobes, yellow; pollen yellow. *Ovary* ± cylindric, 5–6 mm long, usually exserted; style branches 4 mm long, crests linear, 2–5 mm long. *Capsules* club-shaped-ovoid, 6–10 mm long. *Seeds* unknown. *Flowering time*: late November to March.

Distribution and ecology: eastern South Africa, Lesotho and Eswatini from the Mpumalanga/northern KwaZulu-Natal Border through western Free State and Lesotho to Kokstad in southern KwaZulu-Natal and to the Elandsberg and Katberg in Eastern Cape; fairly common in middle and upper elevation grassland.

Diagnosis: *Moraea brevistyla* is recognised but the moderate-sized to small white, sometimes blue to mauve flushed flowers, the outer tepals only 16–30 mm long and with a spreading to half reflexed limb 9–20 mm long, and characteristic inner tepals with the limbs consisting of three linear, subequal lobes with the inner lobe spreading and arching upward distally. It is closely allied to the Mpumalanga and Eswatini *M. pubiflora*, with strikingly similar but substantially larger white flowers, the outer tepals 25–30 mm long and disproportionately long filaments with a column ± 13 mm long vs. 4 to 9 mm in *M. brevistyla*. *Moraea pubiflora* also has unusual scabrid or velvet outer surfaces of the large outer tepals, whereas in *M. brevistyla* the reverse of the outer tepal claws is smooth or minutely papillate. The ranges of the two overlap in the Wakkerstroom area of the Mpumalanga–KwaZulu-Natal Border, but the two species remain distinct morphologically. *Moraea brevistyla* is parapatric in the Sentinel area of the northern high Drakensberg with the very similar *M. vigilans* and their differences are outlined below. Two subpecies are recognised, the typical extending from Royal Natal National Park and Lesotho to Eastern Cape, and subsp. *papillosa* in the northern part of the range, from the Sentinel and Golden Gate National Park to Eswatini.

Key to subspecies

1a Outer tepals 16–22 mm long; outer tepal claws smooth (rarely papillate) outside; outer rhipidial spathe 40–50 mm long; filaments 4–6(7) mm long. . . . . 153a. subsp. *brevistyla*

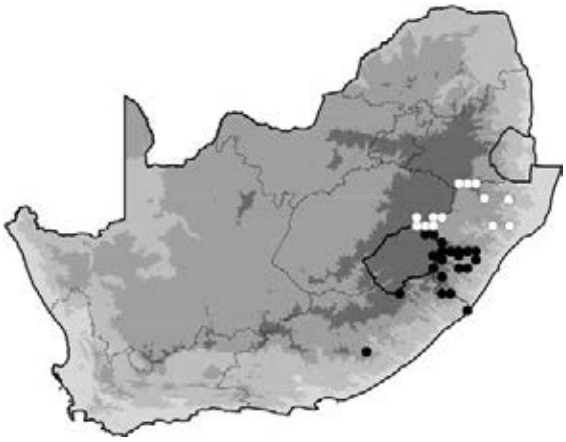
1b Outer tepals 25–30 mm long; outer tepal claws papillate outside; outer rhipidial spathe (50)60–80 mm long; filaments 8–9 mm long. . . . . 153b. subsp. *papillosa*

153a. subsp. **brevistyla**

Plants with outer rhipidial spathes 40–50 mm long; *Flowers* with outer tepals 16–22 mm long, with claws smooth (rarely papillate) outside; inner tepal claws 3–5 mm long. *Filaments* 4–6(7) mm long, free in upper 0.4–1.5 mm; anthers 4–5(6) mm long.

Distribution and ecology: extending from Royal Natal National Park near Tendele to the KwaZulu-Natal Midlands and southern Lesotho, and Elandsberg and Katberg in Eastern Cape; in rocky grassland.

Diagnosis: subsp. *brevistyla* is the smaller-flowered subspecies, thus distinguished by the outer tepals 16–22 mm long with the claws smooth outside (rarely minutely papillate), inner tepal claws short, 3–5 mm long, and filaments 4–6(–7) mm long. The inner rhipidial spathes are also relatively short, 40–50 mm long.



Distribution of ***Moraea brevistyla*** subsp. ***brevistyla***, ●; subsp. ***papillosa***, ○.

153b. subsp. **papillosa** *Goldblatt & J.C.Manning*, new subspecies. Type: South Africa, Free State, Mont aux Sources, slopes, *Flanagan 2037* (PRE, holo.; BOL, SAM, iso.)

Plants with outer rhipidial spathes (50)60–80 mm long; *Flowers* with outer tepals 25–30 mm long, with claws papillate outside; inner tepal claws 5.0–7.5 mm long. *Filaments* 7–9 mm long, free in upper 2–3 mm; anthers 4–5 mm long.

Distribution and ecology: extending from eastern Free State at Golden Gate National Park north to Wakkerstroom and the Mpumalanga–KwaZulu-Natal border area in rocky grassland.

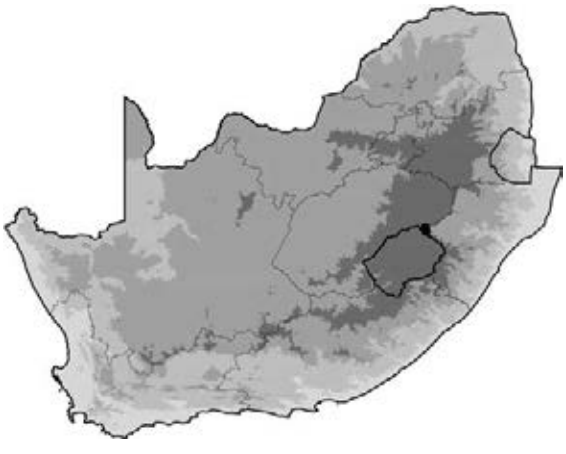
Diagnosis: subsp. *papillosa* is distinguished by the larger flowers with outer tepals 25–30 mm long with the claws always papillate outside, inner tepal claws 5.0–7.5 mm long, and filaments 7–9 mm long. The inner rhipidial spathes are also longer, mostly 60–80 mm long, occasionally only 50 mm long.

154. **Moraea vigilans** *Goldblatt & J.C.Manning* in Novon 10: 17 (2000a). Type: South Africa, Free State, slopes of The Sentinel, 15 Feb. 1999, *Goldblatt & Manning 11046* (NBG, holo.; K, MO, PRE, iso.).

Plants 500–700 mm high. *Corm* globose, 8–15(–20) mm diam.; corms with tunics of fine, light brown fibres. *Stem* 3 or 4 internodes long, usually branched at 2 upper internodes, with up to 4 branches per node, sheathing leaves 42–50 mm long, green with dry, brown, attenuate apices. *Foliage leaf* solitary, ± basal, linear, channelled, erect, often ± as long as stem, often bent and trailing above, 3–4 mm wide. *Rhipidial spathes* with dry, brown, acute(–attenuate) apices, inner 50–55 mm long, outer ± $^2/_3$ as long. *Flowers* long-lived, white, often faintly tinged with mauve especially reverse of tepals, outer tepal limbs with bluish bands or spots toward bases, speckled with mauve over lower $^1/_3$–$^2/_3$, rarely over entire surface, claws banded with mauve lines, inner tepals brown with ± white dots, sweetly scented; outer tepals 24–28 × 14–17 mm, claws ascending, 7–9 mm long, limb ± broadly ovate, spreading; inner tepals erect, 8.5–10.0 mm long, 3-lobed, lateral lobes spathulate, 5–6 mm long, inner lobe filiform, arching outward, 4–6 mm long. *Filaments* 4.0–4.5 mm long, united in a column ± 3 mm long, diverging in upper 1.0–1.5 mm; anthers ± 4 mm long, bluish, apiculate; pollen yellow. *Ovary* oblong-cylindric, 5–6 mm long; style branches 4–5 mm long, crests narrowly triangular 3–4 mm long, brown. *Capsules* oblong, 12–15 × ± 5 mm. *Seeds* angular-prismatic, ± 1.2 mm long. *Flowering time*: January to mid-February.

Distribution and ecology: a narrow endemic of the northern high Drakensberg, so far recorded only on the slopes of The Sentinel, which lies close to the borders of KwaZulu-Natal and Free State in South Africa (probably also in Lesotho); locally common on steep, moist slopes on basalt outcrops in peaty loam.

Diagnosis: *Moraea vigilans* is evidently closely related to the widespread *M. brevistyla* but the two are readily distinguished when alive. They grow within a few metres of one another on the slopes of The Sentinel where *M. brevistyla* grows on deeper soils on grassy slopes and *M. vigilans* is confined to basalt outcrops. The most striking difference between them is the broadly ovate to orbicular outer tepal limbs of *M. vigilans*, spreading or ascending up to 30°, whereas the narrower, oblanceolate-obovate outer tepal limbs of *M. brevistyla* are weakly to strongly reflexed and the limbs are usually pinched downward in the proximal third. Less apparent are the shorter outer tepal claws of *M. vigilans*, 7–9 mm long, and shorter filament column and style branches, the latter reaching opposite the apex of the outer tepal limb. The short, brownish crests extend upward above the base of the tepal limbs for up to 4 mm. The outer tepal claws of *M. brevistyla* are 9–11 mm long, the filaments and anthers are longer than those of *M. vigilans* (11–12 mm combined length in *M. brevistyla* vs. ± 8.5 mm in *M. vigilans*), and the style branches usually exceed the outer



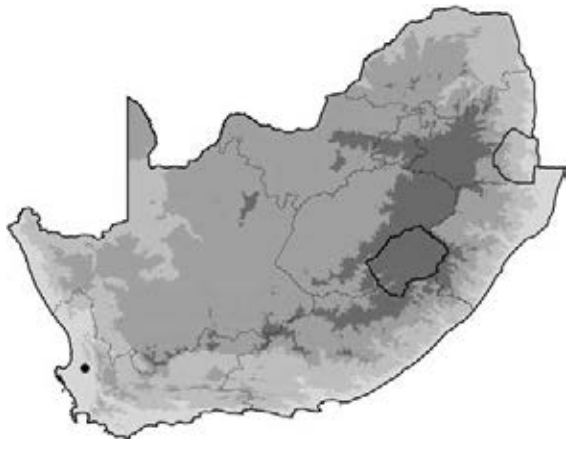
Distribution of ***Moraea vigilans***.

tepal limbs by up to 3.5 mm, while the white style crests extend upward a further 5 mm. Vegetatively the two species appear virtually identical but the stems of *M. vigilans* are somewhat willowy and incline toward the ground, whereas the stems of *M. brevistyla* are usually stiffly erect.

155. **Moraea decipiens** *Goldblatt & J.C.Manning* in Bothalia 42: 115 (2012b). Type: Western Cape, Piketberg, Farm Noupoort, south-trending, rocky sandstone slope in shallow pockets of soil, 2 Nov. 2011, *Goldblatt & Porter 13709* (NBG, holo.; K, MO, PRE, iso.).

Plants 300–450 mm high. *Corm* 9–12 mm diam.; tunics of pale, fine fibres. *Stem* simple, rarely 1-branched, sheathing leaves 45–55 mm long, green with dry attenuate apices. *Foliage leaf* solitary, linear, channelled but with margins folded together, 0.7–1.5 mm diam., exceeding stem, often trailing above, sometimes with cormlet in axil. *Rhipidial spathes* with dry, brown, attenuate tips, inner 35–40 mm long, outer ± half as long. *Flowers* long-lived, purple, outer tepal limbs with white, wedge- or V-shaped, minutely papillate nectar guides at bases, dark purple in centre, laxly spreading; outer tepals 20–23 mm long, claws 8–9 mm long, with wide, dark violet median stripe, limb 12–15 × 6–8 mm; inner tepals 7–10 mm long, ± erect, 3-lobed, lateral lobes rounded, central lobe 3–4 mm long, tapering to attenuate, laxly twisted apex. *Filaments* 3.5–4.0 mm long, united in lower ± 2 mm; anthers 4.5–6.0 mm long, sometimes shortly exceeding stigma lobe, dark purple-black; pollen orange-red. *Ovary* narrowly oblong, 7–9 mm long, usually exserted in mature flower; style branches 7–9 × 1–2 mm, crests narrowly wedge-shaped, ± 5 mm long, erect. *Capsules* narrowly ovoid, 8–11 mm long. *Seeds* angular, 1.2–1.5 mm long, angles forming raised, pale, ± spongy ridges. *Flowering time*: late October to mid-November.

Distribution and ecology: restricted to the eastern half of the Piketberg in Western Cape, South Africa, evidently at middle elevations; on stony sandstone slopes in shallow pockets of soil among restiads and low shrubs.



Distribution of ***Moraea decipiens***.

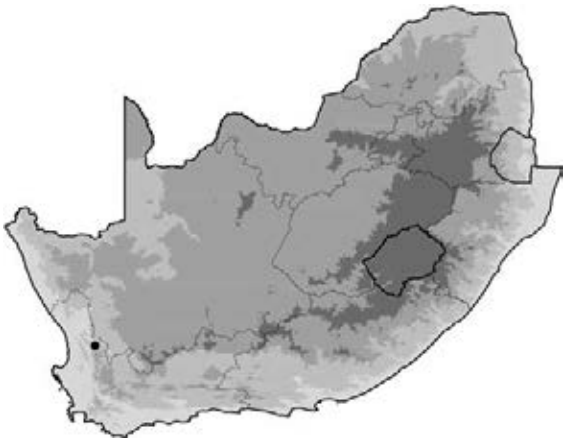
Diagnosis: named for the deceptive appearance of the flowers to those of the common and widespread *M. tripetala*, *M. decipiens* differs in having the inner tepal claws distinctly expanded distally, sometimes into three rounded lobes, with the limb linear-attenuate and curved inward distally. The inner tepals recall those of *M. unguiculata* and *M. algoensis* but unlike those species, the filaments of *M. decipiens* are ± 3.7 mm long and shortly united for ± 2 mm and the style branches diverge above the fused part of the filaments whereas in *M. unguiculata* and *M. algoensis* the filaments are united almost to their apices in a well-developed thick column. The style branches of *M. decipiens* are relatively short, ± 7 mm long, whereas those of *M. tripetala* are usually 9–12 mm long. The markings on the outer tepal limbs are also notable, consisting of a wedge- or V-shaped white zone surrounding a dark purple basal mark continuous as a wide, longitudinal purple streak on the claws. Typical *M. tripetala* occurs at higher elevations on the Piketberg but flowers some two to four weeks earlier.

156. **Moraea petricola** *Goldblatt & J.C.Manning* in Bothalia 43: 158 (2013). Type: South Africa, Western Cape, Pakhuis peaks, ± 5 km NW of Kliphuis, Rheboksvlei Extension 185, 925 m, 25 Oct. 2008, *Helme 5726* (NBG, holo.).

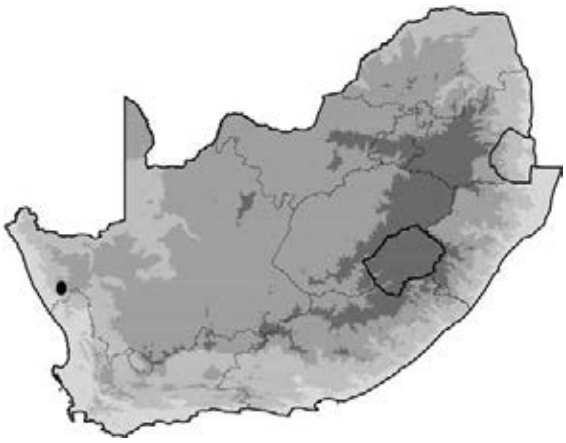
Plants ± 30 mm high. *Corm* globose, ± 12–16 mm diam.; tunics of grey-brown, medium-textured, netted fibres, accumulating in fibrous collar around base of stem. *Stem* with 3 aerial internodes, unbranched, sheathing leaves with dry attenuate apices, 35–40 mm long. *Foliage leaf* solitary, basal, linear, narrowly channelled, $^{2}/_{3}$ to ± as long as stem, ± 2 mm wide opened flat. *Rhipidial spathes* with dry, attenuate apices, inner ± 40 mm long, outer ± half as long. *Flowers* lasting 3 days, purple, outer tepal limbs with white, wedge-shaped nectar guides at bases, laxly spreading to weakly reflexed; outer tepals ± 20 mm long, claws ± 6 mm long, ascending; inner tepals ± 9 mm long, limbs spreading, ± 4 mm long, 3-lobed with long, tapering central cusp and short, rounded, obtuse lateral lobes, claws ± 5 mm long, ascending, tapering from narrow base to wide apex. *Filaments* ± 8 mm long, united in smooth cylindric column in lower ± 3 mm, diverging in upper 5 mm; anthers ± 5 mm long, dark purple; pollen red. *Ovary* ± cylindric, ± 8 mm long, exserted; style branches ± 8 × 2 mm long, ascending, held above subtending limbs, crests narrowly wedge-shaped, ± 4 mm long. *Capsules* and *seeds* unknown. *Flowering time*: October to mid-November.

Distribution and ecology: evidently restricted to higher elevations in the mountains to the north of Pakhuis Pass in the northern Cederberg in Western Cape, South Africa; on stony, sandstone slopes.

Diagnosis: *Moraea petricola* is a typical member of subg. *Vieusseuxia* in its solitary basal leaf and 3-lobed inner tepals. The purple flowers are assumed to be long-lasting and the outer tepal limbs have narrow, white, wedge-shaped nectar guides edged with dark purple. The



Distribution of ***Moraea petricola***.



Distribution of ***Moraea helmei***.

inner tepals have unusually broad, 3-lobed limbs with a prominent, linear, reflexed central cusp and rounded lateral lobes. The flowers in general recall *M. decipiens,* particularly in the flower colour and shape but have much longer filaments, ± 8 mm long vs. 3.5–4.0 mm in *M. decipiens*, a style ± 5 mm long (vs. ± 2 mm) and shorter tepal claws, 5–6 mm (vs. 8–9 mm). The relatively long style branches are held well above the subtending outer tepals limbs, whereas in *M. decipiens* the style branches are appressed to the tepal claws and the inner tepals curve upward rather than having reflexed limbs with the central cusp directed downward. Additional collections of this rare species are needed to confirm current observations based on limited material.

157. **Moraea helmei** *Goldblatt & J.C.Manning* in Bothalia 42: 116 (2012b). Type: South Africa, Northern Cape, Kamiesberg south of Farm Karas, near top of Langkloof, 1 125 m, 28 Oct. 2011, *Goldblatt & Porter 13688* (NBG, holo.; MO, iso.).

Plants 250–350 mm high. *Corm* 9–12 mm diam. with pale, fibrous tunics. *Stem* simple or with 1 or 2 short branches. *Foliage leaf* solitary, linear, channelled, remaining ± erect, ± 2 mm wide when opened flat; sheathing leaves 2 or 3, attenuate, becoming dry at tips, 35–45 mm long. *Rhipidial spathes* with dry, attenuate tips, inner 40–45 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* pale blue to violet, outer tepal limbs darkly veined, with narrowly triangular, shortly velvety, yellow nectar guides at bases of outer tepal limbs outlined pale blue to dark violet; outer tepals 21.0–23.5 mm long, claw 8–10 mm long, with a shallow raised marginal tooth shortly below apex, limbs 12.5–13.5 × 7–8 mm; inner tepals short, ± 4 mm long, 3-forked in upper 1 mm, inner lobe slightly larger than laterals, ± puberulous. *Filaments* ± 4 mm long, united in puberulous column in lower 1.5 mm; anthers ± 6.5 mm long, dark violet; pollen yellow. *Ovary* narrowly ellipsoid, ± 7 mm long, initially partly included, ultimately fully exserted; style branches linear, 9 × 1 mm, crests ± 7 mm long, erect. *Capsules* and *seeds* unknown. *Flowering time*: late October to mid-November.

Distribution and ecology: known from only two sites in the Kamiesberg in central Namaqualand in Northern Cape, South Africa, at the upper end of the Langkloof; in seasonally moist places at ± 1 125 m elevation.

Diagnosis: the filaments, united for 1.5 mm and slightly more than one third their length, and the short style, ± 2 mm long, place *Moraea helmei* among the several species of the *Moraea tripetala* complex, but its inner tepals are relatively well developed, ± 4 mm long, and expanded distally into three short, subequal lobes (vs. linear and usually cusp-like in *M. tripetala* and its immediate allies). The puberulous filament column appears to be unique in the complex. The trilobed inner tepals of *M. helmei* recall those of *M. unguiculata*, which has a longer, narrow, coiled central lobe and rounded lateral lobes, but the filaments of this species are united in a prominent column for more than half their length. A peculiarity of the outer tepal claws of *M. helmei* is the pair of shallow tooth-like marginal projections just below the apices – the tepal claws in other species are straight or bowed outward and usually have plane margins.

158. **Moraea mutila** *(C.H.Bergius ex Eckl.) Goldblatt & J.C.Manning* in Bothalia 42: 119 (2012b). *Vieusseuxia mutila* C.H.Bergius ex Eckl.: 12 (1827). *M. tripetala* var. *mutila* Baker: 23 (1896), as new name for *V. mutila* Licht. ex Klatt: 621 (1866), illegitimate homonym, not *V. mutila* C.H.Bergius ex Eckl. (1827). Type: South Africa, [Western Cape], vicinity of Camps Bay, *Bergius 15* (S [7238], holo.).

Iris tripetala Thunb.: 13 (1782b, Dec.), illegitimate superfluous name for *M. tripetala* L.f. (1782, Apr.). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS–THUNB, syn.).

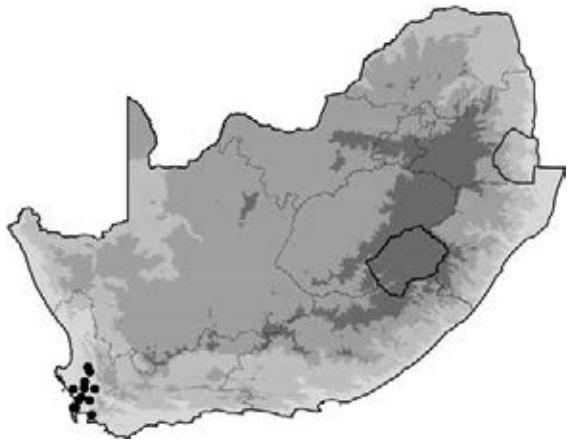
Moraea punctata Baker: 1003 (1904b). Type: South Africa, [Western Cape], Piketberg Road [Gouda], 17 Aug. 1897, *Schlechter 4851* (K, lecto., designated by Goldblatt: 751 (1976a); B, GRA, PRE, isolecto.).

Moraea monophylla Baker: 24 (1906). Type: South Africa, [Western Cape], Olifants River, Clanwilliam, Aug. 1894, *Penther 685* [K, lecto., designated by Goldblatt: 751 (1976a)].

Plants 150–300 mm high, usually with fibrous collar around base. *Corm* mostly 10–15 mm diam.; tunics of medium to coarse fibres, vertical members often thickened below into claw-like ridges. *Stem* simple, rarely 1-branched, sometimes pilose, sheathing leaves usually 2, with dry, attenuate apices, 20–40 mm long. *Foliage leaf* solitary, linear, shallowly channelled below, often becoming flat and slightly twisted in distal $^1/_3$, ± $^1/_2$ to as long as stem, 3–5(–7) mm wide, smooth or hairy abaxially or on margins. *Rhipidial spathes* with dry, attenuate apices, sometimes velvety, inner 35–40(–45) mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, pale blue or white, outer tepal limbs with triangular, white to pale yellow nectar guides with dark blue dots at bases, often edged with darker colour, velvety (or smooth?), reflexed ± 45°, outer tepals 23–27 × ± 10 mm, claws ascending, 9–12 mm long, limbs ovate, margins recurving later; inner tepals sublinear slightly expanded in middle, sometimes as rounded lobes, 7.5–12.5 mm long. *Filaments* 3.0–3.5 mm long, united for 0.5–1.5 mm; anthers 4.5–6.5(–7.5) mm long; pollen red or yellow. *Ovary* narrowly ellipsoid, 7–8 mm long; style branches 7–9 mm long, crests linear, 8–10 mm long. *Capsules* ellipsoid, 15–17 × ± 5 mm. *Seeds* angular, light brown, ± 1.8 mm long, testa spongy, angles narrowly winged. *Chromosome number* 2*n* = 12. *Flowering time*: August to mid-September.

Distribution and ecology: centred in the western lowlands of Western Cape, South Africa, from the Cape Peninsula to the Piketberg and locally inland to the Tulbagh Valley; on shale and loamy clay soils, probably also on granites, usually in renosterveld.

Diagnosis: early-blooming *Moraea mutila* is recognised by the pale blue, rarely white flowers with linear to narrowly lanceolate inner tepals 7.5–12.5 mm long, erect below and spreading distally. Often difficult to see in preserved specimens, the inner tepals are usually slightly wider in the midline and sometimes expanded into rounded lobes near the base of the spreading distal half. The flowers otherwise seem little different from those of the more common *M. tripetala*, but the pilose nectar guides are usually white or palest yellow and dotted with dark blue to purple, whereas the nectar guides of *M. tripetala* are more often yellow, edged with dark blue or purple. The leaf is typically relatively short, in most collections shorter than the stem, and widely channelled, sometimes plane in the distal half. Plants sometimes have leaves velvety on the abaxial surface and velvety spathes. The pubescence is evidently variable in populations, thus a character of limited value for identification. Leaves of *M. tripetala* are almost invariably hairless.



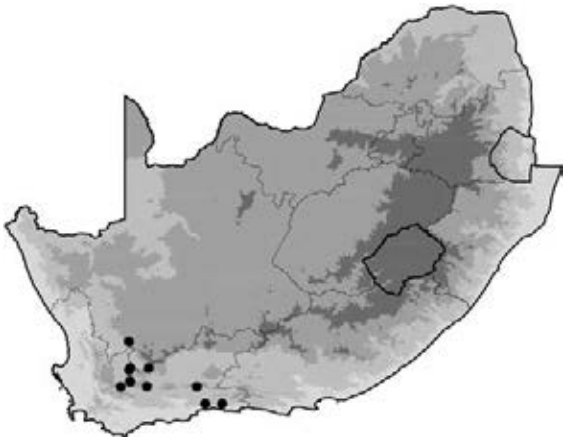
Distribution of ***Moraea mutila***.

Possibly belonging here are pale blue-flowered plants from the western lower slopes of Sir Lowry's Pass with the inner tepals trilobed as in *Moraea mutila* but the filaments united for ± 2.5 mm and the style 4 mm long. Alternatively these plants may be hybrids between *M. tripetala* and *M. unguiculata*.

159. **Moraea cuspidata** *Goldblatt & J.C.Manning* in Bothalia 42: 120 (2012b). Type: South Africa, Western Cape, near Farm Fortuin, north of Matjiesfontein, near shaded rest stop (co-blooming with *M. amabilis*), 28 Sept. 2009, *Goldblatt & Porter 13462* (NBG, holo.; MO, iso.).

Plants 180–300 mm high, with collar of tough fibres around base. *Corm* 15–25 mm diam., without cormlets at base; tunics of brown to ± black, tough, medium to coarse fibres. *Stem* simple or 1(2)-branched exceptionally with up to 6 branches, sheathing leaves with dry attenuate tips, (30–)40–55 mm long. *Foliage leaf* solitary, linear(–linear-filiform), channelled, usually V-shaped in section, leaf halves closely appressed in dry conditions, 1.5–3.0 mm wide (opened flat), erect or trailing distally. *Rhipidial spathes* with attenuate, dry tips, inner (40–)50–80 mm long, outer ± half as long. *Flowers* long-lived, pale blue, mauve or violet blue, outer tepal limbs with large white, velvety nectar guides dotted and usually edged with dark violet at bases, lanceolate, half reflexed; outer tepals (20–)26–34 × 10–16 mm, claws (8–)10–12 mm long, usually speckled with dark blue to violet dots or purple in midline; inner tepals linear, (8–)10–15 mm long, ascending below, distal $^1/_3$–$^1/_2$ usually spreading (± erect when short). *Filaments* (3–)4–6 mm long, united basally for 0.5–1.8 mm; anthers 4–8 mm long, violet; pollen red (rarely white). *Ovary* ellipsoid, 11–15 mm long; style branches 8–10 mm long, crests 5–8 mm long, linear. *Capsules* ovoid-ellipsoid, 14–16 mm long. *Seeds* angular, 1.8–2.0 mm long, light brown, testa spongy, thickened on angles. *Chromosome number* 2*n* = 12. *Flowering time*: mid-September and October.

Distribution and ecology: fairly widespread in southwestern South Africa, extending from the southern



Distribution of ***Moraea cuspidata***.

Roggeveld and Klein Roggeveld in Northern Cape to the Bonteberg and Voetpadsberg near Touws River in Western Cape and in the Swartberg and higher mountains of the Little Karoo (an apparent gap in the range between the Roggeveld and the Swartberg may be the result of incomplete collecting); in fairly arid habitats, in mountain renosterveld and dry, marginal fynbos, usually in sandy or sandy loam soils derived from sandstones of the Cape and Karoo Systems.

Diagnosis: closely allied to *Moraea tripetala*, *M. cuspidata* is distinguished by the linear inner tepals up to 15 mm long (rarely less than 10 mm), spreading in the distal half, and usually with a particularly narrow foliage leaf with the halves usually tightly appressed in dry conditions. The brown to almost black corm tunics consist of thickened vertical fibres sometimes with raised ridges, and form a collar of stiff fibres around the base of the stem. The flowers are pale blue to violet with the large, velvety nectar guides spotted with dark blue on a white background. The filaments are usually united for 1.0–1.5 mm but occasionally less, and are ± as long as or slightly shorter than the dark purple anthers that bear red pollen. Capsules (where known) are relatively large, 14–16 mm long and the seeds are also relatively large, 1.8–2.0 mm long and unusual in having a pale, spongy testa much thickened into prominent ridges on the angles.

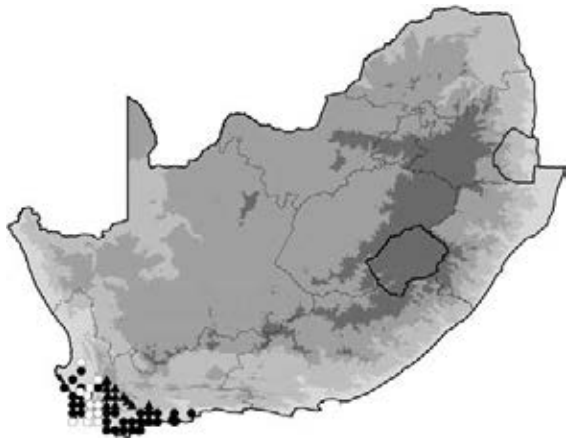
The species is sympatric at some sites and even co-blooming with smaller-flowered *Moraea amabilis* (also allied to *M. tripetala*) but that species has a broadly channelled foliage leaf, sometimes plane distally and often pilose on the abaxial surface, and consistently short, hair-like inner tepals typically 1.5–2.0 mm long. At sites where they have been recorded growing together pollen of *M. amabilis* is white, contrasting with the orange-red pollen of *M. cuspidata.* An outlying record of *M. cuspidata* from Perdekloof, southeast of Oudtshoorn, probably belongs here. The flowers are exceptionally small, the inner tepals are 8–9 mm long, otherwise consistent with the species.

160. **Moraea tripetala** *(L.f.) Ker Gawl.* in Curtis's Botanical Magazine 19: t. 702 (1803c); Goldblatt: 751 (1976a); Goldblatt: 152 (1986a) [including *M. amabilis, M. grandis* & *M. mutila*]; Goldblatt & Manning: 123 (2012b). *Iris tripetala* L.f.: 92 (1782). *Vieusseuxia tripetaloides* DC.: 138 (1803), illegitimate superfluous name for *Iris tripetala* L.f. (1782). *Vieusseuxia tripetala* (L.f.) Voigt: 602 (1845). Type: South Africa, [Western Cape], without precise locality, *Thunberg s.n.* [UPS–THUNB 1186, lecto., designated by Goldblatt: 751 (1976a)].

Plants (140–)250–450 mm high. *Corm* mostly 8–15 mm diam., without cormlets at base; tunics of moderately coarse, wiry, usually dark grey fibres. *Stem* simple or 1- or 2(6)-branched, sheathing leaves with dry, brown attenuate apices, mostly 45–60 mm long. *Foliage leaf* solitary (rarely 2 in subsp. *violacea*), leathery, narrowly channelled, C- or V-shaped in section, up to 5 mm wide, usually exceeding stem and trailing distally. *Rhipidial spathes* with dry attenuate apices, inner 35–65(–70) mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, pale blue, purple or violet, outer tepal limbs with nectar guides at bases triangular, either yellow edged with violet, or white-dotted with dark blue and edged with darker blue, spreading at 45°, lightly honey-scented, unscented or strongly scented of carnation (subsp. *violacea*); outer tepals 20–30(–32) × ± 8–13 mm, claws 9–12 mm long, limbs obovate, 11–18 mm, inner tepals hair-like to ± linear, 1–4(–6) mm long, or lacking. *Filaments* 4–6 mm long, united for 0.5–1.5 mm, occasionally (southern populations) ± free; anthers 4–7 mm long; pollen usually orange-red, rarely white. *Ovary* 4–9 mm long; style branches 9–12 mm long, crests ± linear, 5–12 mm long. *Capsules* ellipsoid, 8–14 mm long. *Seeds* ± angular, 1.0–1.3 mm long, with raised, golden-brown ridges. *Chromosome number* 2*n* = 12. *Flowering time*: mainly August to December (January).

Distribution and ecology: widespread in Western Cape, South Africa, extending from Aurora on the west coast to near Knysna in the east, and inland to Ceres and the Little Karoo; in a variety of habitats including limestone flats in fynbos, to neutral and acid sands in sandveld, to loamy alluvium in coastal and montane fynbos; interior populations from the Warm Bokkeveld (Ceres) and western Little Karoo, here segregated as subsp. *violacea*, occur in significantly drier habitats on clay soils in renosterveld; populations segregated as subsp. *jacquiniana* are mostly montane and occur above 500 m but at lower elevations in the southern Cape Peninsula, and flower significantly later in the year.

Diagnosis: *Moraea tripetala* is distinguished by blue to violet flowers with inner tepals reduced to hair-like, filiform cusps mostly 2–4 mm long (rarely up to 6 mm long), and filaments united for up to 1.5 mm and occasionally free. The outer tepal limbs are broadly ovate, longer than wide and oriented ± 45° below horizontal. The corm tunics are dark brown to grey and usually composed of medium-textured fibres. The production



Distribution of ***Moraea tripetala*** subsp ***tripetala***, ●; subsp. ***jacquiniana***, ○; subsp. ***violacea***, ▲.

of cormlets is not known in *M. tripetala*. Nectar guides are often yellow edged with dark blue or purple, but occasionally white, then dotted with blue to purple. The seeds are small, and typical of the complex in being 5(6)-sided with the facets slightly wrinkled and showing the brown colour of the seed body. The angles are raised into narrow wings of paler colour. Related species including *M. amabilis*, *M. cuspidata* and *M. grandis* have larger seeds of more complex structure.

Among the plants included in *Moraea tripetala* are two important variants. Populations from the interior Western Cape on clays and shales from Ceres to the western Little Karoo are treated as subsp. *violacea*. These plants have dark violet outer tepals with yellow nectar guides, are usually relatively short in stature, and have short stiff, hair-like inner tepals, mostly ± 2 mm long. The flowers have an unusual strong clove or carnation-like scent. Unusual for the *M. tripetala* complex, and for subg. *Vieusseuxia* as a whole, several populations of this morph have two foliage leaves. A second set of populations flowering from November to January on the Cape Peninsula and surrounding mountains stand out in their softly fibrous corm tunics, slightly smaller flowers, and usually very narrow leaves, and are treated as subsp. *jacquiniana*. The flowers also often have inner tepals 4–6 mm long. Typical *M. tripetala* in the same area flowers from August to early October.

Key to subspecies

1a Plants mostly of montane habitats in rocky sandstone soils, flowering mainly November to January, occasionally in October; ovary 4–6 mm long; inner tepals often 5–6 mm long, reaching bases of anthers; tepals mostly dark violet . . . . . 160c. subsp. *jacquiniana*

1b Plants of clay, granitic or sometimes rocky limestone or sandstone soils, flowering mainly August to early October; ovary 6–9 mm long; inner tepals 1–3(–5) mm long (or absent), rarely reaching base of anthers; tepals pale to dark blue to violet:

2a Ovary 6–8 mm long; outer tepals 24–26 mm long and inner tepals 1–2 mm long; tepals violet with yellow nectar guides; foliage leaves 1 or 2; plants of clay soils in renosterveld in the Warm Bokkeveld, Bonteberg and Little Karoo . . . . . 160b. subsp. *violacea*

2b Ovary 8–9 mm long; outer tepals 23–30(–32) mm long and inner tepals absent or 1–3(–5) mm long; tepals pale blue or deep blue or purple usually with white (occasionally yellow) nectar guides; foliage leaf always solitary; plants of sandy flats and slopes, sometimes in limestone, extending from Aurora to Knysna . . . . . 160a. subsp. *tripetala*

160a. subsp. **tripetala**

Iris mutila Licht. ex Roem. & Schult., Systema vegetabilium secundum 1: 477 (1817). *Vieusseuxia mutila* (Licht. ex Roem. & Schult.) A.Dietr.: 494 (1833), illegitimate homonym, not *V. mutila* Eckl. (1827). Type: South Africa, [Western Cape], Lion's Head, as 'monti Leonis (Leeuwenrug),' *Lichtenstein s.n.* (location of specimens unknown, probably originally at B and now lost).

Plants 250–450 mm high, stem sometimes sheathed below by collar of brown fibres. *Corm* mostly 12–15 mm diam.; tunics of coarse, light to dark brown fibres *Foliage leaf* solitary, linear. *Inner rhipidial spathes* 45–65(–70) mm long. *Flowers* pale blue or purple with yellow or white nectar guides, faintly honey-scented or unscented; outer tepals 23–30(–32) mm long, claws 10–12 mm long, limbs 12–18 mm long; inner tepals usually hair-like, 1–3(–5) mm long, or absent. *Filaments* 4–6 mm long, united for 1.0–1.5 mm, occasionally (southern populations) ± free; anthers 4.5–7.0 mm long; pollen usually red, sometimes white. *Ovary* 8–9 mm long; style branches ± 12 mm long, crests mostly 8–12 mm long. *Capsules* 12–14 mm long. *Flowering time*: late August to mid-September, occasionally in October (exceptionally July).

Distribution and ecology: largely a plant of coastal forelands, extending from Aurora on the west coast of Western Cape to near Knysna in the east and inland on the Piketberg, the Hottentots Holland–Jonkershoek mountain complex, the Witzenberg at Ceres, and the lower southern slopes of the Langeberg; usually in sandy habitats or on coastal limestone, thus in sandveld, strandveld and fynbos vegetation, at low elevations but occasionally up to ± 700 m.

Diagnosis: subsp. *tripetala* has the largest flowers of the species, the outer tepals 23–30(–32) mm long and the inner tepals 1–3(–5) mm long or sometimes absent. The tepals are pale blue or deep blue or purple usually with white (occasionally yellow) nectar guides. The foliage leaf is always solitary and 4–5 mm wide. Populations along the southern Cape coast, notably in the De Hoop area, the Agulhas Peninsula and some from near Caledon, occasionally lack inner tepals or individual flowers may lack one or two of the inner tepals. Plants from the southern foothills and lower slopes of the Langeberg sometimes have free filaments.

160b. subsp. **violacea** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 42: 125 (2012b). Type: South Africa, Western Cape, Op-de-Tradouw, Barrydale to Montagu, south-facing clay slope in renosterveld, 26 Aug. 2000, *Goldblatt 11438* (NBG, holo.; K, MO, PRE, iso.).

Plants mostly 200–300 mm high, sometimes with collar of fine fibres around base. *Corm* mostly 8–10 mm diam., tunics of medium-textured, usually pale fibres, sometimes thickened below. *Foliage leaf* 1 or 2, linear, mostly 1.5–2.5 mm wide, leaf halves often folded together and blade appearing terete. *Inner rhipidial spathes* 35–45(–50) mm long. *Flowers* violet with yellow, velvety nectar guides, strongly scented of cloves (?always); outer tepals 24–26 mm long, claws ± 10 mm long, limbs 14–16 mm long, inner tepals hair-like, 1–2(3) mm long. *Filaments* 4.0–6.5 mm long, united for 0.5–1.2 mm; anthers 4.0–6.5 mm long, pale violet; pollen white. *Ovary* 6–8 mm long; style branches ± 12 mm long, crests 6–8(10) mm long. *Capsules* 8–11 mm long. *Flowering time*: late August to late October.

Distribution and ecology: occurring in interior Western Cape, extending from Gydo Pass and the Warm Bokkeveld though the southern foothills of the Hex River Mtns inland to Touws River and the western Little Karoo near Barrydale. Populations with two foliage leaves are scattered across its range; almost invariably on clay soils, usually in renosterveld but also among low succulent shrubs.

Diagnosis: subsp. *violacea* is distinguished by the violet perianth, the outer tepals with yellow nectar guides. The flowers are, as far as known, strongly scented of cloves. The leaves are unusually narrow, 1.5–2.5 mm wide when opened flat. Almost unique for subg. *Vieusseuxia*, some populations have two subequal, basal foliage leaves.

160c. subsp. **jacquiniana** *(Schltr. ex G.J.Lewis) Goldblatt & J.C.Manning* in Bothalia 42: 126 (2012b). *Moraea tripetala* var. *jacquiniana* Schltr. ex G.J.Lewis: 54 (1941). Type: South Africa, [Western Cape], Constantiaberg, December, *Wolley Dod 1919* (BOL, lecto. designated by Goldblatt: 751 (1976a); GRA, isolecto.).

Vieusseuxia pulchra Eckl.: 13 (1827). Type: South Africa, [Western Cape], 'Hottentotshollandkloof', *Ecklon & Zeyher s.n.* (S, holo.).

Plants 140–300 mm high, usually with collar of fine, loosely netted fibres around base. *Corms* ± 10 mm diam., tunics of relatively fine fibres. *Foliage leaf* solitary, narrowly channelled or leaf halves appressed together thus appearing terete, up to twice as long as stem, 2–3(–5) mm wide (when dry often apparently ± 1.5 mm diam.). *Inner rhipidial spathes* 40–50 mm long. *Flowers* usually purple or blue with triangular, white nectar guides spotted with dark blue and edged with darker colour, unscented, outer tepals 20–25 mm long, claws 9–11 mm long, limbs lanceolate, 11–16 × 8–11 mm, inner tepals hair-like, mostly 5–6 mm long, reaching or exceeding anther bases. *Filaments* 4–6 mm long, united for 1.0–1.5 mm; anthers 5–6 mm long; pollen usually (always?) red. *Ovary* 4–6 mm long; style branches 10–11 mm long, crests linear, 5–8 mm long. *Capsules* mostly 10–14 mm long. *Flowering time*: mid-November to January, rarely in late October.

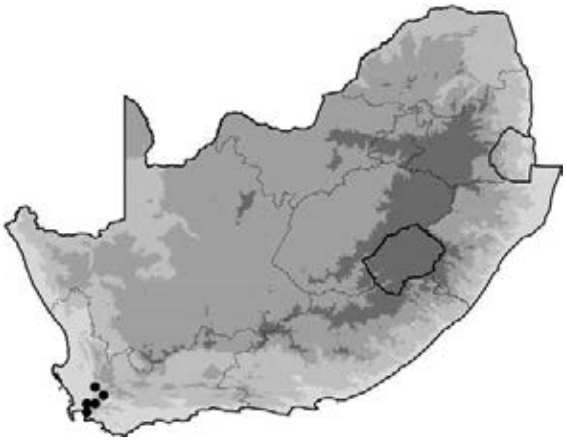
Distribution and ecology: extending in Western Cape from Ceres and Piketberg to the Cape Peninsula and the Hottentots Holland and Houw Hoek Mtns; largely montane but at low elevations in the southern Cape Peninsula, in fynbos on stony sandstone slopes.

Diagnosis: subsp. *jacquiniana* is poorly differentiated from subsp. *tripetala*, but apart from the later flowering time it can be distinguished by the finely fibrous corm tunics, shorter rhipidial spathes 40–50 mm long and slightly smaller flowers, usually deep violet, consistently with inner tepals 4–6 mm long (usually shorter or absent in subsp. *tripetala*). The outer tepals are typically 20–25 mm long, the ovary 4–6 mm long, and the capsules 10–14 mm long, all smaller than in subsp. *tripetala*. The nectar guides are evidently always white whereas *M. tripetala* has yellow or less often white guides, then speckled with blue dots.

161. **Moraea ogamana** *Goldblatt & J.C.Manning* in Bothalia 42: 128 (2012b). Type: South Africa, Western Cape, Bo-Hermon, Elandsberg Farm, foot of Elandskloof Mtns, seasonally wet alluvial flats, in fynbos, 9 Sept. 2010, *Goldblatt & Manning 13520* (NBG, holo.; MO, iso.).

Plants 150–200(–380) mm high. *Corm* 6–12 mm diam.; tunics of hard, wiry, black fibres. *Stem* usually unbranched, 2 or 3 internodes long, sheathing leaves with dry attenuate tips, 30–45 mm long. *Foliage leaf* solitary, sometimes with second leaf from axillary cormlet, usually shorter than stem, rarely longer, 2–3 mm wide when opened flat, widely channelled or leaf halves almost folded together, inserted or shortly below ground level, usually bearing small axillary cormlet. *Rhipidial spathes* with dry, brown, attenuate tips, inner up to 55 mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, pale blue, outer tepal limbs with triangular yellow nectar guides at bases and dark veins radiating from nectar guides; outer tepals 27–29 mm long, claws 12–14 mm long, limbs ovate, ± 15 mm long, inner tepals hair-like, up to 4 mm long. *Filaments* ± 5 mm long, united ± 1 mm; anthers ± 6 mm long, dark blue-black; pollen white. *Ovary* linear-cylindric, 10–13 mm long, darkly lined vertically on locules and septa; style branches ± 12 mm long, crests ± linear, 8–12 mm long. *Capsules* ± cylindric, (15–)20–24 × 2 mm. *Seeds* angular, 0.8–1.5 mm diam., golden-brown, shortly winged on angles. *Flowering time*: mid-August to mid-September.

Distribution and ecology: restricted to the lowlands of Western Cape, South Africa, from Voëlvlei near Gouda to Strand in the south and locally in the upper Breede River Valley between Wolseley and Botha; in seasonally waterlogged stony ground.



Distribution of ***Moraea ogamana***.

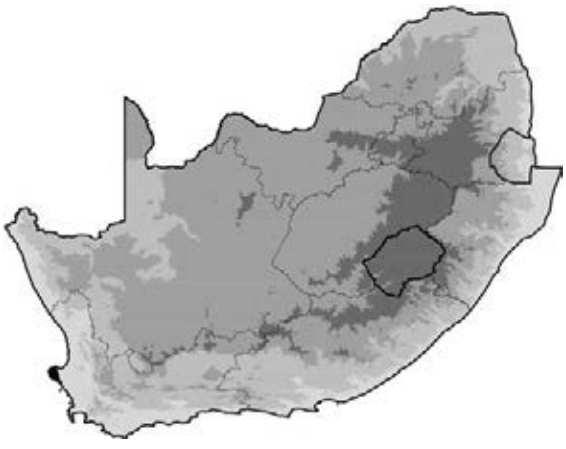
Diagnosis: a member of the *Moraea tripetala* complex of species, *M. ogamana* has hair-like inner tepals ± 4 mm long but is distinguished by the linear-cylindric ovary 10–13 mm long, often partly included in the spathes, and pale blue flowers with dark radiating venation and yellow nectar guides on the outer tepals. Associated with these features are the short stature, rarely exceeding 180 mm, fairly small corms, 7–12 mm diam., with wiry, black tunic fibres and a relatively short leaf, usually shorter than, but occasionally exceeding the stem. Unlike most populations of *M. tripetala* in the Western Cape forelands, which have orange-red pollen, the pollen of *M. ogamana* is white. An additional, but somewhat trivial distinction, the style crests, up to 12 mm, are unusually long for the relatively small flowers. Plants usually have a single small cormlet in the foliage leaf axil, and this modest level of vegetative reproduction results in plants sometimes growing in small clumps of three or four individuals. Correlated with the long, angular ovary, the capsules are ± cylindric and normally 20–24 mm long. Capsules of *M. tripetala* are ellipsoid-oblong and only 10–14 mm long. The seasonally waterlogged habitat is distinctive for *M. ogamana*.

162. **Moraea hainebachiana** *Goldblatt & J.C.Manning* in Bothalia 42: 127 (2012b). Type: South Africa, Western Cape, Vredenburg, Jacobsbaai, 1 km E of town on calcrete ridge, Erf 890, 31 Aug. 2011, *Claassens 95* (NBG, holo.; MO, iso.).

Plants 180–280 mm high. *Corm* mostly 7–12 diam., usually with many cormlets at base; tunics of coarse, ± black, hard, wiry fibres, thickened below into claw-like ridges. *Stem* simple, rarely 1-branched, bearing several, dark-coloured cormlets just below ground level in foliage leaf axil, sheathing leaves with dry attenuate apices, ± 55 mm long, lowermost sometimes with axillary cormlets. *Foliage leaf* solitary, linear, channelled, inserted shortly above ground, trailing distally, (1.5–)2.0–4.0 mm wide, exceeding stem by 100–150 mm. *Rhipidial spathes* with dry attenuate tips, inner 60–65 mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, pale violet to deep blue, outer tepal limbs with white nectar guides at bases with radiating lines of dark blue, scented of vanilla, outer tepals 24–25 mm long, claw ± 10 mm long, white-hairy on adaxial surface, limb 14–15 × 9 mm, usually ultimately recurving, inner tepals spindle-shaped, sometimes oblanceolate and obscurely 3-lobed, 5–6 × 0.5 mm, tapering distally with apex curving inward. *Filaments* ± 6 mm long, united in lower 1.0–1.5 mm; anthers 5–6 mm long, blue-grey; pollen ± white or yellow. *Ovary* narrowly oblong-truncate, included or exserted, 7–9 mm long; style branches wedge-shaped, 7–8 mm long; crests narrowly wedge-shaped (or sublinear), ± 10 × 1 mm. *Capsules* not developed, shed soon after flowers wilt. *Seeds* not produced. *Flowering time*: August to mid-September.

Distribution and ecology: a narrow endemic in the vicinity of Saldanha Bay in Western Cape, South Africa, including the West Coast National Park; restricted to rocky, limestone flats and slopes and calcareous sands along the coast and adjacent hills.

Diagnosis: *Moraea hainebachiana* shows several unusual features in the *M. tripetala* group. The first of these is the cluster of small, dark grey or bluish cormlets in the foliage leaf axil and at the base of the corm, the latter feature especially pronounced in non-flowering individuals. The foliage leaf is always inserted on the stem above ground level. Flowers are consistently pale violet to deep blue and have inner tepals 5–6 mm long, somewhat longer than is typical for *M. tripetala* and unusual in being expanded in the middle, thus spindle-shaped or sometimes oblanceolate and obscurely 3-lobed. More significantly, the filaments are as long as or slightly longer than the anthers, whereas the anthers are slightly longer than the filaments in *M. tripetala* and in some closely related species, often considerably so. The nectar guides are also somewhat unusual, consisting of lines of dots on a whitish background with the edges not clearly defined as they are in *M. tripetala* in which the yellow or white nectar guides are typically edged in darker blue to violet. Vegetative reproduction does not occur in *M. tripetala* and the production of multiple cormlets in leaf axils and at the base of the corm is unknown elsewhere in the *M. tripetala* complex.



Distribution of ***Moraea hainebachiana***.

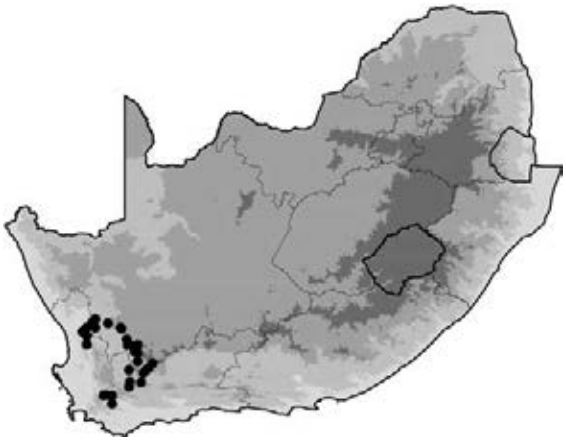
Moraea hainebachiana is sterile and all capsules are shed soon after the flowers fade and seeds are not developed, thus it is evidently a vegetative apomict and propagation is effected by cormlets that plants produce liberally.

163. **Moraea amabilis** *Diels* in Botanische Jahrbücher für Systematik 44: 118 (1909). Type: South Africa, [Northern Cape], Bokkeveld, Calvinia, Oorlogskloof, *Diels 626* [B, lecto. [as holo.], designated by Goldblatt: 751 (1976a)].

Plants 150–250 mm high, growing in clonal colonies. *Corm* mostly 7–12 mm diam., with tunics of pale, medium to fairly coarse fibres (rarely soft fine fibres), often replaced annually by two daughter corms. *Stem* simple or 1(2)-branched, glabrous or velvety, sometimes with cormlets in below-ground axils, sheathing leaves glabrous or velvety on outer surface, with dry, attenuate apices. *Foliage leaf* solitary, linear, channelled, often widely so, 2–5 mm wide, abaxial surface often velvety-pilose (or glabrous). *Rhipidial spathes* with dry and attenuate apices, smooth or velvety, inner mostly 45–55 mm long, outer ± $^{1}/_{2}$–$^{2}/_{3}$ as long. *Flowers* long-lived, mostly purple or violet to dark blue (rarely pink, dull yellow or buff-brown), outer tepal limbs with white, velvety nectar guides at bases speckled with purple or dark blue, often with larger dark mark at base, often slightly scented of honey or vanilla; outer tepals 20–31 × 10–14 mm, broadly lanceolate, claws pale mauve often with darker central line and spotted purple-black, 10–12 mm long, velvety, limbs (9–)11–18 mm long, apex obtuse-apiculate, inner tepals erect, hair-like, acute, 1.5–2.5 mm long. *Filaments* ± free, 3.5–6.0 mm long; anthers 4.5–7.0(–8.0) mm long; pollen red or white, rarely pale blue. *Ovary* narrowly ellipsoid, 6.0–9.5 mm long, usually flushed red, exserted; style branches ± 10 mm long; crests linear, often arching inward, 6–9 mm long. *Capsules* narrowly ellipsoid, 11–16 mm long, often with thickened apical rim. *Seeds* angular, 1.7–2.0 mm long, angles with spongy edges and prominent spongy micropylar crest. *Chromosome number* 2*n* = 12. *Flowering time*: mostly September to middle October.

Distribution and ecology: relatively widespread in southwestern South Africa, extending from the Bokkeveld Escarpment in an arc across the northern edge of the Roggeveld Escarpment and south through the Roggeveld and Klein Roggeveld in Northern Cape to Worcester, the western end of the Little Karoo and the Olifants River Valley; in light clay soils or sandy loam, sometimes in the Bokkeveld Mtns and Gifberg on shallow sandy ground on sandstone pavement.

Diagnosis: *Moraea amabilis* is recognised by the virtually free filaments (united for < 0.4 mm), inner tepals reduced to hair-like cusps up 2.5 mm long, and the distinctive mode of vegetative reproduction in which the parent corm is often replaced annually by two new corms. Plants also often have a cormlet in the leaf axil and as a result form clonal colonies. This unusual characteristic is only evident if the plants are carefully extracted from the ground. The species is most likely to be confused with *M. grandis*, which also has nearly free filaments but is larger



Distribution of ***Moraea amabilis***.

in all features, notably the ovary, 10–12(–15) mm vs. 6–9 mm long in *M. amabilis* and anthers 9–11 mm long, ± twice as long as the filaments vs. 4.5–7.0(–8.0) mm and up to half again as long as the filaments in *M. amabilis*. The corms of *M. amabilis* have pale (rarely dark) brown, coarsely fibrous tunics with prominent vertical elements in contrast to the finer tunic fibres in *M. grandis*. Apart from smaller flowers, *M. amabilis* often has white pollen in contrast to the consistently bright red-orange pollen of *M. grandis*. Capsules of *M. amabilis*, typically 11–16 mm long, contain relatively small, sharply angular seeds, ± 2 mm at longest axis, with a prominent, pale, spongy micropylar crest, whereas capsules of *M. grandis* are significantly larger, up to 19 mm long, with a thickened apical ridge and the large, dark brown seeds are up to 3 mm long. The velvety to pilose pubescence is universal on the leaves, stem and spathes of western Karoo populations of *M. amabilis* but those from the Bokkeveld Mtns, Gifberg and Cederberg–Olifants River mtns usually have glabrous leaves although there are some exceptions in the area. Only moderate confidence can be placed in the pubescence character as some other members of the *M. tripetala* complex occasionally have hairy leaves (notably *M. mutila*) although *M. grandis* is consistently glabrous. In the Nieuwoudtville area *M. amabilis* and *M. grandis* are sometimes difficult to distinguish, most likely due to hybridization. Plants from near Worcester included in *M. amabilis* have unusual, buff-yellow or dusty pink flowers and those from the Rabiesberg, not far distant, also with velvety stems and leaves, were described as having brown (we assume buff-brown) flowers.

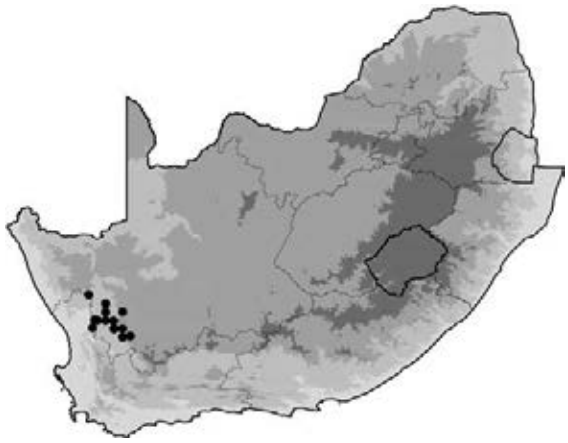
164. **Moraea grandis** *Goldblatt & J.C.Manning* in Bothalia 42: 133 (2012b). Type: South Africa, Northern Cape, Wild Flower Reserve at Nieuwoudtville, around shrubs near top of dolerite slope, scented of vanilla, 22 Sept. 2011, *Goldblatt & Manning 13658* (NBG, holo.; MO, PRE, iso.).

Plants 200–400 mm high, usually in small colonies, usually with 1 or more cormlets in leaf or cataphyll axils, and sometimes with collar of fibres around base. *Corm*

mostly 10–15 mm diam.; tunics of light (rarely dark brown), relatively fine, firm or soft fibres; often producing two new corms to replace parent corm. *Stem* rarely velvety to pilose or glabrous, simple or 1(2)-branched, sheathing leaves or becoming dry from tips, attenuate, 55–70 mm long. *Foliage leaf* solitary, shallowly channelled, usually exceeding stem and up to twice as long, 3.5–5.5 mm wide, often trailing distally. *Rhipidial spathes* with dry, attenuate tips, inner 55–80 mm long, outer ± ½ as long. *Flowers* long-lived, pale blue to pale violet or light purple, outer tepal limbs with small, triangular yellow (rarely ± white) nectar guides at bases edged dark blue, short-velvety (rarely glabrous), spreading at 45–60°, scented of vanilla; outer tepals 30–40 × 15–20 mm, claws 12–18 mm long, velvety, limbs ± orbicular, widest above middle, 15–20(–23) mm long, usually ± as wide, inner tepals hair-like, erect, 1.5–3.5 mm long. *Filaments* ± free or united < 0.2 mm, 4.0–5.5 mm long; anthers 8–11 mm long, usually not reaching stigma lobes; pollen orange-red. *Ovary* ellipsoid, slightly narrowed below apex, (10–)12–15 mm long; style vestigial, branches ± 15 mm long, crests linear, 8–12 mm long. *Capsules* 16–19 mm long, narrowly ovoid-oblong with thickened rim. *Seeds* angular, relatively large, 2–3 mm long, angles forming wing-like ridges. *Chromosome number* 2*n* = 12. *Flowering time*: mainly late Aug. to late Sept.

Distribution and ecology: restricted to the northern end of the western Karoo in Northern Cape, South Africa, extending from the Langberg west of Loeriesfontein through the higher country between Loeriesfontein and Calvinia and along the Bokkeveld Plateau to the northern end of the Roggeveld Escarpment; usually in heavy clay soils, most often in heavy red clay among dolerite rocks but also in lighter soils derived from tillite and shale.

Diagnosis: the most striking of the species of the *Moraea tripetala* complex, *M. grandis* has relatively large corms up to 15 mm diam., with tunics usually of fine, soft (rarely firm) fibres, and the largest flowers in the alliance. The outer tepals are 30–40 mm long with ± orbicular limbs 18–23 × 15–20 mm, thus almost as wide as long, and have unusually small nectar guides, usually yellow (sometimes ± white) on a white background,



Distribution of ***Moraea grandis***.

minutely spotted with dark blue, and usually edged with darker blue or violet. The limbs are also widest in the upper third and usually have an abrupt, comma-like tip. The flowers have a pleasant, vanilla-like odour. Like its relative, *M. amabilis*, it typically grows in colonies resulting from vegetative reproduction by axillary cormlets and sometimes by the replacement of the parent corm by two daughter corms. It also resembles *M. amabilis* in having virtually free filaments (united for < 0.2 mm), but the anthers, 8–11 mm long, are at least twice as long as the filaments and sometimes 2.5 times as long, easily the largest in the *M. tripetala* complex. The pollen is consistently bright orange-red, not unusual for the complex, but contrasting with the white pollen in most western Karoo populations of *M. amabilis*, which has smaller anthers 4.5–7.0 mm long and ± as long as or up to 1.5 times as long as the filaments.

Moraea grandis sometimes grows in close proximity to *M. amabilis*, and the two can be seen flowering together at sites in the Calvinia District and occasionally elsewhere. Difficulty in distinguishing the two in the immediate vicinity of Nieuwoudtville is probably the result of hybridisation and introgression between the two species, which share the same large-bodied bees as pollinators.

Sect. 13. **Villosae** *Goldblatt & J.C.Manning* in Goldblatt et al. in *Bothalia* 43: 40 (2013). Type: *Moraea villosa* (Ker Gawl.) Ker Gawl.

Foliage leaf and stem usually pilose or velvety abaxially (not *M. aristata* and *M. caeca*). *Flowers* variously coloured, large with outer tepal limbs exceeding claws, limbs rotund, as wide or wider than long; inner tepals tricuspidate with central cusp long and trailing.

165. **Moraea aristata** *(D.Delaroche) Asch. & Graebn.*, Synopsis der Mitteleuropäischen Flora 3: 518 (1906); Goldblatt: 773 (1976a); Goldblatt: 182 (1986a). *Vieusseuxia aristata* D.Delaroche: 33 (1766). *M. candida* Baker: 59 (1892), as a new name for *V. aristata* D.Delaroche (mistakenly cited as *V. fugax* D.Delaroche). Type: South Africa, without precise locality or collector, cult. in Holland [L: Herb. van Royen, lecto., designated by Goldblatt: 773 (1976a)].

Ferraria ocellaris Salisb.: 41 (1796). Type: South Africa, without precise locality or collector, illustration in Curtis: t. 168 '*Iris pavonia*' (1791).

Vieusseuxia glaucopis DC.: 141 (1803). *Moraea glaucopis* (DC.) Drapiez: *Moraea* 6 (1833). Type: South

Africa, without precise locality or collector, illustration in Redouté: t. 42 (1803).

Moraea tricuspis var. *ocellata* D.Don in Sweet: t. 249 (1834). Type: South Africa, without precise locality or collector, illustration in Sweet: t. 249. (1834).

Plants 250–350 mm high. *Corms* ± 15 mm diam.; tunics of pale fibres. *Stem* glabrous, sometimes 1-branched. *Foliage leaf* solitary, basal, linear, glabrous, exceeding stem, channelled, often trailing distally. *Rhipidial spathes* with dry, brown, attenuate apices, inner 50–70 mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, white, flushed blue-mauve outside, outer tepal limbs with prominent nectar guide of concentric crescents of dark purple, blue violet or green, spreading; outer tepals 30–35 × ± 25 mm, claws suberect, densely velvety, ± 12 mm long, limbs ± orbicular; inner tepals 15–20 mm long, 3-lobed, lateral lobes short, obtuse, central lobe ± linear, ± trailing. *Filaments* 3–4 mm long, united below in a glabrous column, free near apex; anthers ± 5 mm long, blue; pollen orange. *Ovary* ± cylindric, ± 10 mm long; style branches 7–8 mm long, crests 6–7 mm long, narrowly triangular. *Capsules* ± club-shaped, 15–20 nm long. *Seeds* angular, with spongy testa. *Chromosome number* 2*n* = 12. *Flowering time*: September.

Distribution and ecology: known today only from the grounds of the Royal Observatory, Cape Town, in Western Cape, South Africa, but probably originally with a wider distribution on the lower slopes of Devil's Peak between Cape Town and Rondebosch; in loamy clay.

Diagnosis: it is no exaggeration to say that *Moraea aristata* is far more common in European herbaria than it is in the wild and it was in cultivation in Europe as early as the 1760s. Among the members of sect. *Villosae*, *M. aristata* is distinguished by the glabrous stem and leaf, rather than velvety or hairy as in *M. villosa*, and by the white flowers with striking nectar guides of dark purple or turquoise green. The outer tepals are up to 35 mm long with the limbs almost orbicular, thus nearly as wide as long, and the tepal claws are heavily bearded.

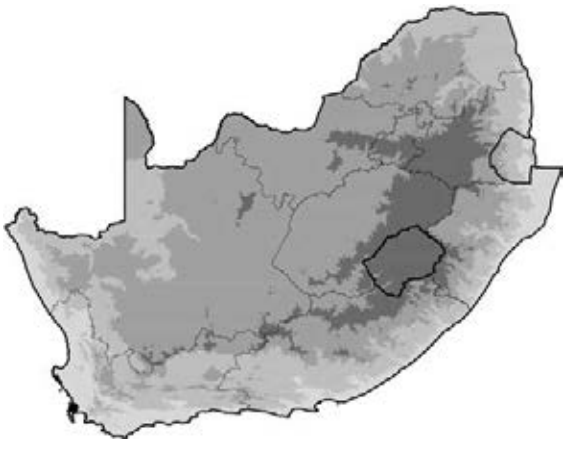
Moraea aristata is diploid with 2*n* = 12 in contrast to most populations of closely related *M. villosa*, which are tetraploid.

166. **Moraea caeca** *Barnard ex Goldblatt* in Annals of the Missouri Botanical Garden 63: 21 (1976b); Goldblatt: 178 (1986a). Type: South Africa, [Western Cape], top of Dasklip Pass, Porterville, *Goldblatt 678* (BOL, holo.; K, MO, PRE, S, iso.).

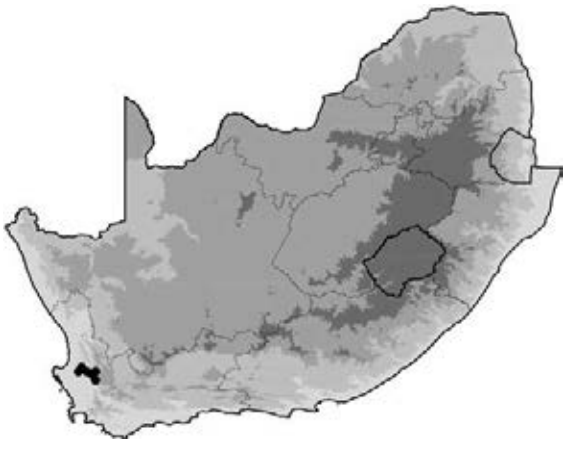
Plants slender, 200–400 mm high. *Corm* ± 10 mm diam.; tunics of pale, medium-textured fibres. *Stem* glabrous or sometimes velvety, simple or occasionally 1-branched, sheathing leaves dry and brown distally, 45–50 mm long. *Foliage leaf* solitary, linear, channelled, exceeding stem, often trailing distally, 3–4 mm wide. *Rhipidial spathes* green with dry, brown, attenuate apices; inner ± 50–60 mm long, outer ± half as long. *Flowers* long-lived, mauve-lilac to almost white, outer tepal limbs with small, triangular yellow or black nectar guides at bases, spreading; outer tepals 22–28 × 15–22 mm, claws ± erect, channelled, velvety, 8–12 mm long, limbs broadly ovate; inner tepals 3-lobed, channelled below, lateral lobes 1– 2 mm long, obtuse, central lobe 5–8 mm long, laxly spreading. *Filaments* 2–3 mm long, united ± in lower $^1/_2$; anthers 5–6 mm long, purple; pollen yellow or orange. *Ovary* ± cylindric, 10–18 mm long; style branches ± 5 mm long, flushed purple or black, crests 5–7 mm long, pale mauve to blue. *Capsules* club-shaped, 12–15 mm long. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: late September and October.

Distribution and ecology: restricted to the southern end of the Olifants River Mtns, Grootwinterhoek Mtns and Waaihoek Mtns, and on the Piketberg in Western Cape, South Africa; on stony sandstone slopes.

Diagnosis: *Moraea caeca* is recognised by the mauve-lilac to almost pink or whitish flowers with 3-lobed inner tepals, and broadly ovate outer tepals limbs with small, yellow or black nectar guides. Unlike most other members of the section the leaves and stems are usually glabrous, but at least a population from the Grootwinterhoek Mtns has



Distribution of ***Moraea aristata***.



Distribution of ***Moraea caeca***.

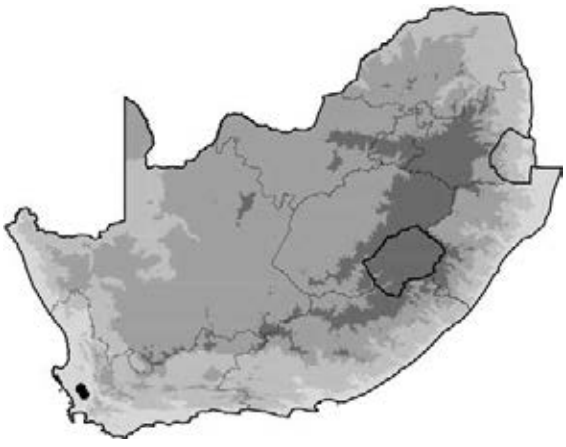
conspicuously velvety stems, and somewhat larger flowers, seemingly confirming the relationship of *M. caeca* to the *M. villosa* alliance. *Moraea caeca* is the only montane species of sect. *Villosae*. It is distinguished from *M. villosa* by its smaller flowers with reduced nectar guides.

167. **Moraea amissa** *Goldblatt* in Annals of the Missouri Botanical Garden 63: 774 (1976a); Goldblatt: 180 (1986a). Type: South Africa, [Western Cape], 10 km NW of Malmesbury, *Acocks 20739* (PRE, holo.).

Plants slender, 250–300 mm high. *Corm* 10–12 mm diam.; tunics or hard, brown, thickened fibres. *Stem* simple or occasionally branched, sheathing leaves with dry, brown apices, 35–40 mm long. *Foliage leaf* solitary, basal, linear, channelled, glabrous, exceeding stem or trailing, 1.5–2.5 mm wide. *Rhipidial spathes* with dry, brown attenuate apices, inner ± 40 mm long, outer ± $^1/_2$ as long. *Flowers* long lasting, pale violet, outer tepal limbs with white nectar guides edged with dark violet and dark, purple-brown claws, spreading; outer tepals lanceolate, 18–20 × ± 13 mm, claws ± 8 mm long; inner tepals either entire, ± lanceolate or with limbs becoming ± 3-lobed distally, ± 15 × 10 mm. *Filaments* 3–4 mm long, united in a slender column finely hairy at base; anthers ± 4 mm long, violet; pollen pale mauve. *Ovary* ovoid-cylindric, ± 7 mm long; style branches 4–5 mm long, crests 4–5 mm long, narrowly wedge-shaped. *Capsules* ovoid-elliptic, ± 12 mm long. *Seeds* unknown. *Flowering time*: early October.

Distribution and ecology: a narrow endemic of the Malmesbury District of Western Cape, South Africa; in granite-derived gravel in rocky habitats.

Diagnosis: *Moraea amissa* has broad, spreading, outer tepal limbs reminiscent of *M. villosa* but the pale blue flowers are much smaller and the inner tepals are either entire or imperfectly 3-lobed, thus inconsistent with *M. villosa*. The stems and leaves are glabrous, in contrast to the condition in most members of the *M. villosa* alliance. The immediate relationships of *M. amissa* remain uncertain.



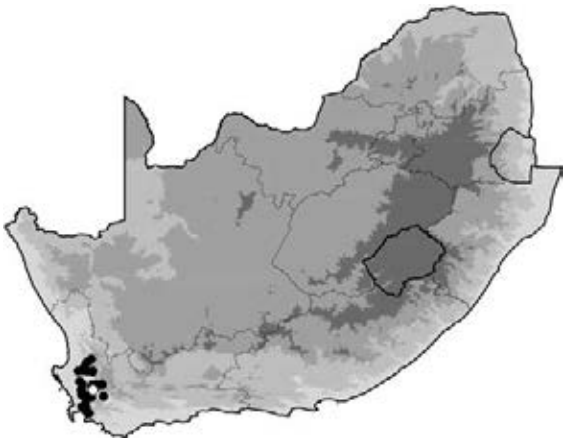
Distribution of ***Moraea amissa***.

168. **Moraea villosa** *(Ker Gawl.) Ker Gawl.* in König & Sims, Annals of Botany 1: 240 (1804a); Goldblatt: 775 (1976a); Goldblatt: 184 (1986a). *Iris villosa* Ker Gawl.: t. 571 (1802b). *Vieusseuxia villosa* (Ker Gawl.) Spreng.: 166 (1824). *M. pavonia* var. *villosa* (Ker Gawl.) Baker: 59 (1892). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 571 (1802b).

Plants 200–400 mm high. *Corm* 10–15 mm diam.; tunics with inner layers of fine and outer layers of pale, coarse, almost woody fibres. *Stem* simple or 1- or 2-branched, velvety, sheathing leaves with dry, brown, attenuate apices, 30–50 mm long. *Foliage leaf* solitary, linear, basal, velvety-hairy on abaxial surface, occasionally on margins only (rarely glabrous), exceeding stem, often bent and trailing distally. *Rhipidial spathes* with dry, brown attenuate apices; inner 40–60 mm long, outer ± $^2/_3$ as long. *Flowers* long-lived, shades of purple, lilac, pink or occasionally creamy green (subsp. *villosa*), or orange to peach (subsp. *elandsmontana*), outer tepal limbs with prominent dark purple, turquoise green or navy blue nectar guides at bases, sometimes edged with yellow, claws covered with orange, yellow or purple-brown hairs (rarely inner tepals with small nectar guide); outer tepals 28–40 mm long, limbs 22–38 × 20–35 mm, claws 8–12 mm long, diverging, limbs orbicular, ± as wide as long, spreading slightly below or above horizontal; inner tepals 16–30 mm long, tricuspidate with lateral lobes short, rounded, obtuse, central lobe ± linear, long, ± outspread. *Filaments* 4–5 mm long, united in a cylindric column, free near apices; anthers 6–10 mm long, occasionally exceeding stigma lobe, mauve; pollen orange or yellow. *Ovary* ± cylindric, 7–10 mm long, green or dull red; style branches 5–7 mm long, arching over outer tepal claws, crests (3–)5–8 mm long. *Capsules* ± cylindric, 20–30 mm long. *Seeds* angled with spongy testa. *Chromosome number* $2n = 12$ (subsp. *elandsmontana*), 24 (subsp. *villosa*). *Flowering time*: mid-August and September.

Distribution and ecology: relatively widespread in Western Cape, South Africa, from near Citrusdal in the Olifants River Valley to Somerset West and the Hottentots Holland Mtns and inland in the Tulbagh and Ceres Valleys but absent from the Cape Peninsula; on a variety of soils, including clay loam, granitic gravel and rocky flats in sandy ground.

Diagnosis: one of several species of the 'peacock moraea' group of species, characterised by their particularly broad, spreading outer tepals marked with large, contrasting markings, *Moraea villosa* is distinguished by the velvety stems and abaxial leaf surfaces, large flowers with outer tepals 28–40 × 20–25 mm and 3-lobed inner tepals with a long, spreading central lobe, and the well-developed style branches 6–8 mm long with crests 3–8 mm long. The anthers are usually shorter than the style branches, though occasionally slightly longer. The closely related *M. tulbaghensis*, which has orange to red (rarely white) flowers, has anthers exceeding the shorter and narrower style branches and significantly smaller flowers (outer tepals 28–31 mm long).



Distribution of ***Moraea villosa*** subsp. ***villosa***, ●; subsp. ***elandsmontana***, ○.

Two subspecies are recognised, widespread subsp. *villosa* with purple, lilac, creamy green or occasionally white flowers, large nectar guides, and yellow tepal claws is tetraploid, 2*n* = 24, and subsp. *elandsmontana* with orange to peach-coloured flowers with smaller, navy blue nectar guides is diploid, 2*n* = 12. The two are sympatric in the Elandsberg Nature Reserve north of Wellington.

Key to subspecies

1a Flowers predominantly purple, lilac, pink or creamy green; outer tepals 30–40 mm long, spreading to slightly reflexed; plants tetraploid . . . . . 168a. subsp. *villosa*

1b Flowers predominantly orange to peach-coloured; outer tepals 28–31 mm long, often slightly cupped to spreading; plants diploid . . . . . 168b. subsp. *elandsmontana*

168a. subsp. **villosa**

Stem usually unbranched. *Flowers* purple, lilac, pink or occasionally creamy green, outer tepals limbs with prominent purple or turquoise green nectar guides, spreading, often slightly below horizontal, claws yellow; outer tepals 30–40 × 20–25 mm, claws 8–12 mm long. *Filaments* ± 5 mm long; anthers 6–8 mm long, occasionally exceeding stigma lobe, mauve; pollen orange. *Ovary* often dull red. *Chromosome number* 2*n* = 24.

Distribution and ecology: as for the species.

168b. subsp. **elandsmontana** *Goldblatt* in Annals of the Missouri Botanical Garden 69: 366 (1982); Goldblatt: 186 (1986a). Type: South Africa, [Western Cape], foot of Elandskloof Mtns, Farm Elandsberg, *Goldblatt 6206* (MO, holo.; K., NBG, PRE, S, iso.).

Plants like subsp. *villosa* in vegetative features but stem usually unbranched. *Flowers* bright orange to peach-coloured (exceptionally yellow), outer tepal limbs with navy blue nectar guides at bases, often slightly cupped or spreading, claws orange; outer tepals 28–31 mm long, claw 8–11 mm long, limb curving upward distally, margins curving upward. *Filaments* ± 4 mm long; anthers ± 6 mm long. *Ovary* usually green; style branches ± 6 mm long, orange. *Chromosome number* 2*n* = 12. *Flowering time*: September.

Distribution and ecology: restricted to lower western slopes of the Eland's Kloof Mtns in the Elandsberg Nature Reserve; in stony sandstone soil in fynbos.

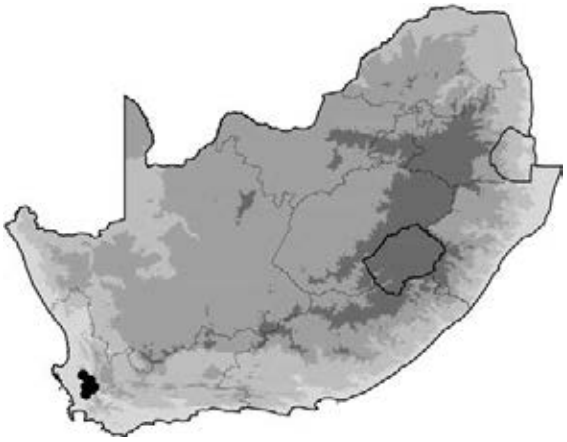
Diagnosis: subsp. *elandsmontana* is almost identical to subsp. *villosa* except for the striking orange to peach-coloured flowers with contrasting navy blue nectar guides. The flowers are slightly smaller than in subsp. *villosa*, the outer tepals 28–31 mm long and usually curving upward, rather than spreading slightly below horizontal. It is diploid, 2*n* = 12 whereas several counts for subsp. *villosa* shows it to be tetraploid, 2*n* = 24.

169. **Moraea tulbaghensis** *L.Bolus* in South African Gardening and Country Life 22: 276 (1932c); Goldblatt: 778 (1976a); Goldblatt: 189 (1986a) [not including *M. neopavonia*]. Type: South Africa, [Western Cape], Saron, *H.M.L. Bolus s.n.* (BOL, holo.).

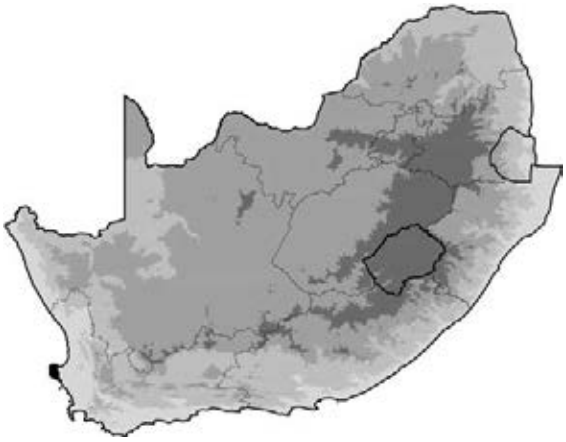
Iris pavonia L.f.: 98 (1782). *Vieusseuxia pavonia* (L.f.) DC.: 139 (1803). *Moraea neopavonia* R.C.Foster: 108 (1947), as a new name for *M. pavonia* (L.f.) Ker Gawl.: 240 (1804a), illegitimate homonym, not *M. pavonia* Thunb. (1787). Type: South Africa, [Western Cape], Swartland hills, *Thunberg s.n.* [UPS–THUNB 1148A, lecto., designated by Goldblatt: 769 (1976a)].

Plants 250–600 mm high. *Corm* 10–15 mm diam.; tunics of pale, coarse, ± woody fibres. *Stem* velvety-hairy, simple or 1-branched, sheathing leaves with dry attenuate apices, 45–60 mm long. *Foliage leaf* solitary, linear, basal, velvety on abaxial surface, exceeding stem, ± erect but often trailing distally. *Rhipidial spathes* with dry, brown, attenuate apices, inner 40–70(–80) mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, bright orange, rarely red or white, outer tepal limbs with blue-green, navy blue, turquoise or darkly spotted nectar guides at bases, spreading, claws bearing orange hairs; outer tepals 22–40 mm long, limbs (12–)15– 21 × 15–23 mm, claws ± 10 mm long, diverging, densely velvety; inner tepals 15–25 mm long, either 3-lobed, with lateral lobes short, rounded, obtuse, central lobe linear, elongate, spreading or narrowly elliptic with acute apex. *Filaments* 4–5 mm long, united in a column, free near apices; anthers 7–10 mm long, reaching or exceeding style crests by up to 3 mm. *Ovary* ± 7–9 mm long; style branches 5–7 mm long, 2–5 mm wide, crests triangular, ± 2 mm long. *Capsules* cylindric, 20–40 mm long. *Seeds* large, angular, with spongy testa. *Chromosome number* 2*n* = 12, 24. *Flowering time*: September.

Distribution and ecology: a fairly narrow endemic of Western Cape, South Africa, extending from near Saron along the foothills of the Twenty Four Rivers and Elandskloof



Distribution of ***Moraea tulbaghensis***.



Distribution of ***Moraea calcicola***.

Mtns, in the upper Tulbagh Valley, Kasteelberg and on the hills of the Berg River Valley as far west as Koringberg; on clay and stony slopes and flats, mostly in renosterveld.

Diagnosis: resembling *Moraea villosa* in its velvety stems and outer leaf surfaces, *M. tulbaghensis* typically has bright orange flowers with navy blue to glossy, emerald green nectar guides. The flowers are usually somewhat smaller than those of *M. villosa*, the outer tepals 22–40 mm long, but the species is most easily distinguished by the anthers, 7–10 mm long and exceeding the style branches and often overtopping the particularly short crests ± 2 mm long. Western populations, recognised as *Iris pavonia* and later named *M. neopavonia*, sometimes have small, elliptic to obscurely three-lobed rather than the strongly tricuspidate inner tepals that characterise other populations, and are diploid, whereas the species is tetraploid elsewhere. Tepal markings in these populations are either navy blue or consist of small dark spots. Populations from Voëlvlei and at Elandsberg Nature Reserve have dark red rather than the more common orange flowers. Even more unusual, a white-flowered population occurs on the slopes of Kasteelberg.

170. **Moraea calcicola** *Goldblatt* in Annals of the Missouri Botanical Garden 69: 364 (1982); Goldblatt: 188 (1986a). Type: South Africa, [Western Cape], limestone hills above Saldanha, *Goldblatt 4118* (MO, holo.; BR, E, K, NBG, PRE, S, US, WAG, iso.).

Plants slender, 300–400 mm high. *Corm* 9–12 mm diam.; tunics of light brown, netted fibres. *Stem* simple or 1-branched, finely velvety, sheathing leaves green with dry, attenuate apices, 50–60 mm long. *Foliage leaf* solitary, basal, linear, channelled, exceeding the stem, villous on abaxial surface, 3–5 mm wide, often bent and trailing. *Rhipidial spathes* becoming dry from apices, attenuate, inner 50–70 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* long-lived, blue or mauve, becoming paler with age, outer tepal limbs with small dark blue, triangular nectar guides at bases or ± without nectar guides, claws densely covered with black hairs, faintly scented; outer tepals 23–35 × 27–32 mm, limbs 15–25 mm long, spreading horizontally, claws 8–10 mm long, narrowly diverging; inner tepals 14–22 mm long, 3-lobed, lateral lobes short, obtuse, central lobed elongate, extended ± horizontally. *Filaments* 2–3 mm long, united in a glabrous column, free in upper 0.5 mm; anthers 5.5–6.5 mm long, dark blue-violet; pollen orange. *Ovary* ± cylindric, 10–15 mm long; style branches inclined, 6–8 mm long, ± 6 mm at widest point, crests ± 4 mm long, margins irregularly serrated. *Capsules* ellipsoid, 18–24 mm long. *Seeds* pale straw-coloured, angular. *Chromosome number* $2n = 12$. *Flowering time*: September.

Distribution and ecology: a narrow endemic of the Saldanha District of Western Cape, South Africa, extending from the Donkergat Peninsula northward to Paternoster, a distance of some 50 km; restricted to limestone outcrops along the coast and a short distance inland.

Diagnosis: *Moraea calcicola* resembles *M. villosa* in its velvety stems and outer leaf surfaces but differs in its clear blue to blue-mauve flowers, usually lacking markings on the tepal limbs and with dark, almost black tepal claws. *Moraea calcicola* is a more slender plant than *M. villosa* and has closer set outer tepals with darkly bearded claws 8–10 mm long and relatively short filaments 2–3 mm long. *Moraea villosa* has large dark nectar guides and contrasting yellow tepal claws 8–12 mm long, and filaments 4–5 mm long. The dark-coloured hairs on the outer tepal claws of *M. calcicola* are reminiscent of *M. loubseri*, which has outer tepals with a heavy beard covering the claws and proximal part of the limb, and the inner tepals are similarly coloured. The two species are most likely immediately related.

171. **Moraea loubseri** *Goldblatt* in Flowering Plants of Africa 44: t. 1724 (1977b); Goldblatt: 190 (1986a). Type: South Africa, [Western Cape], Olifantskop, Langebaan, *Goldblatt 2076* (MO, holo.; K, NBG, PRE, S, iso.).

Plants 150–200 mm high. *Corm* ± 10 mm diam.; tunics of pale, fairly coarse fibres. *Stem* minutely velvety,

simple or 1(2)-branched, sheathing leaves green, with dry, brown attenuate apices, 40–50 mm long. *Foliage leaf* solitary, basal, linear, channelled, hairy outside, exceeding stem and trailing distally. *Rhipidial spathes* with brown attenuate apices; inner 40–60 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* long-lived, blue-violet, outer tepal claws and proximal $^{1}/_{3}$ of limbs densely covered with blue-black hairs, limbs laxly spreading to half reflexed; outer tepals 24–30 mm long, limbs 14–20 × 12–18 mm, claws broad, ± 10 mm long; inner tepals 3-lobed, 15–20 mm long, lateral lobes short, obtuse, central lobe linear-acuminate, ± 12 mm long, spreading to slightly reflexed. *Filaments* ± 4 mm long, united in lower ± 3 mm, free and diverging distally; anthers 5 mm long, violet; pollen orange. *Ovary* narrowly ovoid-cylindric, 8–10 mm long; style branches ± 6 mm long, ± horizontal, crests 8–10 mm long, wedge-shaped, spreading. *Capsules* ± club-shaped, 18–20 mm long. *Seeds* angular, testa inflated. *Chromosome number* 2*n* = 12. *Flowering time*: late August to late September.

Distribution and ecology: an extremely local endemic, restricted to the upper slopes and summit of Olifants Kop, a low, granite hill on the outskirts of Langebaan south of Saldanha on the Atlantic Coast of Western Cape, South Africa; in sandy, rocky granitic ground.

Diagnosis: one of the so-called 'peacock moraeas', *Moraea loubseri* is readily recognised by the striking dark blue-violet flowers with the outer tepal claws and proximal parts of the limbs densely covered with dark blue-black hairs. The flowers are relatively large with outer tepals 24–30 × 12–18 mm. As in several other species of the *M. villosa* alliance, the solitary, linear leaf is velvety-hairy on the outer surface and the stem is minutely velvety. The inner tepals are 3-lobed with a particularly long, slender central lobe spreading to laxly reflexed and the style branches and crests are unusual in spreading horizontally rather than ascending as in other species of the *M. villosa* group.

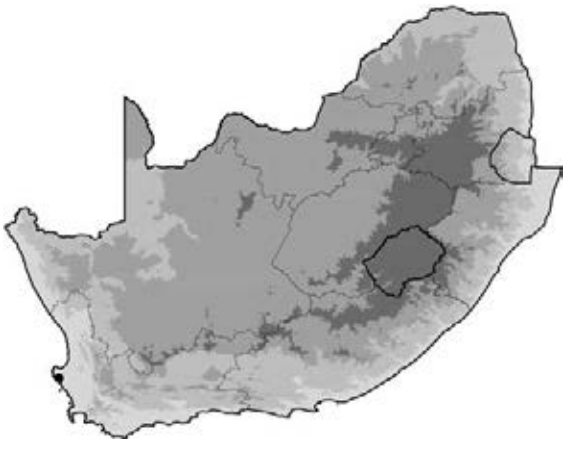
The only known locality has subsequently been partially excavated and most of the original habitat of *Moraea loubseri* is destroyed. Only a few plants still survive in the wild but the species is now widely cultivated by bulb enthusiasts.

172. **Moraea gigandra** *L.Bolus* in South African Gardening and Country Life 17: 418 (1927b); Goldblatt: 771 (1976a); Goldblatt: 196 (1986a). Type: South Africa, [Western Cape], without precise locality, *Metelerkamp s.n.* (BOL, holo.).

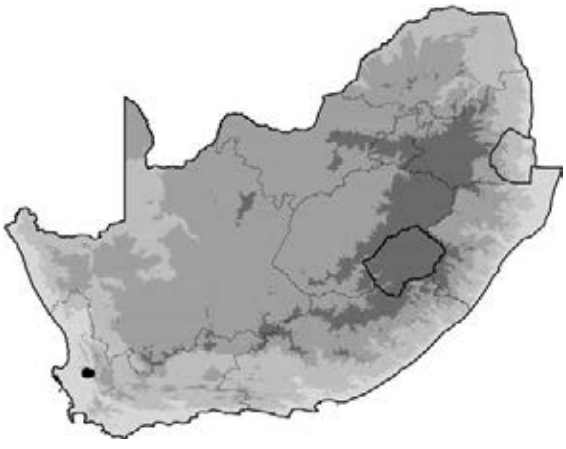
Plants 200–400 mm high, usually unbranched. *Corms* ± 15 mm diam.; tunics of fine inner fibres and coarse woody outer fibres. *Stem* velvety, simple or 1-branched, sheathing leaves with attenuate, brown apices, 50–70 mm long. *Foliage leaf* solitary, basal, linear, sparsely hairy or glabrous on adaxial surface, usually exceeding stem, trailing distally. *Rhipidial spathes* with dry, dark brown attenuate apices, inner 50–80 mm long, outer ± $^{3}/_{4}$ as long. *Flowers* long-lived, blue-violet, (rarely white or orange), outer tepal limbs with narrow, dark blue-turquoise, crescent-shaped nectar guides at bases, spreading, claws densely hairy, dark brown; outer tepals 35–45 mm long, claw ± 6 mm long, broad, limbs 30–38 × 18–35 mm, inner tepals 9–15 mm long, 3-lobed, lateral lobes short, obtuse, central lobes linear, much longer, spreading to laxly reflexed. *Filaments* 2–4 mm long, free in upper 1 mm; anthers 13–15 mm long, dark blue, much exceeding style crests; pollen yellow. *Ovary* ± cylindric, 18–22 mm long; style branches ± 6 × 2 mm, crests vestigial, barely exceeding stigma lobe. *Capsules* 20–30 mm long, narrowly obovoid. *Seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: late September to mid-October.

Distribution and ecology: restricted to the lower slopes of the Piketberg and the Swartland hills to the east as far as Porterville in Western Cape, South Africa, now on the verge of extinction; on clay soil in renosterveld.

Diagnosis: with one of the largest and most striking flowers in the genus, *Moraea gigandra* has dark blue-purple, or rarely white or orange flowers with broad, shortly clawed outer tepals up to 45 mm long and 30–35 mm wide, the



Distribution of ***Moraea loubseri***.



Distribution of ***Moraea gigandra***.

limbs spreading horizontally and with dark blue to turquoise, crescent-shaped nectar guides. The flowers are distinctive not only in size but also for their extraordinarily long anthers, 13–15 mm long and exceeding the style branches. The style crests are barely developed and are about as long as the stigmatic lobes. The single, channelled leaf is usually hairy on the abaxial surface and the stems are velvety. Like other species in the *M. villosa* alliance the inner tepals are 3-lobed, with an elongate spreading to trailing central lobe. The species is comparatively late-flowering. *Moraea gigandra* was evidently once common north of the Berg River but is now on the verge of extinction, and the white- and orange-flowered populations have not been recorded since the 1930s.

Subg. 11. **Homeria**

Subg. **Homeria** *(Vent.) Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 40 (2013). *Homeria* Vent.: 2 (1808); Goldblatt: 431 (1981). Type: *H. collina* (Thunb.) Salisb. = *M. collina* Thunb.

Sessilistigma Goldblatt: 156 (1984a). Type: *S. radians* Goldblatt = *Moraea radians* (Goldblatt) Goldblatt

Plants simple or few–several-branched; corm tunics of wiry, black fibres. *Foliage leaves* few to solitary. *Flowers* fugaceous or long-lived, yellow, beige or pink to orange, sometimes with dark markings; outer and inner tepals mostly subequal, both whorls usually with nectar guides, claws as long as limbs or much shorter. *Filaments* united entirely or free near apices (free in *M. radians*); style branches reduced with crests vestigial or absent. *Capsules* ovoid-ellipsoid to cylindric, included or exserted. *Basic chromosome number* $x = 6$.

Sect. 14. **Stipantherae** *(Goldblatt) Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 40 (2013). *Homeria* sect. *Stipantherae* [*Stipanthera*] Goldblatt: 426 (1981). Type: *Moraea cookii* (L.Bolus) Goldblatt

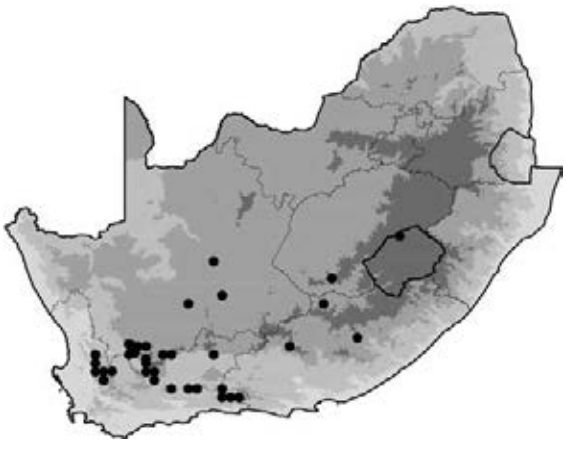
Leaf solitary, clasping stem below. *Flowers* yellow (rarely pink); tepals with claws much shorter than limbs, clasping or forming a cup including base of filament column. *Filaments* free near apices or fully united.

173. **Moraea cookii** *(L.Bolus) Goldblatt* in Novon 8: 375 (1998). *Homeria cookii* L.Bolus: t. 306 (1928a); Goldblatt: 440 (1981). Type: South Africa, [Western Cape], Concordia Valley, Montagu, *Cook s.n.* (BOL, lecto. designated by Goldblatt: 440 (1981); K, isolecto.).

Homeria pillansii L.Bolus: t. 684 (1938). Type: South Africa, [Western Cape], Gydo Pass, Ceres, *N. Pillans s.n.* (BOL [19882], holo.; K, PRE, iso.).

Plants (200–)300–600 mm high. *Corms* 15–30 mm diam.; tunics of coarse, black fibres. *Stem* branched from upper nodes, occasionally also near base, branches short, straight, but flexed below rhipidia, sheathing leaves acute, (40–)60–90 mm long. *Foliage leaf* solitary, basal, sheathing lower part of stem, falcate to trailing above, longer than stem, channelled, (6–)12–25 mm wide. *Rhipidial spathes* acute, inner elongating later to enclose capsules, (40–)50–90 mm long, outer slightly shorter to $^2/_3$ as long. *Flowers* fugaceous, pale yellow (rarely pale salmon-pink), darker towards centre, tepal limb bases minutely spotted dark yellow to green, faintly scented, spreading and twisted distally, claws erect, clasping filament column; outer tepals 30–43 × 14–18 mm, claws 4–6 mm long, limbs oblong to slightly obovate; inner tepals 30–35 × 12–14 mm. *Filaments* 6–10 mm long, united in cylindric column smooth or papillate in lower $^1/_3$, usually free in upper 1–2 mm; anthers 6–10 mm long, diverging, tips curving inward, yellow; pollen yellow. *Ovary* ± cylindric, 10–15 mm long, usually included; style branches diverging, 5–7 mm long, arching upwards distally, stigma bilobed, stigmatic laterally, crests 2–4 mm long, ± linear, arching inward. *Capsules* 15–22 mm long, cylindric to club-shaped. *Seeds* angular, light brown. *Chromosome number* $2n = 12, 24, 36$. *Flowering time*: late August to October.

Distribution and ecology: widespread in South Africa, mainly at high altitudes, from the Cederberg in Western Cape and the Roggeveld in Northern Cape east through the Karoo to Queenstown in Eastern Cape, and north in



Distribution of ***Moraea cookii***.

the mountains of the eastern Free State and western Lesotho; mainly montane, in grassland or fynbos on a variety of soils, flowering only after fire in Western Cape.

Diagnosis: *Moraea cookii* is distinguished by the large, usually pale yellow (rarely pale salmon-pink) flowers with short, erect tepal claws and broad spreading limbs mostly 25–35 mm long. The claws either clasp the filament column or form a narrow cup including the lower part of the filament column. The filaments are free distally for 1–2 mm, a feature shared with few other species of subg. *Homeria*, notably the closely related *M. elegans*. The broad leaves are grey-green and usually 15–25 mm wide (occasionally narrower) and clasp the lower part of the stem. The species is heteroploid, with diploids and tetraploids in the Karoo and interior but hexaploid in Western Cape.

174. **Moraea pallida** *(Baker) Goldblatt* in Novon 8: 375 (1998). *Homeria pallida* Baker: 75 (1892); Goldblatt: 445 (1981). Type: South Africa, [Northern Cape], Moshowa River near Old Litakun, *W. Burchell 2252-1* [K, lecto., designated by Goldblatt: 445 (1981)].

Moraea glauca J.M.Wood & M.S.Evans: 352 (1897). *Homeria glauca* (J.M.Wood & M.S.Evans) N.E.Br.: 350 (1929b). Type: South Africa, [KwaZulu-Natal], Mooi River, *Wood 4305* [K, lecto., designated by Goldblatt: 445 (1981)].

Homeria humilis N.E.Br.: 351 (1929b). Type: South Africa, [Gauteng], Pretoria District, *Mare s.n.* (K, lecto. designated by Goldblatt: 445 (1981); PRE, isolecto.).

Homeria mossii N.E.Br.: 351 (1929b). Type: South Africa, [Northern Cape], Concordia, *Moss 15606* (K, lecto. designated by Goldblatt: 445 (1981); LD, isolecto.).

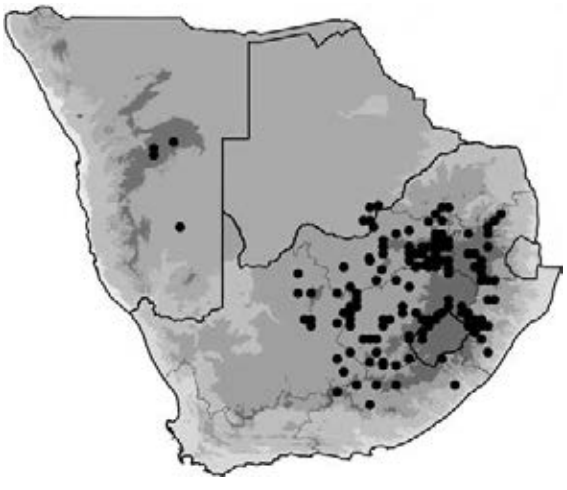
Homeria pura N.E.Br.: 351 (1929b). Type: South Africa, [Free State], Parys, *Young sub Moss 13494* [PRE, lecto., designated by Goldblatt: 434 (1981)].

Homeria townsendiae N.E.Br.: 351 (1929b). Type: South Africa, [Mpumalanga], Ermelo, *Townsend sub Moss 15810* (K, lecto., designated by Goldblatt: 434 (1981); PRE, isolecto.).

Plants 120–400 mm high, slender to robust. *Corms* 10–20 mm diam., sometimes with cormlets at base; tunics of black, wiry, coarse fibres. *Stem* straight or sometimes weakly flexed below nodes, several-branched, branches flexed below rhipidia; sheathing leaves attenuate with dry attenuate tips, 30–50 mm long. *Foliage leaf* solitary, basal, usually sheathing lower part of stem, distally falcate or suberect, often bent and trailing distally, channelled, longer than stem, usually 5–15 mm wide. *Rhipidial spathes* acute-attenuate, inner 35–50(–60) mm long, outer slightly shorter. *Flowers* fugaceous, yellow (rarely pink), tepal limbs with deep yellow nectar guides minutely speckled dark green at bases, spreading, claws erect, clasping filament column; outer tepals 18–24(–27) × 5–8(–12) mm long, claws narrow, ± 3 mm long, limbs ± oblong to obovate; inner tepals smaller, narrowly obovate, 5–8 mm wide. *Filaments* 5–7 mm long, united below in a smooth, cylindric column, free in upper 1.5–2.0 mm and diverging; anthers straight, arching inward after anthesis, 4–6 mm long, exceeding stigmas, yellow; pollen yellow. *Ovary* ± 10 mm long, ± cylindric; style branches diverging, 5–6 × ± 1 mm, stigma bilobed, crests ± 1 mm long, erect or arching inward. *Capsules* club-shaped, 10–20 mm long. *Seeds* angular, light brown. *Chromosome number* 2*n* = 12, 8. *Flowering time*: late August to October (rarely until December).

Distribution and ecology: widespread in South Africa, extending from central Namibia near Windhoek across southeastern Botswana, eastern Northern Cape, Free State to Gauteng and Mpumalanga as far east as Machadodorp and Lydenburg, and in the KwaZulu-Natal Midlands as far south as Lions River; in grassland often after the first spring rains, sometimes in vleis and seasonally wet sites.

Diagnosis: despite its several synonyms, *Moraea pallida* is relatively uniform both in the small yellow flowers and low stature with a solitary leaf clasping the lower half of the stem. The flowers have spreading tepal limbs 16–24 mm long and erect claws, ± 3 mm long, clasping the lower part of the filament column. Somewhat unusually for the genus, the filaments are free and diverging distally for 1–2 mm, a feature shared with *M. cookii* to which it appears to be closely related. The relatively short style branches reach only to the middle of the anthers but have short crests, either erect or curving inward. Populations from KwaZulu-Natal differ somewhat in having numerous small cormlets around the base of the parent corm and even in the axils of the foliage and sheathing leaves. Plants bloom in spring to early summer usually at the end of the dry winter, before the onset of the summer-rainfall season. It is extremely toxic to stock and is the cause of considerable debilitation and death among sheep and cattle.



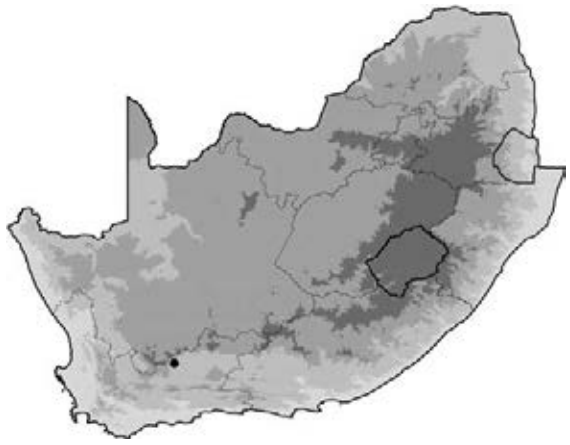
Distribution of ***Moraea pallida***.

Cytologically *Moraea pallida* is unusual in being heteroploid. Northern populations have the typical $2n = 12$ for subg. *Homeria* but those sampled from Northern Cape and Free State are dysploid, $2n = 8$ and are complex heterozygotes, the chromosomes forming rings at meiosis.

175. **Moraea doleritica** *Goldblatt & J.C.Manning* in Bothalia 43: 160 (2013). Type: South Africa, Western Cape, Great Karoo, ± 52 km south of Fraserburg to Leeu Gamka, low dolerite outcrops below Great Escarpment, 27 Sept. 2012, *Goldblatt & Porter 13806* (NBG, holo.; MO, PRE, iso.).

Plants 350–450 mm high. *Corm* unknown. *Stem* with (1)2 or 3 branches from penultimate node, bearing a solitary sheathing leaf 45–55 mm long, attenuate, ± dry and light brown midway through flowering. *Foliage leaf* solitary, linear, fibrotic, falcate, longer than stem, narrowly channelled, 2–3 mm wide when opened flat. *Rhipidial spathes* pale grey-green, dry and light brown in upper half, attenuate, with fine white nerves evident, inner 50–65 mm long at anthesis, outer ± half as long, inner elongating after flowering to enclose ripening capsules. *Flowers* fugaceous, pale yellow, outer tepal limbs with deeper yellow nectar guides at base with fine dark dots; outer tepals obovoid-pandurate, 25–27 mm long, limbs ± 20 mm long, claws of both whorls ± 6 mm long, ascending to form narrow cup including lower half of filament column, limbs spreading and twisted through ± 45° distally, inner tepals ± 22 × 7 mm. *Filaments* 7–8 mm long, united for most of their length in smooth, cylindric column, free and diverging in upper 0.7 mm; anthers ± 8 mm long before anthesis, 5–6 mm after releasing pollen, then tips arching inward, exceeding style branches, yellow; pollen yellow. *Ovary* cylindric, usually exserted, ± 12 mm long; style branches ± 4 mm long, crests ± linear, erect, ± 1.5 mm long. *Capsules* and *seeds* unknown. *Flowering time*: mid-September and October; flowers opening early morning and collapsed by 11:00.

Distribution and ecology: known only from the western Great Karoo between Leeu Gamka and Fraserburg in Western Cape, South Africa; evidently restricted to low dolerite outcrops.



Distribution of ***Moraea doleritica***.

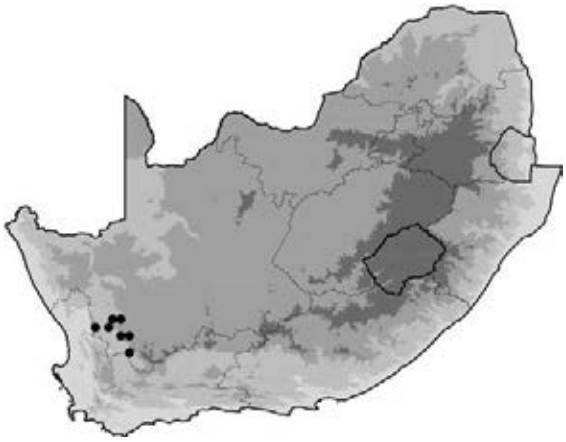
Diagnosis: the pale yellow flowers with relatively well-developed style branches and short, erect crests and, in particular, the filaments free distally for a short distance are somewhat unusual for subg. *Homeria* and recall *Moraea pallida* and *M. cookii*, also with a solitary foliage leaf. The spreading tepals twisted distally through ± 45° of *M. doleritica* are also found in *M. cookii* and *M. pallida*. Both *M. cookii* and *M. pallida* have a relatively broad leaf clasping the lower part of the stem, thus rather different to the particularly long, narrowly channelled, and relatively rigid, tough, fibrous leaf of *M. doleritica*. The range of *M. doleritica* in the Great Karoo is complimentary to that of *M. cookii* and *M. pallida*, with *M. cookii* extending from the Cederberg in Western Cape through the mountains of the Karoo to Lesotho, and *M. pallida* occurring across the Upper Karoo through Free State to Mpumalanga.

176. **Moraea marlothii** *(L.Bolus) Goldblatt* in Novon 8: 375 (1998). *Homeria marlothii* L.Bolus: 320 (1929c); Goldblatt: 443 (1981). Type: South Africa, [Northern Cape], Hantam Mts, *Marloth 12787* (BOL, lecto., designated by Goldblatt: 443 (1981); K, PRE, isolecto.).

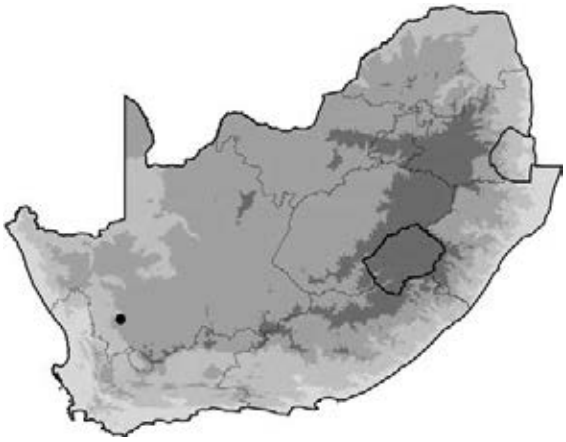
Plants large, 500–750 mm high. *Corms* large, ± 35 mm diam.; tunics of coarse, wiry black fibres. *Stem* straight, several-branched from upper nodes, branches suberect, flexed upward below rhipidia, with sheathing leaves acute, 80–120 mm long. *Foliage leaf* solitary, basal, sheathing lower part of stem, channelled, falcate to trailing, 15–35 mm wide. *Rhipidial spathes* attenuate with brown, membranous tips, inner 50–70 mm long, outer slightly shorter. *Flowers* fugaceous, upright to half nodding, pale yellow (rarely pink), tepal limbs with dark yellow nectar guides at limb bases covered with tiny green dots, spreading, tepal claws erect, distally appressed to base of filament column, slightly bulbous below; outer tepals 27–34 × 11–17 mm, claws ± 4 mm long, limbs ± ovate; inner tepals slightly smaller, obovate. *Filaments* 7–10 mm long, united in cylindric to slightly bulbous column pubescent in lower $^1/_2$; anthers 8–11 mm long, diverging, exceeding style branches, arching inward distally; pollen yellow. *Ovary* cylindric-curved, 10–20 mm long; style branches diverging, 4–10 mm long, stigma lobe broad, fertile laterally; crests horizontal, 3 mm long. *Capsules* 20–25 mm long, club-shaped. *Seeds* angular, light brown. *Chromosome number* $2n = 24$. *Flowering time*: September and October.

Distribution and ecology: extending in Northern Cape, South Africa, from the Bokkeveld Mtns east to Calvinia and the Roggeveld as far south as Middelpos; mostly in rocky sites in heavy red clay but in sandstone outcrops in the west of its range.

Diagnosis: broadly resembling the widespread *Moraea cookii* in the solitary broad leaf clasping the lower half



Distribution of ***Moraea marlothii***.



Distribution of ***Moraea reflexa***.

of the stem, *M. marlothii* is a taller plant with slightly smaller, usually half nodding flowers with spreading to half reflexed tepals 27–34 × 11–17 mm and nearly equal vs. outer tepals 30–43 × 14–18 mm and markedly larger than the inner in *M. cookii*. The filaments are completely united whereas those of *M. cookii* are free in the upper 1–2 mm. A striking feature of *M. marlothii* is the slender, curved ovary up to 20 mm long. *Moraea marlothii* co-occurs on the Hantamsberg with vegetatively similar *M. reflexa,* which has pendent flowers with the tepals fully reflexed and a top-shaped ovary only 7–8 mm long.

177. **Moraea reflexa** *Goldblatt* in Novon 8: 375 (1998), as a new name for *Homeria hantamensis* Goldblatt & J.C.Manning: t. 2128 (1997) [not *M. hantamensis* Klatt (1882)]. Type: South Africa, [Northern Cape], Calvinia, Hantamsberg summit plateau, 11 Oct. 1995, *Goldblatt & Manning 10355* (NBG, holo.; K, MO, PRE, S, WAG, iso.).

Plants 700–1 100 mm high. *Corm* globose, 15–22 mm diam.; tunics of coarse, wiry, dark brown fibres. *Stem* straight, 3(4) internodes long, 2- to 4-branched from upper nodes, branches also sometimes branched, sheathing leaves with attenuate, dry apices, 60–100 mm long. *Foliage leaf* solitary, basal, sheathing stem in lower half, channelled below becoming ± plane above, falcate, 12–20 mm wide, slightly twisted distally. *Rhipidial spathes* nodding, with dry brown attenuate apices, inner 50–70 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, nodding to nearly pendent, pale yellow, tepal limbs with creamy and darker yellow nectar guides minutely speckled dark green at bases, fully reflexed, claw tips clasping base of bulbous part of filament column, sweetly scented; outer tepals 28–34 × ± 8 mm, claws 3–4 mm long, erect; inner tepals oblong, 23–29 × ± 6 mm. *Filaments* ± 13 mm long, united in a bulbous column, cylindric and 2.5 mm at base, abruptly swollen to ± 3 mm diam., column tapering gradually to slender apex; anthers ± 6 mm long, diverging, pale yellow lined abaxially with grey; pollen pale yellow. *Ovary* ± top-shaped, 7–8 mm long, exserted, pedicel recurved; style branches ± 4 × 2 mm, diverging, expanded distally with stigmatic lobe wider than style branch and extended either side of anthers, crests straight, linear, 3–5 mm long. *Capsules* narrowly obovoid, 10–12 mm long. *Seeds* not known. *Flowering time*: late September to mid-November.

Distribution and ecology: a narrow endemic of the Hantamsberg at Calvinia, Northern Cape, South Africa; among dolerite rocks on the plateau above 1 300 m.

Diagnosis: *Moraea reflexa* is distinguished among the yellow-flowered species of subg. *Homeria* by the solitary, broad, glaucous leaf, the lower portion clasping the stem, and the half to fully pendent flowers with reflexed tepal limbs. The tips of the tepal claws clasp the thickened filament column but are slightly bowed toward the bases, which contain nectar. The style branches are relatively well developed and bear broad stigmatic lobes and straight linear crests. *Moraea reflexa* may be confused with superficially similar *M. marlothii*, a taller, more robust species that occurs widely across the western Karoo, but the tepals in that species, either yellow or pink, spread horizontally or are sometimes half reflexed, the filament column is usually narrow and cylindric or only slightly thickened below, and the ovary is long and slender and curved outward, whereas the shorter ovary of *M. reflexa* is straight, top-shaped and widest near the apex. Although the flowers of *M. marlothii* are comparable in size to those of *M. reflexa,* it has much larger anthers 8–11 mm long compared with anthers ± 6 mm long in *M. reflexa.*

178. **Moraea britteniae** *(L.Bolus) Goldblatt* in Novon 8: 374 (1998). *Homeria britteniae* L.Bolus: 11 (1931a); Goldblatt: 449 (1981). Type: South Africa, [Eastern Cape], Grahamstown, *Britten 2951* (BOL, lecto., designated by Goldblatt: 449 (1981); K, isolecto.).

Plants 200–450 mm high. *Corm* 10–15 mm diam.; tunics of coarse, black fibres. *Stem* straight, usually branched, branches ascending, held close to axis, sheathing leaves

60–80 mm long, attenuate. *Foliage leaf* solitary, basal, often sheathing lower part of stem, longer than stem, erect or trailing distally, channelled, 6–9 mm wide, dark green. *Rhipidial spathes* attenuate, inner initially 60–80 mm long, elongating with age to enclose developing capsules, outer 40–60 mm long. *Flowers* fugaceous, creamy white to pale yellow, tepal limbs with deep yellow nectar guides at bases spotted with green, spreading horizontally, twisted distally, tepal claws suberect, forming a narrow tube enclosing filament column; outer tepals narrowly obovate to pandurate, 26–35 × 8–13 mm, claws 8–9 mm long, suberect; inner tepals smaller, 21–35 × 6–10 mm. *Filaments* 7–8 mm long, united below in a smooth, cylindric column, free in upper 0.5–1.5 mm (or virtually united entirely); anthers 6–7 mm, shortly exceeding stigma lobes, white; pollen white. *Ovary* cylindric, 15–24 mm long; style branches diverging and curved upward, 4–6 mm long, stigma bilobed, broad, receptive laterally, crests short, horizontal, ± 2 mm long. *Capsules* cylindric, (18–)25–45 mm long. *Seeds* angular. *Chromosome number* 2*n* = 12, 24. *Flowering time*: mid-September and October.

Distribution and ecology: occurring on the south coast of South Africa, from Knysna in Western Cape in the west to Grahamstown in Eastern Cape in the east; often in damp situations, most often in sandy soils, usually in low-lying areas that remain moist throughout the winter.

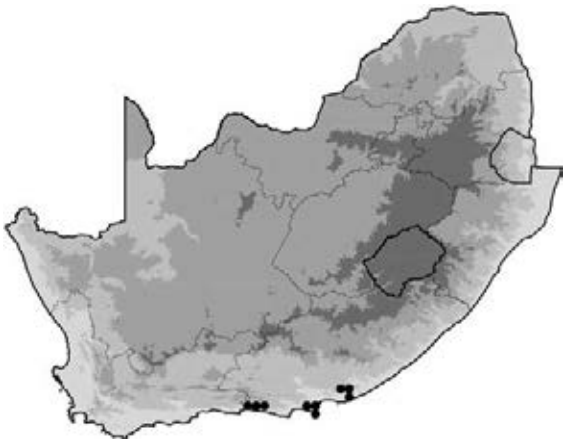
Diagnosis: often confused with other single-leaved species of subg. *Homeria*, *Moraea britteniae* is immediately recognised by the basal foliage leaf sheathing the lower half of the stem and the creamy white (to pale yellow) flowers. The tepal claws form a narrow cup including the filament column and sometimes the base of the anthers, with the apices of the filaments free for up to 1.5 mm. The ovary is relatively long, 15–24 mm, giving rise to capsules mostly 25–45 mm long. The apically free filaments and leaf sheathing the stem for some distance correspond with the critical features of the *M. cookii*–*M. pallida* group, although the long floral cup is unknown elsewhere in the group. DNA sequence data place the species closest to *M. ochroleuca* and *M. collina* (sect. *Homeria*) which also have unusually long capsules. Available information is thus conflicting and provisionally the species remains in *Stipantherae*.

179. **Moraea eburnea** *Goldblatt & J.C.Manning* in Bothalia 43: 160 (2013). Type: South Africa, Western Cape, Seweweekspoort to Laingsburg near Farm Vleiland, northern foothills of the Klein Swartberg Mtns, 25 Sept. 2004, *Goldblatt & Porter 12561* (NBG, holo.; K, MO, PRE, iso.).

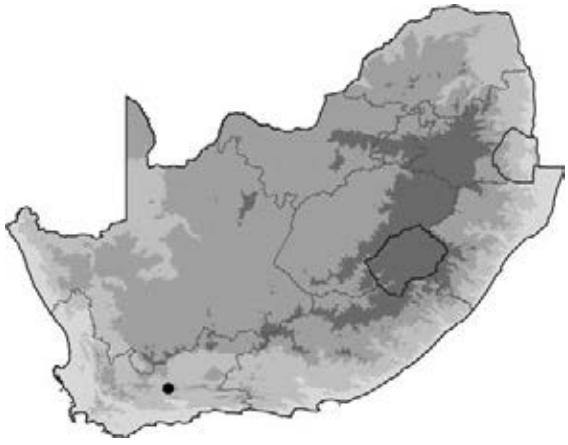
Plants 150–200 mm high. *Corm* unknown. *Stem* mostly 2- to 4-branched, flexed above sheaths of basal and cauline leaves, sheathing leaves 30–40 mm long, attenuate, dry and light brown in distal half. *Foliage leaf* solitary, basal, linear, falcate, ± twice as long as stem, narrowly channelled, ± 2 mm wide opened flat, often dry and trailing distally. *Rhipidial spathes* dry and light brown in distal half, attenuate, inner 30–35 mm long, outer almost half as long. *Flowers* fugaceous, pale ivory-yellow, limbs of all tepals with deeper yellow nectar guides at bases, spreading; outer tepals narrowly obovate, 20–25 × 7–8 mm, limbs 18–22 mm long, claws of both whorls ± 2 mm long, ascending as a narrow cup including lower half of filament column, inner tepals 18–21 × 6–7 mm. *Filaments* ± 5 mm long, united in smooth, cylindric column 4 mm long, free and diverging in upper 1 mm; anthers ± 3 mm long before anthesis, ± 2 mm after releasing pollen, exceeding style branches, yellow; pollen yellow. *Ovary* spindle-shaped, usually exserted, ± 5.5 mm long; style branches flattened, 2.5 × 1.5 mm long, with broad stigmatic lobes, crests ± linear, erect, ± 1 mm long. *Capsules* obovoid, ± 10 mm long. *Seeds* unknown. *Flowering time*: September to mid-October.

Distribution and ecology: known only from the Farm Vleiland in the northern foothills of the Klein Swartberg Mtns in Western Cape, South Africa; on clay slopes.

Diagnosis: the relatively small, pale yellow flowers of *Moraea eburnea* have moderately well-developed, flattened style branches terminating in unusually broad



Distribution of ***Moraea britteniae***.



Distribution of ***Moraea eburnea***.

stigmatic lobes and short, erect crests somewhat unusual in subg. *Homeria*, as are the filaments, united in a smooth, cylindric column ± 4 mm long but free and diverging in the upper 1 mm. The distally free filaments and moderately well-developed style branches suggest that *M. eburnea* may be most closely related to the *M. pallida* group (sect. *Stipantherae*) as most other species of subg. *Homeria* have the filaments completely united. If this assignment is correct *M. eburnea* is by far the smallest member of the alliance. The slender stem and narrow leaf place *M. eburnea* in an isolated position in the group. Relationships in subg. *Homeria* are difficult to assess by phenetic comparison and the affinities of *M. eburnea* remain to be established.

Sect. 15. **Flexuosae** *Goldblatt* in Annals of the Missouri Botanical Garden 69: 356 (1982). Type: *Moraea flexuosa* Goldblatt = *M. flexicaulis* Goldblatt

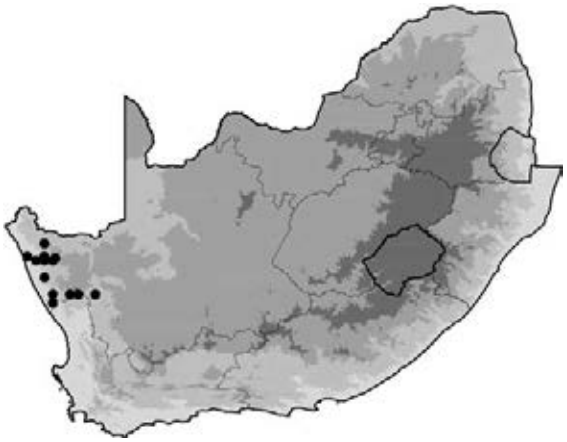
Homeria sect. *Namaquanae* Goldblatt: 425 (1981). Type: *H. schlechteri* L.Bolus = *Moraea schlechteri* (L.Bolus) Goldblatt

Leaves several, decreasing in size above. *Flowers* fugaceous, open only in the morning, yellow; tepals with claws much shorter than limbs, clasping or forming a cup including base of filament column. *Filaments* free near apices or ± fully united.

180. **Moraea schlechteri** *(L.Bolus) Goldblatt* in Novon 8: 375 (1998). *Homeria schlechteri* L.Bolus: sub t. 306 (1928a); Goldblatt: 434 (1981). Type: South Africa, [Northern Cape], Concordia, *Schlechter 11329* (BOL, lecto., designated by Goldblatt: 434 (1981); B, E, G, GRA, K, LD, MO, P, PH, PRE, S, US, Z, isolecto.).

Plants 150–350 mm high. *Corm* up to 30 mm diam.; tunics of coarse, wiry, black fibres. *Stem* flexuose, several-branched from upper nodes, fewer-branched in years of low rainfall, upper nodes sometimes with ± sheathing leaves, usually with expanded leafy tips. *Foliage leaves* 3 to several, lowermost ± basal (or inserted shortly above ground), up to 350 mm long, channelled, 8–20 mm wide, margins straight or slightly undulate. *Rhipidial spathes* with dry attenuate apices, inner 40–60 mm long, outer $^{2}/_{3}$ as long. *Flowers* fugaceous, half nodding, pale yellow, tepal limbs with darker yellow nectar guides as bases often edged grey or green, spreading, usually twisted through 90°; outer tepals 18–28 × 9–10 mm, narrowly obovate, to pandurate, claws poorly defined, ± 1 mm long, ascending, inner tepals slightly smaller. *Filaments* 4–5 mm long, united below in a slender, smooth column, free and diverging in upper 0.5–1.0 mm; anthers ± 2 mm long, strongly arched against style branches, yellow; pollen yellow. *Ovary* ± cylindric, 7–10 mm long, exserted; style branches diverging, ± 2 mm long, flattened, nearly horizontal, stigma lobes upright, appressed to crests, stigmatic laterally, crests arching inward to ± horizontal, ± 2 mm long. *Capsules* ± ovoid, 10–13 mm long. *Seeds* angular, light brown. *Chromosome number* $2n = 12$. *Flowering time*: August and September; flowers open early in the morning and begin to fade ± 12:30.

Distribution and ecology: fairly widespread in Namaqualand, South Africa, from Steinkopf in Northern Cape to south of Bitterfontein in Western Cape, with an outlying population near Loeriesfontein in the western Karoo; in open places on granite-derived sandy gravel.



Distribution of ***Moraea schlechteri***.

Diagnosis: evidently one of the least specialised species of subg. *Homeria*, *Moraea schlechteri* has several foliage leaves, the lower longest, but even those on the upper nodes normally have expanded blades. The flowers are pale yellow and have small darker yellow nectar guides on all tepals, these with short, poorly differentiated claws ± 1 mm long. The filaments are united in a slender column but are free in the upper 0.5–1.0 mm, and the well-developed style branches are slightly wider than the anthers and have prominent crests 2 mm long. Closely related *M. knersvlaktensis* has a similar vegetative form, though with broader, undulate leaves, the lowermost inserted well above the ground and even the outer rhipidial spathes are somewhat leafy, sheathing the inner spathes only in the lower half. The flowers of the two species are structurally nearly identical but the nectar guides are more prominent in *M. knersvlaktensis*, the tepals claws 2 mm long, and the filament column sparsely and shortly hairy. Both *M. schlechteri* and *M. knersvlaktensis* have morning flowers that fade soon after midday.

181. **Moraea knersvlaktensis** *Goldblatt* in Novon 8: 375 (1998) as a new name for *Homeria ramosissima* Schltr.: 94 (1900); Goldblatt: 436 (1981) [not *M. ramosissima* (L.f.) Druce (1917)]. Type: South Africa, [Western Cape], banks of Sout River, Vanrhynsdorp, *Schlechter 8128* (B, lecto., designated by Goldblatt: 436 (1981); E, G, GRA, K, MO, P, PRE, US, Z, isolecto.).

Plants small to medium, 80–200 mm high. *Corm* 10–20 mm diam.; tunics of hard, blackish fibres. *Stem* with

a long basal internode and first leaf inserted well above ground, flexed above each node, much-branched and rounded in shape. *Foliage leaves* several, lowermost inserted above ground, blades of all leaves channelled, lightly undulate, up to 150 mm long, 12–18 mm wide, leaves produced at all nodes. *Rhipidial spathes* grey-green, inner 35–50 mm long, ± attenuate, outer sheathing below with the upper half leafy and arching outward. *Flowers* pale yellow, all tepals limbs with dark yellow nectar guides at bases outlined in grey-green, spreading and often twisted through 90°, claws erect and clasping lower part of filament column; outer tepals obovate 17–19 × ± 8 mm long, claws ± 2 mm long, inner tepals slightly smaller. *Filaments* 6–7 mm long, united in a slender column papillate in lower $^1/_3$, free in upper ± 1 mm and diverging; anthers 2–3 mm long, arched, yellow; pollen yellow. *Ovary* ± narrowly club-shaped, 7–9 mm long; style branches flattened, ± 2 mm long, diverging, stigmatic lobes erect, crests ± 1.5 mm long, directed inward. *Capsules* oblong-club-shaped, 10–15 mm long. *Chromosome number* 2*n* = 12. *Flowering time*: late July to early September; flowers open in early morning and fade after ± 12:30.

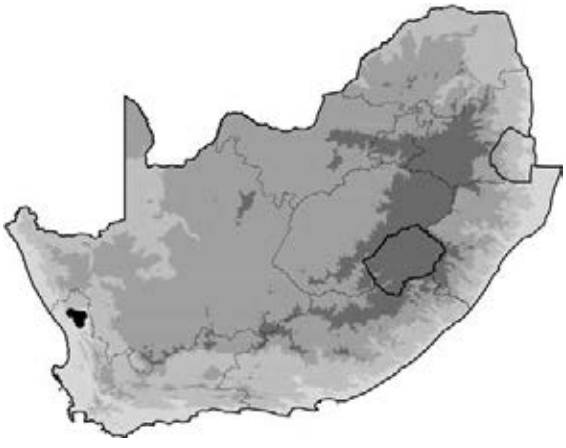
Distribution and ecology: endemic to southern Namaqualand, mainly in the Knersvlakte, between Vanrhynsdorp and Nuwerus, in Western Cape, South Africa; on stony clay flats and slopes.

Diagnosis: *Moraea knersvlaktensis*, with its typical rounded form, is a distinctive plant of the Knersvlakte north of Vanrhynsdorp. It typically has slightly twisted leaves with undulate margins, and the outer inflorescence spathes are free distally and curve outward. The flowers of *M. knersvlaktensis,* which open early in the morning and fade after 12:30, are pale yellow with relatively prominent nectar guides bordered in pale grey-green, and the tepal claws, up to 2 mm long, clasp the base of the filament column. Closely related to *M. schlechteri*, the two species, as well as *M. flexicaulis*, are unusual for subg. *Homeria* in that every stem axil bears a foliage leaf, whereas other species bear attenuate, entirely sheathing leaves resembling the rhipidial spathes at the upper nodes. All three species have filaments with the apices free and diverging, and relatively well-developed style branches with relatively prominent crests.

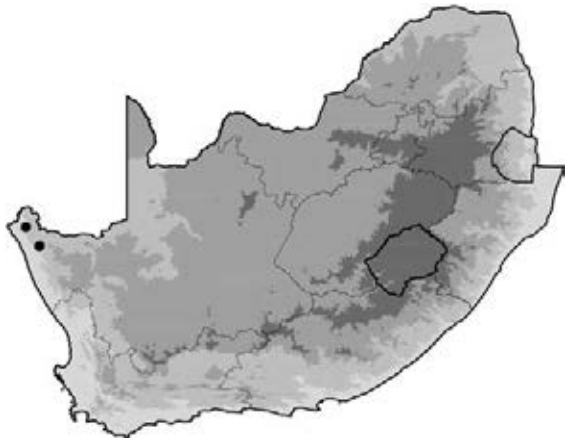
182. **Moraea flexicaulis** *Goldblatt* in Novon 12: 358 (2002), as a new name for *M. flexuosa* Goldblatt: 356 (1982) & 106 (1986a), illegitimate homonym, not *M. flexuosa* L.f. (1782). Type: South Africa, [Northern Cape], Richtersveld, Eksteenfontein road, *Goldblatt 6000A* (MO, holo.; K, NBG, PRE, S, WAG, iso.).

Plants 60–150 mm high. *Corm* 10–15 mm diam.; tunics of matted, relatively fine, dark brown (± black) fibres. *Stem* flexuose, flexed above sheathing base of each leaf, with up to 4 branches, rarely simple, without sheathing leaves. *Foliage leaves* 3 to 5, lowermost inserted shortly (up to 20 mm) above ground and largest, upper leaves progressively shorter, falcate, channelled, up to 60 mm long, 3–6 mm wide. *Rhipidial spathes* ± attenuate, with dry apices, inner 25–50 mm long, outer mostly ± $^1/_2$ as long, free and arching outward in distal $^2/_3$. *Flowers* fugaceous, pale yellow, limbs of all tepals with deeper yellow nectar guides at bases, spreading horizontally, outer tepal guides sometimes with numerous small dark green dots or clear yellow, faintly scented; outer tepals narrowly lanceolate, 28–30 × ± 8 mm, claws ± erect, ± 14 mm long, inner tepals 25–27 × 7 mm long, claws narrow ± as long as limbs, limbs twisted through 45°. *Filaments* 11–12 mm long, united in a cylindric column, free in upper ± 1.5 mm and diverging; anthers straight, ± 3.5 mm long, white; pollen white. *Ovary* ± 7 mm long, ± cylindric, flushed red; style branches 4 mm long, crests ± 2 mm long, erect. *Capsules* ovoid, 12–15 mm long. *Seeds* obovoid, ± smooth. *Chromosome number* 2*n* = 12. *Flowering time*: July and early August, opening near midday and fading in late afternoon.

Distribution and ecology: restricted to the Richtersveld of Northern Cape, South Africa, from the flats west of Anenous Pass north to Eksteenfontein and at the foot of the Ploegberg; in stony ground or loose fine sand.



Distribution of ***Moraea knersvlaktensis***.



Distribution of ***Moraea flexicaulis***.

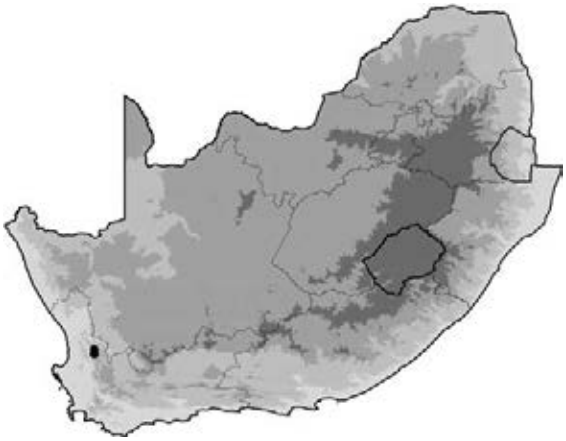
Diagnosis: so unusual is *Moraea flexicaulis* that when first described it was assigned to a separate sect. *Flexuosae* of subg. *Moraea*, but molecular studies have shown it to be deeply nested in subg. *Homeria*, in which its chromosome number, $2n = 12$, and karyotype of exclusively acrocentric chromosomes are consistent, as are the largely united filaments forming a sturdy, cylindric column. *Moraea flexicaulis* is now considered to be most closely allied to two Namaqualand species of subg. *Homeria*, *M. schlechteri* and *M. knersvlaktensis*, all three with several leaves, even those in the upper part of the stem with free blades, and filaments free and diverging distally. The species remains a very distinctive member of the subgenus. Its particularly well-developed style branches and crests are exceptional in subg. *Homeria* but both its presumed close allies have style branches bearing moderately well-developed crests although they have much shorter style branches.

Blooming early in the season, in late June and July, *Moraea flexicaulis* comes into flower three to four weeks after the first soaking autumn or winter rains fall in this arid area of the southern African northwest coast. As with many plants of arid areas, plant size is very variable depending on rainfall. Plants from the base of the Ploegberg in the Richtersveld are unusually robust compared to other collections, up to 150 mm tall (vs. < 100 mm elsewhere) and with larger rhipidial spathes (45–50 mm vs. 20–40 mm) and broader leaves, leaving open the possibility that they may be a separate species but this remains uncertain until more material is available.

Sect. 16. **Homeria** *(Vent.) Goldblatt* in Novon 8: 374 (1998). Type: *H. collina* (Thunb.) Salisb. = *Moraea collina* Thunb.

Stem straight or flexed below nodes, upper leaves with expanded blades or entirely sheathing. *Foliage leaves* several to one. *Flowers* fugaceous or lasting 2(3) days; tepal claws short and erect or long and diverging to form a cup partly to entirely enclosing filaments and sometimes anthers; filaments usually united entirely (free in *M. radians*); style branches much reduced, usually narrower than anthers and with short to vestigial crests.

183. **Moraea cedarmonticola** *Goldblatt* in Novon 8: 374 (1998), as a new name for *Homeria cedarmontana* Goldblatt: 451 (1981) [not *M. cedarmontana* (Goldblatt) Goldblatt (1998)]. Type: South Africa, [Western Cape], Cederberg, half way up Uitkyk Pass [as Cederberg Pass], *Goldblatt 3871* (MO, holo.; K, NBG, PRE, S, US, WAG, iso.).



Distribution of ***Moraea cedarmonticola***.

Plants large, 700–1 000 mm high. *Corm* deep-seated, ± 20 mm diam.; tunics of coarse, hard black fibres. *Stem* straight, branched from upper nodes, branches short, held close to axis, all cauline leaves with short blades. *Foliage leaves* several, lower 1 or 2 ± basal, upper leaves progressively shorter above, all with channelled blades, lower leaves linear, up to 500 mm long, upright but often trailing distally, channelled, 15–20 mm wide, uppermost leaves up to 100 mm long. *Rhipidial spathes* attenuate, inner 60–80 mm long, outer ± $^3/_4$ as long. *Flowers* fugaceous, uniformly pale yellow, sweet-scented, tepal claws forming a narrow cup enclosing filament column, limbs spreading; outer tepals ± 40 mm long, claws ± 20 mm long; inner tepals slightly smaller. *Filaments* united in a column 16–20 mm long, minutely velvety in lower half, included in floral cup; anthers 9–10 mm long, initially erect, arching inward after dehiscence, exserted. *Ovary* ± cylindric, 11–14 mm long; style branches ± 7 mm long, diverging, stigma lobe upright, appressed to base of crests, stigmatic laterally, crests erect, 2–3 mm long, either exceeding or shorter than anthers. *Capsules* ± cylindric, mostly 20–25 mm long. *Seeds* angular, light brown. *Chromosome number* $2n = 12$. *Flowering time*: August and September, in October at higher elevations.

Distribution and ecology: a narrow endemic of Western Cape, South Africa, extending from the Cederberg at Middelberg above Algeria south to Elandskloof; on stony sandstone slopes, flowering well in the spring following a fire, rarely in other years.

Diagnosis: a tall species up to 1 m high with at least three well-developed leaves and the upper leaves with short, expanded blades, *Moraea cedarmonticola* is unmistakable even before flowering. The large yellow flowers have subequal tepals ± 40 mm long, the claws forming a narrow cup including the filament column but with the anthers exserted.

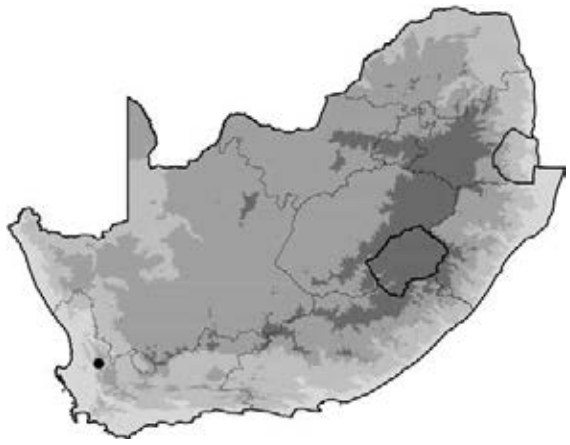
184. **Moraea autumnalis** *(Goldblatt) Goldblatt* in Novon 8: 374 (1998). *Homeria autumnalis* Goldblatt: 467 (1981). Type: South Africa,

[Western Cape], Elandskloof, 23 km east of Citrusdal, *Goldblatt 5504* (MO, holo.; BR, C, K, NBG, NSW, P, PRE, S, STE, US, WAG, iso.).

Plants 160–300 mm high. *Corm* globose, ± 20 mm diam.; tunics of coarse, black fibres. *Stem* slightly flexed below nodes, usually 2- to several-branched (rarely simple), bearing attenuate sheathing leaves 35–60 mm long. *Foliage leaf* solitary, basal, ± linear, flat to broadly channelled, sheathing base of stem, barely exceeding to slightly shorter than stem, with a prominent thickened, flat apical portion. *Rhipidial spathes* becoming dry and brown above, attenuate, inner 45–70 mm long, outer ± $^1/_2$ as long. *Flowers* probably long-lived, bright yellow, all tepal limbs with darker yellow nectar guides at bases, spreading, tepal claws erect, forming a narrow cup around filament column and bases of anthers; outer tepals 32–40 × ± 15 mm, claws 9–10 mm long, inner tepals 30–35 × 8–12 mm. *Filaments* united in a smooth, cylindric column 7–9 mm long; anthers narrowly diverging, 5–7 mm long, exceeding stigmatic lobes, curving inward above. *Ovary* ± cylindric, 8–9 mm long, exserted; style branches ± 3 mm long, crests triangular, 2 mm long. *Capsules* oblong, 8–15 mm long, exserted. *Seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: April to early June.

Distribution and ecology: known only from the mountains around Elandskloof, southeast of Citrusdal in Western Cape, South Africa; in stony, sandy mountain soil, apparently flowering well only after fire.

Diagnosis: unusual in the genus in its early flowering time, April to June (autumn and early winter), *Moraea autumnalis* is recognised by the solitary foliage leaf inserted close to the base of the sparsely branched (rarely simple) and slightly flexuose stem, and yellow flowers with the tepal claws ± erect and forming a narrow cup 9–10 mm long enclosing the filament column and bases of the anthers. The filaments are entirely united in a cylindric column minutely papillate in the lower half, and the anthers, 5–7 mm long, are twice as long as the style branches and arch inward after dehiscence. The style branches bear short, horizontal crests. When described *M. autumnalis* was thought to be closely allied to *M. pyrophila* (as *Homeria galpinii*) because they have a similar vegetative morphology and broadly similar flowers, but the claws of the pale yellow tepals of *M. pyrophila* form a cup enclosing both filaments and anthers, and the shorter filaments, 4–5 mm long, are conspicuously pubescent in the lower half. The anthers are usually shorter than the style branches, which bear short crests as in *M. autumnalis*. It is probably significant that the flowering in *M. pyrophila* is also relatively early in the season, mostly in July and August but as early as March and April.



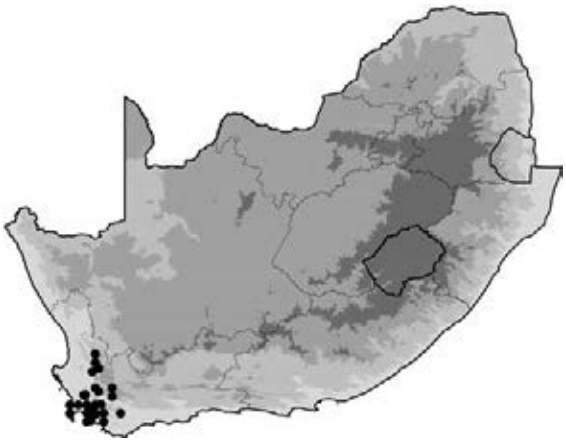
Distribution of ***Moraea autumnalis***.

185. **Moraea ochroleuca** *(Salisb.) Drapiez*, Encyclographie du règne végétale 1: *Moraea* 3 (1833). *Homeria ochroleuca* Salisb.: 308 (1812); Goldblatt: 453 (1981). *H. collina* var. *ochroleuca* (Salisb.) Baker: 75 (1892). *H. exaltata* Sweet: 395 (1826a), illegitimate superfluous name for *H. ochroleuca* Salisb. *M. exaltata* Steud.: 160 (1841), illegitimate superfluous name. Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 1103 [1283 in error] (1808).

Homeria lucasii L.Bolus: 320 (1929c). Type: South Africa, without precise locality, *Lucas s.n.* (BOL [18572], holo.; K, iso.).

Plants medium to large, 350–750 mm high. *Corm* 15–25 mm diam.; tunics of coarse, black fibres. *Stem* 1- to several-branched from upper or all nodes, with attenuate sheathing leaves at upper nodes, 60–70 mm long. *Foliage leaves* usually solitary, sometimes 2(3), lowermost inserted above ground (sometimes up to 150 mm), channelled, exceeding stem, often trailing above, 6–15 mm wide, remaining leaves if present shorter. *Rhipidial spathes* attenuate, inner (50–)60–80 mm long, outer ± $^1/_2$ as long. *Flowers* long-lived, yellow entirely, or with orange floral cup, rarely orange entirely, strongly scented, tepal claws forming a wide cup and secreting nectar from veins on surface, limbs spreading; outer tepals obovate, 30–40 × 15–17 mm, claws 13–16 mm long, inner tepals similar, slightly smaller. *Filaments* united in a slender column 7–10 mm long, tapering from base to apex; anthers 4.5–8.0 mm long, ± straight, narrowly diverging, yellow; pollen yellow. *Ovary* cylindric, 13–16 mm long; style branches 5.0–6.5 mm long, slightly narrower than anthers, stigma bilobed, crests lacking. *Capsules* cylindric, 20–40 mm long, with short beak ± 1 mm long. *Seeds* angular. *Chromosome number* 2*n* = 12, 24 + 0–3B. *Flowering time*: mainly July to October, sometimes until December at higher elevations.

Distribution and ecology: largely a montane species of Western Cape, South Africa, extending from the Cold Bokkeveld and Elandskloof south to the Cape Peninsula and east to Caledon and Hermanus; in rocky sandstone ground, flowering particularly well after fire but erratically in unburned sites.



Distribution of ***Moraea ochroleuca***.

Diagnosis: the large yellow or yellow and orange flowers of *Moraea ochroleuca* are distinctive in their wide cup formed by the tepal claws and spreading tepal limbs. The species is unusual in having nectar secreted from veins over the claw surface rather than from discrete nectaries at the tepal bases as in most other *Moraea* species. The style branches, relatively well developed and up to 6.5 mm long but only ± as wide as the anthers that are appressed to them, terminate in bilobed stigma lobes but lack discrete crests. The tall plants, up to 750 mm high, typically have a solitary foliage leaf but plants with two, or even three foliage leaves are known, these mostly from higher elevations. Flowers of *M. ochroleuca* last three days, opening in the morning on the first day and fading gradually during the third day. The flowers have a strong, rather sickly sweet, slightly fermenting odour, which attracts dung, game and muscid flies, the main pollinators of the species.

At lower elevations *Moraea ochroleuca* often co-occurs with *M. collina* and occasional natural hybrids between the two are known. Both diploid and tetraploid populations have been recorded.

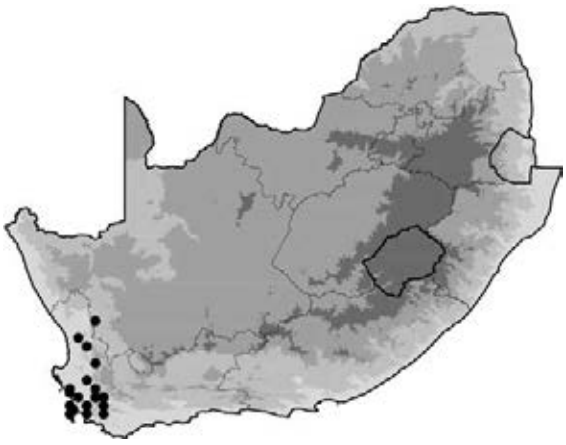
186. **Moraea flaccida** *(Sweet) Steud.*, Nomenclator botanicus, edn. 2, 2: 160 (1841). *Homeria flaccida* Sweet: 395 (1826a); Goldblatt: 464 (1981). *H. collina* var. *flaccida* (Sweet) Klatt: 629 (1866). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 1612 (1814).

Homeria collina var. *bicolor* Baker: 75 (1892). *H. bicolor* (Baker) Klatt: 157 (1894). Type: South Africa, [Western Cape], Stellenbosch, *Sanderson s.n.* (K, holo.).

Plants large, 300–600 mm high. *Corm* ± 20 mm diam.; tunics of hard, wiry, black fibres. *Stem* several-branched, slightly flexed above sheaths of foliage and sheathing leaves, these attenuate, 35–60 mm long. *Foliage leaf* solitary, usually inserted well above ground, linear, channelled, exceeding stem and trailing distally, 9–13 mm wide. *Rhipidial spathes* attenuate, inner 55–80 mm long, outer $^{1}/_{2}$–$^{2}/_{3}$ as long. *Flowers* long-lived, salmon-pink or yellow with yellow cup, all tepal limbs with deep yellow nectar guide at bases, ± spreading, tepal claws diverging, forming wide cup ± 12 mm deep including filaments and bases of anthers; outer tepals ± oblong to obovoid, 35–40 × 13–20 mm, claws up to 14 mm long, smooth or minutely papillate in lower part, inner tepals slightly smaller than inner. *Filaments* 7–8 mm long, united in a column smooth to sparsely papillate-pubescent in lower half, widest at base, tapering slightly to apex; anthers 8–11 mm long, contiguous for 3 mm, slightly diverging distally, yellow; pollen yellow. *Ovary* cylindric, 17–20 mm long; style branches slightly diverging, up to 7 mm long, stigmas bilobed, curved upward above apex of anthers, crests ± 1 mm long, erect, triangular. *Capsules* cylindric, mostly 30–55 mm long, tapering near apex, with a distinct beak ± 2 mm long. *Chromosome number* $2n$ = 24, 36. *Flowering time*: late August to October.

Distribution and ecology: widespread in Western Cape, South Africa, from the Cape Peninsula and Cape Flats north to Klawer and the Bokkeveld Mtns near Nieuwoudtville in Northern Cape; in seasonally waterlogged sites or marshes, mainly in sandy soils.

Diagnosis: *Moraea flaccida* is distinguished by its robust, several- to many-branched stem and characteristic flowers with the tepal claws widely diverging to form a shallow dish including the filaments and bases of the anthers. The tepals are usually salmon-pink with a yellow cup but populations with uniformly yellow flowers are not uncommon. When dry the shape of the flowers is often lost but its large size makes identification fairly easy. The tepals, ovary, filaments, anthers, and capsules are amongst the largest in the genus. The outer tepals are usually 35–40 mm long, and the filaments are ± 8 mm long with the anthers up to 11 mm long. The ovary, initially 17–20 mm long, elongates after fertilization and the capsules may reach a length of 55 mm. The capsules are notable in having a pointed beak some 2 mm long.



Distribution of ***Moraea flaccida***.

Earlier-flowering *Moraea collina* has been confused in the past with *M. flaccida* but is a shorter, few-branched species, the flowers with suberect tepal claws forming a narrow cup enclosing both filaments and anthers. The tepals of *M. collina* seldom exceed 35 mm, the filaments are 6–7 mm long, and the anthers are slightly shorter, 5–6 mm long. The ovary in *M. collina* is often as long as that of *M. flaccida* and the capsule may attain a length of over 35 mm. Capsules of *M. collina*, however, have a shorter, rather obtuse beak ± 1 mm long. Although *M. flaccida* flowers relatively late in the season, by which time *M. collina* is usually in fruit, their flowering times may overlap and natural hybrids have been recorded between the two species on the Cape Peninsula. *Moraea flaccida* is a polyploid species, either tetraploid, $2n$ = 24, or hexaploid, $2n$ = 36, as on the Peninsula and the sandveld to the north, whereas *M. collina* is consistently tetraploid. The hybrids recorded between the two species were pentaploid, $2n$ = 30, and completely sterile.

187. **Moraea collina** *Thunb.*, Dissertatio de *Moraea*: 11 (1787). *Sisyrinchium collinum* (Thunb.) Cav.: 346 (1788). *Homeria collina* (Thunb.) Salisb.: 307 (1812); Goldblatt: 471 (1981). Type: South Africa, [Western Cape], hills around Cape Town, *Thunberg s.n.* [UPS–THUNB 1209, lecto. designated by Goldblatt: 471 (1981)].

Sisyrinchium aurantiacum Zuccagni in Roem.: 145 (1806). *Homeria aurantiaca* (Zuccagni) Sweet: 498 (1830). *Moraea aurantiaca* (Zuccagni) A.Dietr.: 485 (1833). *H. collina* var. *aurantiaca* (Zuccagni) Baker: 75 (1892). *H. breyniana* var. *aurantiaca* (Zuccagni) G.J.Lewis: 232 (1950). Type: unknown, name often applied to *M. flaccida*.

Homeria collina var. *miniata* F.Muell.: 215 (1893). Type: unknown.

[*Moraea grandiflora* Eckl.: 14 (1827), invalid name without description.]

[*Vieusseuxia aurantiaca* Eckl.: 13 (1827), invalid name without description.]

[*Vieusseuxia collina* Eckl.: 12 (1827), invalid name without description.]

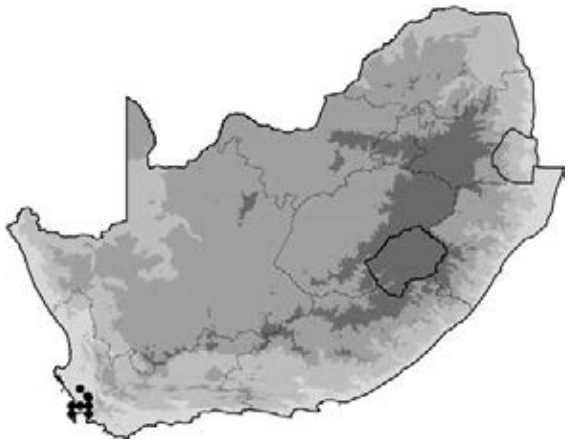
[*Vieusseuxia grandiflora* Eckl.: 14 (1827), invalid name without description.]

Plants 180–350 mm high. *Corm* 12–18 mm diam.; tunics of wiry, black fibres. *Stem* abruptly flexed outward above sheath of foliage leaf, simple or few-branched, branches also flexed outward, bearing attenuate sheathing leaves 20–40 mm long. *Foliage leaf* solitary, inserted well above ground, channelled, exceeding stem, usually trailing distally, 4–10 mm wide. *Rhipidial spathes* attenuate, inner 50–80 mm long, outer ± ½ as long. *Flowers* long-lived, pale yellow or salmon-pink, outer tepal limbs usually with deep yellow nectar guides at bases edged green, spreading, claws suberect, forming a narrow cup ± 12 mm deep, including filaments and anthers, ± 10 mm wide at mouth; outer tepals ± obovate, (25–)30–35 × 10–12 mm, claws 12–15 mm long, often papillate near bases, inner tepals 24–30 × 10 mm. *Filaments* united in a cylindric column 6–7 mm long, lightly pubescent in lower ½; anthers 5–6 mm long, slightly diverging above, yellow; pollen yellow. *Ovary* cylindric, (10–)14–19 mm long, often partly included; style branches (5–)6 mm long, diverging slightly and reaching anther tips, stigma lobe arched over anther tips, crests ± 1 mm long, erect to incurved. *Capsules* cylindric, (21–)30–40 mm long, short rounded beak ± 1 mm long. *Seeds* angular. *Chromosome number* $2n$ = 24. *Flowering time*: late June to early September.

Distribution and ecology: locally common in the south-western Western Cape, South Africa, from the Cape Peninsula east to Bot River and north to Bain's Kloof; mostly on sandy ground and flowering well following a fire or when the ground is cleared.

Diagnosis: *Moraea collina* is distinguished by the solitary leaf inserted on the stem well above ground, the stem flexed above the sheath of the foliage leaf, and yellow or pink flowers with the tepal claws forming a narrow cup including both filaments and anthers. The capsules are unusually long, even for sect. *Homeria*, typically 30–40 mm long and have a short blunt beak ± 1 mm long. It is often difficult to distinguish in herbaria from several other solitary-leaved species of sect. *Homeria*, in particular *M. minor* and *M. flaccida*. In *M. minor* the shorter anthers are 3–5 mm long, the style branches are 5–6 mm long and divide 2–3 mm above the anther bases, the ovary is shorter, up to 10 mm long, with capsules 18–28 mm long. Taller, more robust *M. flaccida* has tepals 35–40 mm long with claws that diverge to form a wide cup, elongate capsules, typically 30–55 mm long, with an acute beak ± 2 mm long.

Natural hybrids between *Moraea collina* and *M. flaccida* have been recorded from the Cape Peninsula. Because *M. flaccida* is hexaploid, $2n$ = 36 in this area (elsewhere sometimes tetraploid) and *M. collina* consistently tetraploid, $2n$ = 24, the resulting pentaploid hybrid with $2n$ ($5x$) = 30 is sterile.



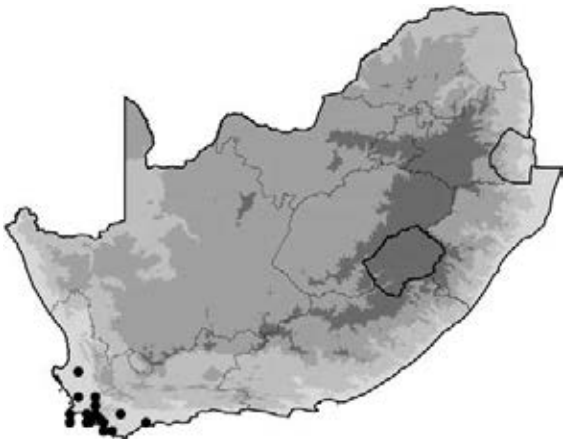
Distribution of ***Moraea collina***.

188. **Moraea pyrophila** *Goldblatt* in Novon 8: 375 (1998), as a new name for *Homeria galpinii* L.Bolus: t. 417 (1931d) [not *Moraea galpinii* (Baker) N.E.Br. (1929)]; Goldblatt: 469 (1981). Type: South Africa, [Western Cape], Klein Drakenstein Mtns above Salem, *Galpin 10600* (BOL [19420], holo.; K, iso.).

Plants 150–300 mm high. *Corm* 15–25 mm diam.; tunics of coarse, tough black fibres. *Stem* usually flexed above sheath of foliage leaf, simple or few-branched, branches also flexed, bearing attenuate sheathing leaves 40–50 mm long. *Foliage leaf* solitary, inserted well above ground, channelled, 100–200 mm long, often shorter but sometimes exceeding stem, 6–10 mm wide, usually rigid with a prominent thickened, unifacial apex. *Rhipidial spathes* attenuate, 40–50(–60) mm long, outer ± $^1/_2$ as long. *Flowers* long-lasting, pale yellow, tepal claws erect, forming a narrow cup 3–4 mm wide at mouth, enclosing stamens and style branches, limbs spreading horizontally; outer tepals ovate-oblong, 28–33 × 9–12 mm, claws 9–10 mm long; inner tepals obovate, slightly smaller. *Filaments* united in a puberulous column 4–5 mm long, broadest at base, tapering upward; anthers 5–6(–8) mm long, diverging slightly, yellow; pollen yellow. *Ovary* 6–10 mm long; style branches ± as long as anthers or slightly shorter, crests erect or curving inward, up to 1 mm long. *Capsules* 12–15(–20) mm long, ellipsoid. *Chromosome number* 2*n* = 12, 24. *Flowering time*: mainly July to September but also in March, April and November.

Distribution and ecology: restricted to southwestern Western Cape, South Africa, recorded on the Piketberg Mtns and from the southern Cape Peninsula and Bain's Kloof east to the Potberg; on sandstone derived soils, flowering rarely except after fire.

Diagnosis: *Moraea pyrophila* is recognised by the solitary foliage leaf inserted well above the ground, sparsely branched (rarely simple), flexuose stem, and yellow flower with the erect tepal claws forming a narrow cup ± 10 mm long completely enclosing the stamens. The filaments are entirely united in a cylindric column 4–5 mm long relatively densely hairy in the lower half, and the anthers, 5–8 mm long, are usually slightly shorter than the style branches. The nearly erect style branches, ± 5 mm long, bear short, horizontal crests, hardly visible in pressed flowers. *Moraea pyrophila* may be most closely related to *M. autumnalis*, which has the foliage leaf inserted close to ground level, and deeper yellow flowers with a floral cup including the filaments and only the bases of the anthers. *Moraea pyrophila* may also be confused with *M. collina* but that species has a longer leaf, usually trailing distally in contrast to the very short, apically thickened leaf of *M. pyrophila*, which seldom exceeds the stem.



Distribution of ***Moraea pyrophila***.

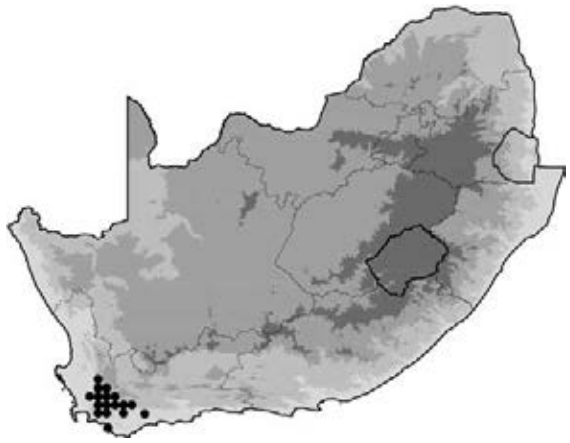
Both diploid and tetraploid populations have been recorded, tetraploids at Houw Hoek and Kleinmond and diploids at Hermanus and the Cape Peninsula. Although plants usually flower in late winter or early spring *M. pyrophila* has also been recorded in flower from March to September and in November.

189. **Moraea longistyla** *(Goldblatt) Goldblatt* in Novon 8: 375 (1998). *Homeria longistyla* Goldblatt: 475 (1981). Type: South Africa, [Western Cape], near bridge over Riviersonderend River east of Villiersdorp–Elgin road, *Goldblatt 4881* (MO, holo.; K, NBG, PRE, S, WAG, iso.).

Plants 150–300 mm high. *Corm* 8–14 mm diam.; tunics of wiry, black fibres. *Stem* flexed above leaf insertion, usually with several branches, or simple, with entirely sheathing leaves 30–50 mm long. *Foliage leaf* solitary, inserted shortly above ground, linear, channelled, longer than stem. *Rhipidial spathes* attenuate, inner 35–60 mm long, outer ± half as long. *Flowers* deep to pale orange-pink or pale yellow, with dark yellow nectar guides at bases of tepal limbs, tepal claws forming a cup 8–9 mm wide, including the filaments and anthers, limbs spreading, flaccid; outer tepals 25–35 × 10–14 mm, claws 11–15 mm long, limbs ± oblong, obtuse; inner tepals slightly smaller. *Filaments* united in a slender, cylindric column 7–9 mm long, minutely papillate-pubescent, smooth near apex; anthers erect, 4–7 mm long, contiguous or slightly diverging in upper $^1/_3$. *Ovary* 8–12(–15) mm long; style dividing opposite or beyond anther tips; branches short, 1–2 mm long or barely developed, stigma bilobed, crests minute, obscure or lacking. *Capsules* 15–20 mm long, cylindric, with short, acute beak ± 1 mm long. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: mid-August to October.

Distribution and ecology: endemic to Western Cape, South Africa, from Caledon north to Ceres and Tulbagh and east to Koo and Montagu; usually on clay soils in renosterveld.

Diagnosis: *Moraea longistyla* is specialised in subg. *Homeria* in having the branches of the style almost or entirely suppressed, the style either dividing near the



Distribution of ***Moraea longistyla***.

apex of the anthers, with very short branches, 1–2 mm long, or essentially undivided with three apical stigmatic lobes. In other respects the species broadly resembles *M. collina* and particularly *M. minor* in the tepal claws forming a narrow cup including the stamens. In *M. minor* the style divides at or below the midline of the anthers, and the well-developed style branches are fairly broad and at least 3 mm long, bearing distinct crests. The ovary and capsules of *M. longistyla* are usually well-exserted from the spathes, while those of *M. minor* are typically enclosed, at least during development, although the ripe capsules are usually exserted. *Moraea longistyla* and *M. minor* have complementary distribution ranges, with *M. minor* always in sandy soils from the Cape Peninsula northward along the west coast into the Olifants River Valley. The morphological distinction between the two is supported by their reproductive biology: *M. longistyla* is self-incompatible, whereas the several populations of *M. minor* studied have proved to be self-compatible and autogamous.

190. **Moraea minor** *Eckl.*, Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon: 15 (1827). *Homeria minor* (Eckl.) Goldblatt: 473 (1981). Type: South Africa, [Western Cape], sandy places in vineyards on eastern slopes of Table Mtn, *Ecklon Irid 7* [S, lecto., designated by Goldblatt: 473 (1981)].

Vieusseuxia curvata Eckl.: 13 (1827). Type: South Africa, [Western Cape], vineyards near Witteboom, *Ecklon s.n.* [S, lecto., designated by Goldblatt: 473 (1981)].

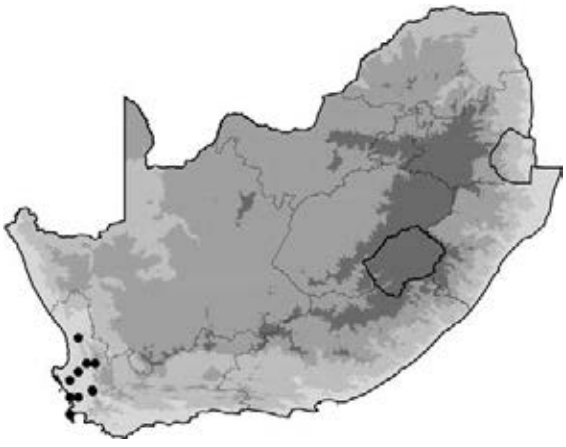
Homeria rhopalocarpa Schltr.: 95 (1900). Type: South Africa, [Western Cape], Vanrhynsdorp, Windhoek, *Schlechter 8366* (B, lecto., designated by Goldblatt: 473 (1981); BOL, C, E, G, GRA, K, M, MO, P, PRE, S, US, isolecto.).

Homeria framesii L.Bolus: 259 (1931c). Type: South Africa, [Western Cape], near Moorreesburg, *Ross-Frames s.n.* (BOL [19147], lecto., designated by Goldblatt: 473 (1981); K, PRE, isolecto.).

Plants 100–300 mm high. *Corm* 10–12 mm diam.; tunics of wiry, black fibres. *Stem* 1- to 3-branched, flexed above leaf insertion and at upper nodes, main axis of only 2 internodes above leaf, lowermost node bearing a sheathing leaf (sometimes with a short lamina). *Foliage leaf* solitary, inserted well above ground, linear, channelled, exceeding stem, 4–8 mm wide. *Rhipidial spathes* attenuate, inner initially ± 50 mm long with the outer ± $^{2}/_{3}$ as long, inner usually much elongating in fruit enclosing developing capsules, up to 80 mm long. *Flowers* fugaceous, usually dark pink with yellow nectar guides at bases of tepal limbs outlined in green, occasionally yellow, tepal claws forming a narrow cup including stamens and style branches, limbs spreading; outer tepals 22–38 × 9–16 mm, obovate; inner tepals 20–36 × 8–14 mm, often twisted. *Filaments* united in a cylindric column 6–9 mm, minutely pubescent in lower half; anthers erect 3–6 mm long, diverging in upper half. *Ovary* 9–15 mm long, enclosed in spathes; style branching opposite middle of anthers; branches erect, barely diverging, 2–3 mm long, usually reaching apex of anthers, or shorter, stigma lobe curved over anther tips, with short, erect crests < 1 mm long. *Capsules* cylindric, 25–28 mm long, without beak, enclosed in spathes during ripening. *Chromosome number* 2*n* = 12. *Flowering time*: mid-August and September.

Distribution and ecology: common along the Atlantic Coast of Western Cape, South Africa, from the Cape Peninsula north into the Olifants River Valley as far north as Klawer and locally into Elandskloof; on sandy soils, usually in sandveld.

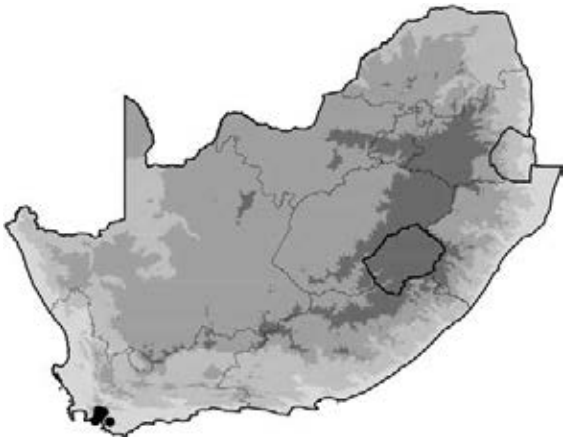
Diagnosis: a diploid, self-compatible and autogamous species, *Moraea minor* has fugaceous flowers, opening in the late morning and fading in the middle of the afternoon of the same day. The flowers are similar to but slightly smaller that those of *M. collina,* having tepal claws forming narrow cup including the stamens and style branches, but the capsules are smaller, 25–28 mm long and without a beak, whereas the longer capsules of *M. collina* are typically 30–40 mm long, with an obtuse beak. On the Cape Peninsula, where both *M. collina* and



Distribution of ***Moraea minor***.

M. minor occur, the species are separated by a difference in flowering times, although they may be sympatric and have similar soil preferences. *Moraea minor* flowers in late August and September there, while *M. collina* blooms from June onwards and is usually in seed by August. *Moraea minor* is closely allied to *M. longistyla*, which occurs east of the range of *M. minor* and usually on clay or rocky ground, and their differences are discussed under that species. Flowers of *M. minor* are fugaceous, whereas those of *M. collina* and *M. longistyla* last two or three days.

191. **Moraea comptonii** *(L.Bolus) Goldblatt* in Novon 8: 375 (1998). *Homeria comptonii* L.Bolus: 294 (1929b); Goldblatt: 459 (1981). Type: South Africa, [Western Cape], near Villiersdorp, *Compton s.n.* (BOL, lecto., designated by Goldblatt: 459 (1981); K, isolecto.).



Distribution of ***Moraea comptonii***.

Plants 180–300 mm high. *Corm* 10–15 mm diam.; tunics of coarse, black fibres. *Stem* usually several-branched, bearing attenuate sheathing leaves 40–60 mm long. *Foliage leaf* solitary, inserted at or near ground level, linear, channelled, exceeding stem, often trailing distally, 3–7 mm wide. *Rhipidial spathes* attenuate, inner 70–100 mm long at flowering, much elongating after flowering and enclosing developing capsules, outer initially ± $^1/_2$ as long as inner. *Flowers* long-lived, yellow or pink to orange with yellow centre, sometimes with large dark green blotches on outer or both tepal whorls, tepals weakly divided into claws in lower half, but lower halves forming an open cup and upper halves ± spreading, heavily and sweetly scented; outer tepals 32–52 × 13–18 mm long, often pandurate or spathulate, widest in upper $^1/_3$; inner tepals 30–50 × 8–15 mm. *Filaments* united in a column tapering from wider base, 6–8 mm long, pubescent in lower $^2/_3$; anthers (8–)10–13 mm long, diverging, usually shorter than style branches, occasionally reaching or exceeding stigma lobes, yellow; pollen yellow. *Ovary* ± cylindric, ± 18 mm long, included or half exserted; style branches diverging, 6–10 mm long, crests erect to incurved, ± 1 mm long. *Capsules* initially cylindric, 25–30 mm long, included. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: late August and September.

Distribution and ecology: endemic to the Caledon District of Western Cape, South Africa, from near Villiersdorp and Bot River in the west to Caledon and Akkedisberg Kloof near Stanford in the east; on heavy clay soils in renosterveld.

Diagnosis: large-flowered *Moraea comptonii* is distinguished by the fiddle-shaped to spathulate tepals weakly divided into claw and limb, with the lower halves forming an open cup and upper halves spreading. The flowers are particularly strongly and sweetly scented and either entirely yellow, or salmon-pink to orange with a yellow cup, often with dark green markings in the lower third. Like its close relative *M. elegans*, plants have a solitary leaf, a partly to fully included ovary, and the inner rhipidial spathes become enlarged to enclose the developing capsules. Also like *M. elegans*, the filaments are fully united in a column tapering from a wide base but the anthers are usually shorter than the style branches in contrast to *M. elegans*, in which the anthers exceed the style branches. Another difference between the two is that the tepals of *M. elegans* are more-or-less ovate, widest in the lower third, and the tepal markings are confined to the outer tepals in the upper third, whereas tepals of *M. comptonii* are widest in the distal third and are either unmarked or have markings at the bases of the tepal limbs of both whorls. Both species have a pollination system using hopliine beetles, various flies and large-bodied bees, the dark markings serving to attract hopliines and the scent the flies and bees.

192. **Moraea elegans** *Jacq.*, Plantarum rariorum horti caesarei Schoenbrunnensis descriptiones et icones 1: 6 (1797). *Sisyrinchium elegans* (Jacq.) Willd.: 577 (1800). *Homeria elegans* (Jacq.) Sweet: 395 (1826a); Goldblatt: 462 (1981). Type: South Africa, without precise locality or collector, illustration in Jacq.: 6 (1797).

Moraea spicata Ker Gawl.: t. 1283 (1810b). *Homeria spicata* (Ker Gawl.) Sweet: 395 (1826a). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 1283 (1810b).

Homeria metelerkampiae L.Bolus: 116 (1928b). Type: South Africa, [Western Cape], ex hort. Metelerkamp, Wellington, wild origin uncertain, *Metelerkamp s.n.* (BOL [31415], lecto., designated by Goldblatt: 462 (1981); K, isolecto.).

Plants 150–300 mm high. *Corm* 10–12 mm diam.; tunics of coarse wiry, black fibres. *Stem* few- to several-branched, bearing attenuate sheathing leaves 50–70 mm long. *Foliage leaf* solitary, inserted at or near ground level, linear, channelled, longer than stem, erect or trailing distally, 7–10 mm wide. *Rhipidial spathes* attenuate, inner 70–100 mm long, later elongating to enclose developing capsules, outer initially ± $^1/_2$ as long as outer. *Flowers* long-lived, predominantly yellow with large green blotch in middle or upper $^1/_3$ of outer tepals and usually orange distally, tepals spreading ±

horizontally from base, weakly differentiated into claw and limb, strongly and sweetly scented; outer tepals 28–35 mm long, oblong or ovate, claws narrow, 13–15 mm wide, widest in lower $^1/_3$; inner tepals 26–38 mm long, ± as long or slightly longer than outer, 10–11 mm wide. *Filaments* 5–7 mm long, united in a column tapering from wider base, pubescent in lower $^1/_3$ or $^1/_4$; anthers 8–10 mm long, diverging, exceeding style branches, apices curving inward after dehiscence, yellow; pollen yellow. *Ovary* ± cylindric, 12–15 mm long, usually included; style branches diverging, ± 6 mm long, shorter than anthers, stigma lobe erect, appressed to anthers, crests 1–2 mm long, directed inward. *Capsules* cylindric, 20–25 mm long, included. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: late August to early October.

Distribution and ecology: restricted to the Caledon and Bredasdorp Districts of Western Cape, South Africa, extending from Genadendal and Caledon eastwards along the foot of the Caledon Swartberg to Napier and Bredasdorp, and in the Hemel-en-Aarde Valley to the south; on heavy clay soils in renosterveld, flowering well after fire or clearing of the surrounding vegetation.

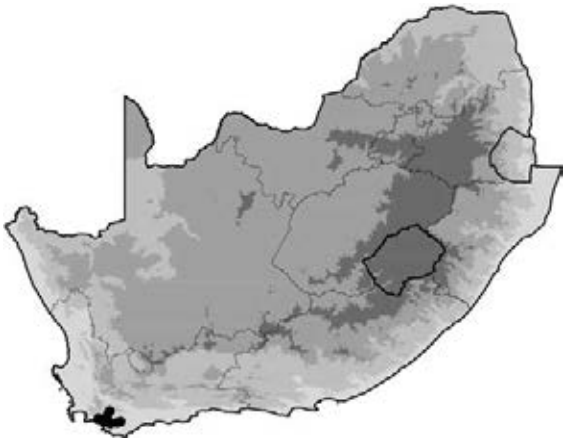
Diagnosis: *Moraea elegans* is distinguished by the large flowers with predominantly yellow tepals spreading from the base, the tepals oblong and broadest in the lower half with the outer tepals strikingly marked with large green or green and orange blotches in the distal half. Plants have a solitary foliage leaf and bear few to several branches. The anthers, 8–10 mm long, are borne on a sturdy filament column wide at the base and tapering to a narrow apex, and exceed the style branches, an important distinction between *M. elegans* and closely allied *M. comptonii*, which has shorter anthers, either uniformly yellow or salmon to orange flowers with a yellow cup with or without green markings, these at the base of the spathulate or fiddle-shaped outer tepals, thus in the middle to lower third of the tepals. *Moraea elegans* and *M. comptonii* have complementary ranges in the Caledon and Bredasdorp Districts and are generally easy to distinguish, although some populations of *M. comptonii* approach *M. elegans* in appearance.

193. **Moraea radians** *(Goldblatt) Goldblatt* in Novon 8: 375 (1998). *Sessilistigma radians* Goldblatt: 156 (1984a). *Homeria radians* (Goldblatt) Goldblatt: 51 (1991). Type: South Africa, [Western Cape], between MacGregor and Stormsvlei at Steenbokvlakte turnoff, *P. Goldblatt 5903* (MO, holo.; K, PRE, S, iso.).

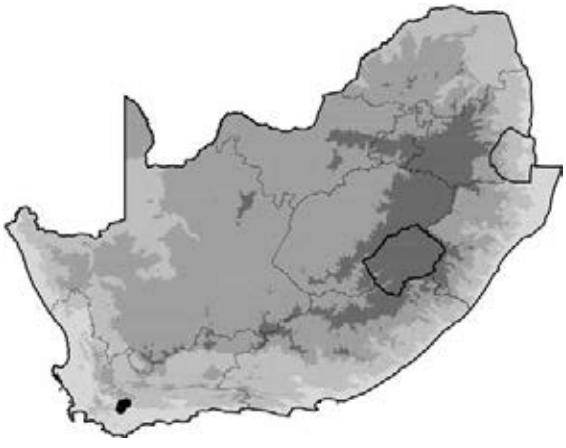
Plants 90–350 mm high. *Corm* 9–15 mm diam.; tunics of coarse, black, netted fibres. *Stem* with elongate basal internode, flexed above sheath of foliage leaf, usually 2- or 3-branched, sheathing leaves with brown attenuate tips, 20–35 mm long. *Foliage leaf* solitary, inserted 25–80 mm above ground, exceeding stem, arching outward, channelled, 2–5 mm wide. *Rhipidial spathes* attenuate, with dry brown tips, inner 30–50 mm long, outer ± half as long. *Flowers* fugaceous, beige-yellow, limbs of all tepals deep yellow at bases, spreading, tepal claws suberect, forming a small narrow cup ± 3 mm deep enclosing filaments; outer tepals obovate, 26–30 × 17 mm, claws 3–4 mm long; inner tepals 24–27 × ± 15 mm. *Filaments* free, ± 4 mm long, minutely papillate; anthers initially straight, suberect, ± 5 mm long, exceeding style branches, curving inward over style branches after anthesis, yellow; pollen yellow. *Ovary* ± cylindric, ± 10 mm long; style ± 1 mm long, branches diverging, ± 3 mm long, flattened and divided for half their length, stigmatic at tips of lobes, without crests. *Capsules* oblong-cylindric, 12–15 mm long. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: September to early October.

Distribution and ecology: a narrow endemic of the Robertson Karoo in Western Cape, South Africa, known from a few sites near MacGregor; on light clay or clay loam soils.

Diagnosis: although vegetatively resembling several other species of sect. *Homeria* in the solitary, somewhat glaucous leaf inserted above the ground and the few-branched stem, *Moraea radians* is so distinctive in its floral structures that it was at first referred to a



Distribution of ***Moraea elegans***.



Distribution of ***Moraea radians***.

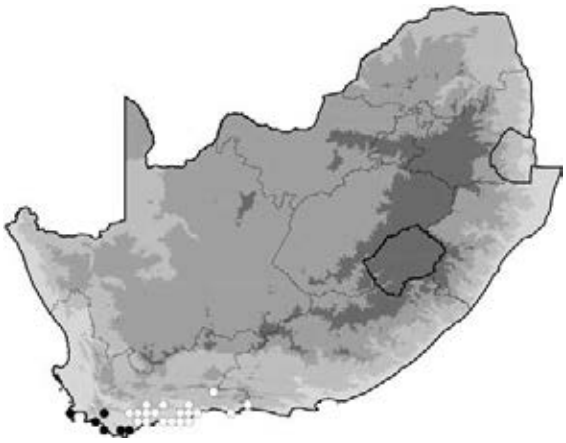
separate genus, *Sessilistigma*. The beige-yellow flowers, with short, erect tepal claws and spreading limbs, are remarkable for the subgenus in their free stamens and almost vestigial style ± 1 mm long, dividing into three, flattened branches forked for half their length. Other species of subg. *Homeria* have filaments partly to entirely united and enclosing a well-developed style, the branches of which are each appressed to the opposed anther. The style branches of *M. radians* lack crests and are stigmatic at the tips of each lobe. Other features of the species, including the chromosome number and karyotype, $2n = 12$, are consistent with subg. *Homeria* and its assignment to the subgenus is fully supported by molecular evidence.

194. **Moraea bulbillifera** *(G.J.Lewis) Goldblatt* in Novon 8: 374 (1998). *Homeria bulbillifera* G.J.Lewis: 117 (1945); Goldblatt: 455 (1981). Type: South Africa, [Western Cape], Caledon Division, Riviera, *Purcell s.n.* (*SAM 54696*, holo.).

Plants 300–500(–600) mm high. *Corm* 10–20 mm diam., often with many small cormlets around base; tunics of coarse, black fibres. *Stem* sometimes ± trailing or suberect, usually much-branched, flexed above sheath of foliage leaf and above sheathing leaves, sometimes bearing several to many cormlets in aerial axils, with attenuate sheathing leaves 3.5–8.0 mm long. *Foliage leaf* solitary, usually inserted at or near ground level, rarely some distance above ground, exceeding stem, channelled, 5–10 mm wide. *Rhipidial spathes* attenuate, inner 40–80 mm long, elongating after flowering to enclose developing capsules, outer ± ½ as long at flowering. *Flowers* fugaceous, pale or deep yellow, occasionally pale pink or flushed orange-pink, all tepal limbs with dark yellow nectar guides at bases spotted green, spreading, tepal claws suberect, forming a small narrow cup 7–10 mm deep, enclosing filaments and lower part of anthers; outer tepals obovate, 23–38 × 10–16 mm, claws 9–11 mm long, inner tepals slightly smaller, 7–12 mm wide. *Filaments* united in a cylindric column 6–8 mm long, papillate or smooth; anthers 4–6 mm long, diverging, often slightly exceeding style branches, yellow; pollen yellow. *Ovary* 7–10(–13) mm long; style branches diverging, 2.5–6.0 mm long, stigma lobes upright, pressed against anthers, receptive laterally, crests 1–2 mm long, directed inward. *Capsules* 17–20(–22) mm long, narrowly club-shaped. *Seeds* angular. *Chromosome number* $2n = 12$, 18, 24. *Flowering time*: August to early October inland, September to early November along the coast.

Distribution and ecology: along the south coast of South Africa, extending from the Cape Peninsula in the west to the Albany District in Eastern Cape in the east, south of the Langeberg–Outeniqua Mtn axis, most frequent between Elim and Knysna; mostly in sandy ground.

Diagnosis: coastal populations of *M. bulbillifera* are unmistakable for the strongly cormiferous habit, but even plants lacking cormlets in the aerial axils are fairly easy to distinguish from other solitary-leaved species by their flowers with the narrow tepal cup enclosing only the filaments, with the anthers and well-developed style branches and crests extending well above the cup. The foliage leaf is usually inserted at or very close to the ground but plants from the drier valleys at the northern edge of its range are often confusing as the leaf may be inserted rather high above ground. Two subspecies are recognised. The typical subsp. *bulbillifera* is coastal and always found on sandy or limestone substrates. It is usually robust and has a well-developed cormiferous habit. Subsp. *anomala* occurs inland, mainly in renosterveld, on the rolling clay plains of the southern Cape, extending into the sandy and rocky valleys of the Langeberg and Riviersonderend Mtns. Sometimes as robust as subsp. *bulbillifera*, it is more often a much smaller plant, especially in drier habitats, with the dwarfing extending to the flowers as well.



Distribution of ***Moraea bulbillifera*** subsp. ***bulbillifera***, ●; subsp. ***anomala***, ○.

Key to subspecies

1a Stems with cormlets at aerial nodes conspicuous and breaking through leaf sheaths. . . . . 194a. subsp. *bulbillifera*

1b Stems without cormlets at aerial nodes (rarely a single cormlet developing at some nodes, always concealed by sheaths) . . . . . 194b. subsp. *anomala*

194a. subsp. **bulbillifera**

Foliage leaf basal, often trailing. *Stem* bearing multiple cormlets at nodes, (1)3- to 10-branched, usually from upper nodes, bearing attenuate sheathing leaves 35–60 mm long. *Rhipidial spathes* somewhat inflated, attenuate with dry, brown tips; inner 50–80 mm long. *Flowers* with outer tepals 23–38 × (10–)14–16 mm, inner tepals 22–32 mm long. *Filaments* 6–7 mm long; anthers 4.5–6.0 mm long, usually ± as long as style branches, or longer. *Chromosome number* $2n = 12$ (18). *Flowering time*: mid-September to November.

Distribution and ecology: entirely coastal, extending from the southern Cape Peninsula eastward to Cape

Agulhas in southern Western Cape; mostly in sandy soils, sometimes on limestone.

Distribution and ecology: subsp. *bulbillifera* is immediately recognised by the conspicuous production of small cormlets at the aerial nodes of the stem. Although plants are usually several-branched, the stems often appear attenuated and the lower nodes often lack branches, and the stem is sometimes ± trailing. Many collections of this subspecies lack developing capsules and it seems likely that at least some populations are sexually sterile. The copious cormlets presumably ensure propagation of such plants.

194b. subsp. **anomala** *(Goldblatt) Goldblatt* in Goldblatt & Manning in Novon 14: 296 (2004). *Homeria bulbillifera* subsp. *anomala* Goldblatt: 458 (1981). Type: South Africa, [Western Cape], Witsands near Ossekop, *Goldblatt 4885* (MO, holo.; BR, K, NBG, PRE, WAG, iso.).

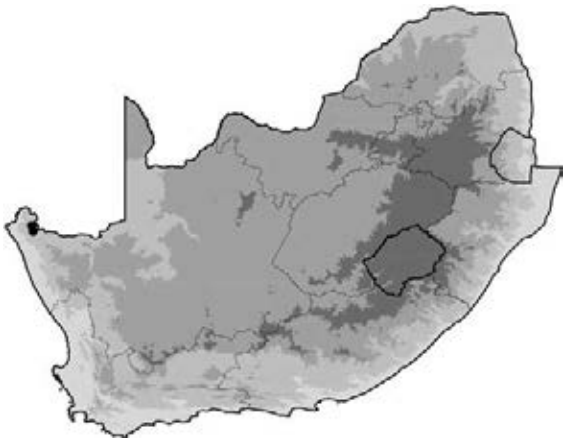
Foliage leaf basal or inserted some distance above ground, usually erect, or trailing distally. *Stem* usually without cormlets at nodes, (1)10- to 20-branched, sheathing leaves 30–60 mm long. *Outer rhipidial spathe* 40–70 mm long, slender. *Flowers* usually smaller than subsp. *bulbillifera*; outer tepals 26–35 × 10–15 mm; inner tepals 23–32 mm long. *Filaments* 6–8 mm long; anthers 5–6 mm long, exceeding style branches, apices curving inward after anthesis. *Chromosome number* 2*n* = 12, 24. *Flowering time*: August to October.

Distribution and ecology: extending from Stormsvlei and Bredasdorp in the west, along the Langeberg–Outeniqua axis as far east as the Albany District; on clay or sand, and inland or coastal.

Diagnosis: flowers of subsp. *anomala* are usually smaller than those of subsp. *bulbillifera* with outer tepals rarely reaching 35 mm in length. The foliage leaf may be basal as in subsp. *bulbillifera* but is more often inserted shortly to well above the ground. Plants will on occasion produce one or two cormlets at some nodes, but this development is much less noticeable than in subsp. *bulbillifera*, where the many cormlets break through the bases of the sheathing leaves.

195. **Moraea serratostyla** *(Goldblatt) Goldblatt* in Novon 8: 376 (1998). *Homeria serratostyla* Goldblatt: 212 (1992). Type: South Africa, [Northern Cape], Richtersveld, foothills of Cornellsberg, *Viviers sub Goldblatt 7377* (NBG, holo.; MO, PRE, iso.).

Plants 160–250 mm high. *Corm* 12–18 mm diam.; tunics of wiry, medium-textured to fine, black fibres. *Stem* sharply flexed above sheaths of foliage leaves, 1- to few-branched. *Foliage leaves* (2)3, lowermost longest, inserted well above ground, suberect, exceeding stem, linear to falcate, channelled, 2–3 mm wide. *Rhipidial spathes* acute, inner initially 30–40 mm long, later elongating



Distribution of ***Moraea serratostyla***.

to enclose developing capsules, outer ± 15–25 mm long. *Flowers* fugaceous, pale yellow, limbs of all tepals with deep yellow nectar guides at bases, ± spreading, tepal claws ascending, forming a cup including lower $^{2}/_{3}$ of filament column; outer tepals obovate, 23–39 × ± 12 mm, claws ± 5 mm long, inner tepals lanceolate, 22–28 × ± 9 mm. *Filaments* united in a smooth, cylindric column ± 6 mm long or free distally for short distance; anthers ± 6 mm long, ascending, tips curving inward after dehiscence, yellow. *Ovary* ± cylindric, ± 7 mm long, usually included; style branches ascending, ± 2.5 × 1.5 mm, reaching to mid-anther level, margins serrated, stigma bilobed, appressed to anthers, receptive laterally, crests ± 0.5 mm long, arching inward, margins serrated. *Capsules* ± barrel-shaped, ± 9 mm long, included. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: July and August; flowers open 15:30 and fade at nightfall, ± 19:30.

Distribution and ecology: evidently rare and known from a few collections in the central Richtersveld in Northern Cape, South Africa; on stony flats and lower slopes.

Diagnosis: *Moraea serratostyla* is recognised by the flexuose stem, two or three foliage leaves with the lowermost inserted on the stem well above ground, and relatively large, pale yellow flowers. Particularly unusual, the style branches are relatively well developed for subg. *Homeria*, ± 2.5 mm long with visible crests 0.5 mm long with the margins of both the style branches and crests serrated. The tepal claws, ± 5 mm long, form a wide cup that includes the lower part of the filament column while the tepal limbs spread outward, often slightly below the horizontal.

196. **Moraea patens** *(Goldblatt) Goldblatt* in Novon 8: 375 (1998). *Homeria patens* Goldblatt: 477 (1981). Type: [Western Cape], Clanwilliam Division, near Boontjies River, *Leipoldt s.n.* (BOL 20768], holo.; K, SAM, iso.).

Plants 250–450 mm high. *Corm* globose, ± 10 mm diam.; tunics of wiry, black fibres. *Stem* usually many-branched,

flexed outward above foliage leaf sheath and above sheathing leaves, these attenuate, 30–40 mm long. *Foliage leaf* solitary (rarely 2), inserted well above ground, linear, channelled, much exceeding stem, 3–5 mm wide. *Rhipidial spathes* attenuate, apices dry, brown, inner initially 40–60 mm long, elongating as capsules develop, inner ± half as long. *Flowers* fugaceous, bright yellow or orange, tepals limbs with dark yellow nectar guides at bases, laxly spreading, widely diverging, forming a wide, shallow cup including filaments; outer tepals pandurate, 25–27 × 9 mm, claw ± 9 mm long, inner tepals 20–24 × 7–8 mm. *Filaments* united in a cylindric column 7–8 mm long, papillate in lower half; anthers ± 4 mm long, diverging, yellow; pollen yellow. *Ovary* 9–10 mm long, exserted; style branches 3–4 mm long, ± as wide as anthers, reaching or slightly exceeding anther tips, crests erect, short (obscure in dry material). *Capsules* usually exserted or partly included, 12–15 mm long. *Chromosome number* 2*n* = 12. *Flowering time*: mid-August and September.

Distribution and ecology: a narrow endemic of the Clanwilliam District of Western Cape, South Africa, in valleys of the Olifants River, Nardouw and Pakhuis Mtns (poorly collected and evidently not common); on stony, sandy ground at relatively low elevations.

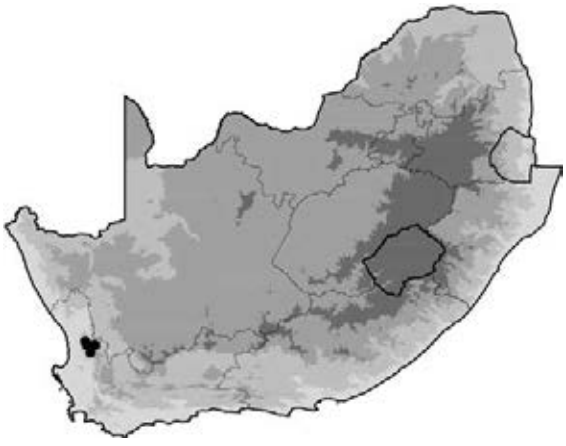
Diagnosis: with a relatively open flower, *Moraea patens* has tepal claws inclined gently upward forming a wide, shallow cup that includes the filament column and with the tepal limbs extending laxly outward. The filaments are united in a cylindric column 7–8 mm long and papillate in the lower half, and the diverging anthers are held well above the tepal cup. *Moraea patens* may be most closely related to the widespread *M. minor* but the two have quite different flowers, the tepal claws in *M. minor* forming a narrow cup completely including both the filaments and the suberect anthers. *Moraea vallisbelli*, occurring to the north on the Bokkeveld Mtns, is probably also closely allied but differs in its well-formed tepal cup, reduced style branches, and ovary and capsules enclosed by the accrescent rhipidial spathes.

197. **Moraea louisabolusiae** *Goldblatt* in Novon 8: 375 (1998), as a new name for *Homeria bolusiae* Goldblatt: 438 (1981) [not *M. bolusii* Baker (1892)]. Type: South Africa, [Western Cape], sandstone outcrop near Bulshoek, Olifants River Valley, *Goldblatt 5660* (MO, holo.; K, NBG, PRE, S, WAG, iso.).

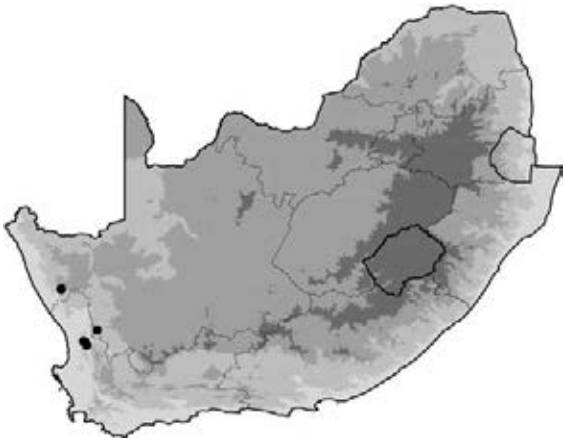
Plants slender, 150–400 mm high. *Corm* ± 10 mm diam.; tunics of wiry, black fibres. *Stem* flexed above leaf insertion, 1- to few-branched, bearing sheathing leaves 20–40 mm long. *Foliage leaf* solitary, inserted well above ground, channelled, exceeding stem, 2–4 mm wide, often broken and trailing above. *Rhipidial spathes* attenuate, inner 40–50 mm long, outer ± $^2/_3$ as long. *Flowers* fugaceous, pale yellow, limbs of all tepals with deeper yellow nectar guides at bases, spreading horizontally, claws short, appressed to lower part of filament column; outer tepals ± 28 × 12 mm, claws 1–2 mm long, limb pandurate-obovoid; inner tepals up to 20 × 8 mm. *Filaments* 5–6 mm long, partly united in a slender, smooth column, free and diverging in upper 0.5–1.0 mm; anthers ± 4 mm long, diverging and arching inward distally, exceeding stigmas, collapsing after anthesis, yellow. *Ovary* ± cylindric, 7–8 mm long, included; style branches broad, flattened, ± 2.5 mm long, stigmatic lobe upright, receptive laterally, crests 1.0–1.5 mm long. *Capsules* and *seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: late August and September, probably also in October.

Distribution and ecology: apparently with a scattered distribution along the Atlantic Coast of South Africa, recorded in Western Cape from the lower slopes of the Nardouw Mtns and in Northern Cape on the Bokkeveld Escarpment at Lokenburg and in the Kamiesberg; in rocky ground on sandstone or granite substrates.

Diagnosis: a fairly typical member of subg. *Homeria*, *Moraea louisabolusiae* has flowers with subequal tepals, all bearing nectar guides, short, erect tepal claws, and filaments largely united in a slender column but free in



Distribution of ***Moraea patens***.



Distribution of ***Moraea louisabolusiae***.

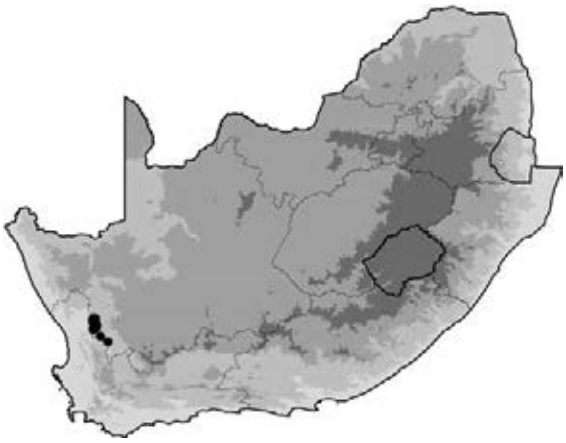
the distal 0.5–1.0 mm. The style branches are ± 2.5 mm long, shorter than the anthers, and bear short crests up to 1.5 mm long. Plants have a solitary, narrow foliage leaf inserted well above ground level and the stem is flexed outward above the sheathing part of the leaf. Apart from the single foliage leaf, the stem bears only sheathing leaves with attenuate apices. The flowers open early in the morning, at first light, and fade between 13:00 and 14:00. Molecular studies place *M. louisabolusiae* close to *M. patens*, which also has a solitary foliage leaf and the stem flexed above the leaf sheath but somewhat different flowers.

198. **Moraea vallisbelli** *(Goldblatt) Goldblatt* in Novon 8: 376 (1998). *Homeria vallisbelli* Goldblatt: 479 (1981). Type: South Africa, [Northern Cape], Oorlogskloof, *Schlechter 10947* (K, lecto., designated by Goldblatt: 479 (1981); B, BOL, M, isolecto.).

Plants 150–300 mm high. *Corm* subglobose, 8–15 mm diam.; tunics of fine to medium-textured, wiry, black fibres. *Stem* sharply flexed above sheath of foliage leaf and of sheathing leaves, usually several-branched (rarely simple), sheathing leaves attenuate, 25–50(–80) mm long, lowermost occasionally ± leaf-like. *Foliage leaf* solitary, inserted well above ground level, linear, ± erect or trailing distally, exceeding stem, channelled, margins inrolled. *Rhipidial spathes* attenuate with dry brown apices, inner initially 3.5–5.0(–7.0) mm long, later elongating to enclose developing capsules, outer initially ± $^1/_2$ as long. *Flowers* deep pink or pale yellow, with dark yellow nectar guides outlined in dark purple or green, tepal claws forming a wide cup, ± 8 mm deep, 10 mm wide at apex, including filament column, tepal limbs spreading; outer tepals ± 26 mm long, limbs 16–18 mm long, obovate, widest just below apex, claws ± 10 mm long, puberulous in lower part; inner tepals slightly shorter and narrower. *Filaments* united in a column 7–8 mm long, slightly narrowed toward apex, velvety in lower $^2/_3$; anthers ± 4.5 mm long, diverging, slightly overtopping style branches, yellow; pollen yellow. *Ovary* 9–12 mm long, included, rarely partly exserted; style branches narrow, ± 3 mm long, crests vestigial. *Capsules* cylindric, 12–14 mm long, usually included. *Seeds* angular-prismatic. *Chromosome number* 2*n* = 12. *Flowering time*: mostly August to mid-September.

Distribution and ecology: centred in the Bokkeveld Mtns north and south of Nieuwoudtville in Northern Cape, South Africa, but extending south to the lower Tanqua Karoo and Botterkloof; typically in stony sandstone soil in fynbos.

Diagnosis: *Moraea vallisbelli* is recognised by the solitary foliage leaf inserted on the stem well above ground, main stem and branches flexed above the sheaths of foliage or sheathing leaves, and a pink or yellow flower with the tepal claws diverging to form a relatively wide cup that includes the filaments. The filaments are united in a narrow column that is velvety

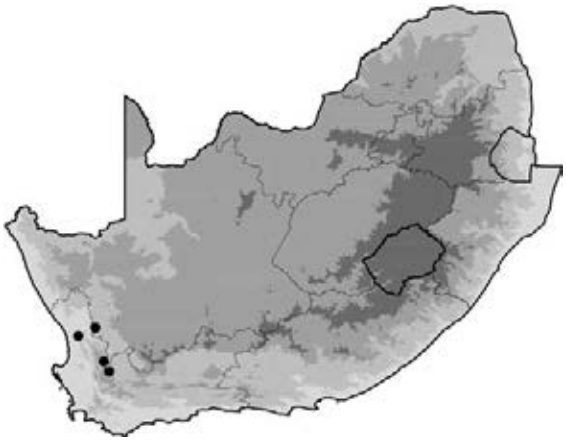


Distribution of ***Moraea vallisbelli***.

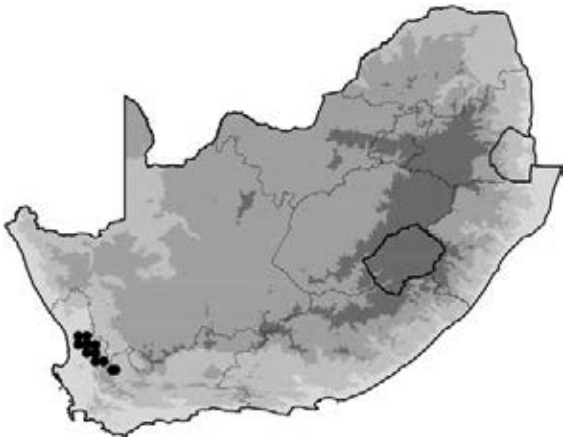
in the lower half, and the diverging anthers slightly exceed the style branches, the crests of which are vestigial. It is apparently related to the more widespread *M. minor* of the Western Cape Atlantic Coast and Olifants River Valley and the two are easily confused, especially when dried. However, in *M. minor* the tepal claws form a narrow cup including both filaments and anthers and the short style branches have larger, clearly visible crests. Both species are diploid but *M. minor* is autogamous and *M. vallisbelli* is self-incompatible. The species was first collected by Rudolf Schlechter in 1896 and his collections bear the manuscript name *Homeria tulipifera*.

199. **Moraea flavescens** *(Goldblatt) Goldblatt* in Novon 8: 375 (1998). *Homeria flavescens* Goldblatt: 481 (1981). Type: South Africa, [Western Cape], Cederberg, at turnoff to Krom River Farm, *Goldblatt 4058a* (MO, holo.; NBG, iso.).

Plants 120–300 mm high. *Corm* ± globose, 8–12 mm diam.; tunics of black, wiry fibres. *Stem* strongly flexed above sheath of foliage leaf, several-branched, sheathing leaves attenuate, 35–55 mm long. *Foliage leaf* solitary, inserted well above ground, linear, much exceeding stem, erect, trailing distally, channelled, up to 4 mm wide. *Rhipidial spathes* attenuate, apices dry, brown, inner initially 30–60 mm long, later elongating to enclose developing capsules, outer ± $^1/_2$ as long. *Flowers* fugaceous, pale yellow, tepal limbs with deep yellow nectar guides at bases edged grey-green, spreading, claws diverging, forming an open cup, ± 8 mm wide at mouth, including most of filament column; outer tepals obovate, 16–24 × 7–9 mm, often emarginate, claws 5–6 mm long, inner tepals 17–19 × 5–7 mm. *Filaments* united in a column ± 5 mm long, sometimes free in upper 0.5–2.0 mm, minutely papillate; anthers 3–4 mm long, diverging, yellow; pollen yellow. *Ovary* ± cylindric, 7–12 mm long, enclosed in spathes; style branches ± 2 mm long, flat, deeply bilobed, shorter than anthers, lobes extending between anthers. *Capsules* ellipsoid to cylindric, 8–16 mm long, enclosed until maturity. *Seeds* angular-prismatic. *Chromosome number* 2*n* = 9. *Flowering time*:



Distribution of ***Moraea flavescens***.



Distribution of ***Moraea demissa***.

September; flowers open in early morning and fade 13:00–14:00.

Distribution and ecology: restricted to the mountains along the West Coast of South Africa, in the Gifberg Mtn complex and in the southern Cederberg and Swartruggens; on stony sandstone slopes and flats in dry fynbos.

Diagnosis: relatively poorly documented, *Moraea flavescens* is rather variable as circumscribed at present. Plants in the south have smaller flowers than those in the north of its range and specimens from this area bear the manuscript name *H. klawerensis* L.Bolus. The species is characterised by its pale, watery yellow flowers with a wide tepal cup and emarginate outer tepals, and flat style branches shorter than the anthers. Populations from the southern Cederberg have the unusual diploid number of $2n = 9$, and form complex heterozygotes at meiosis. *Moraea flavescens* is closely related to a second Cederberg–Gifberg endemic, *M. demissa*, which also has unusual chromosome cytology with diploid numbers of $2n = 10$, 9 or 8. *Moraea demissa* has smaller flowers, also pale yellow, but the tepal claws are suberect and form a narrow cup around the lower half of the filament column. Flowers of *M. flavescens* open in the morning while those of *M. demissa* open after midday and last through the late afternoon.

200. **Moraea demissa** *Goldblatt* in Novon 8: 375 (1998), as a new name for *Homeria tenuis* Schltr.: 95 (1900) [not *M. tenuis* Ker Gawl. (1807)]; Goldblatt: 483 (1981). Type: South Africa, [Western Cape], Pakhuis Mtns, *Schlechter 8647* (B, lecto., designated by Goldblatt: 483 (1981); BOL, E, G, GRA, K, MO, P, PRE, US, Z, isolecto.).

Plants small, 70–200 mm high. *Corm* 5–10 mm diam.; tunics of black or brown, wiry or ± soft-textured fibres. *Stem* sharply flexed above sheath of foliage leaf, few- to several-branched, branches also flexed, bearing attenuate sheathing leaves 150–300 mm long. *Foliage leaf* solitary, inserted shortly to well above ground, linear, exceeding stem, channelled, 2–3 mm wide. *Rhipidial spathes* attenuate, inner initially 20–40(–60) mm long, later elongating to enclose developing capsules, outer 15–25 mm long. *Flowers* fugaceous, pale to deep yellow, tepals limbs with small deep yellow nectar guides at bases, spreading, claws suberect, forming a narrow cup ± 3 mm deep including lower $^1/_2$ of filament column; outer tepals oblong, 10–12 × ± 6 mm, claws 2–3 mm long, inner tepals lanceolate, 9–11 × 4 mm. *Filaments* united in a smooth cylindric column 5–6 mm long; anthers 1.5–2.0 mm long, diverging from base, yellow; pollen yellow. *Ovary* ± cylindric, 5–8 mm long, included; style branches 1.5–2.0 mm long, flattened, stigma bilobed, reaching middle to upper part of anthers, stigmatic laterally, crests very short, often obscured by anthers. *Capsules* clavate-cylindric, 8–11 mm long, included. *Seeds* angular. *Chromosome number* $2n = 10$, 9, 8. *Flowering time*: mid-August to early October; flowers open ± 14:00 and fade near nightfall.

Distribution and ecology: restricted to the mountains along the western coast of Western Cape, South Africa, extending from the Gifberg and Matsikamma Mtns through the Cederberg to the Cold Bokkeveld; on sandstone pavement, rocky sandstone slopes and on loamy clay.

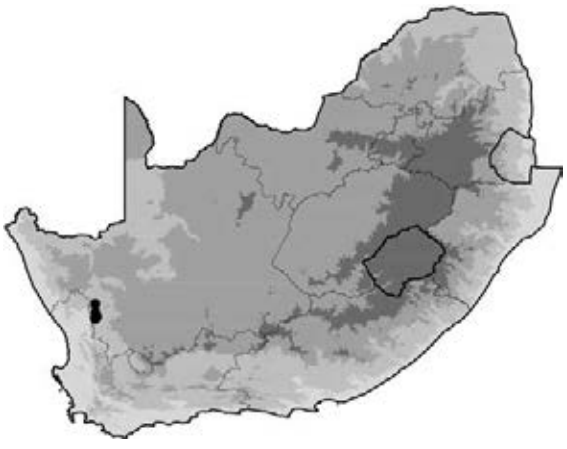
Diagnosis: the smallest species of subg. *Homeria*, *Moraea demissa* has a solitary leaf, flexuose stem, and yellow flowers with tepals only 9–12 mm long. The tepal claws are suberect and form a narrow cup that includes the lower half of the filaments. Cytologically the species is of considerable interest as chromosome counts have revealed populations with diploid numbers of $2n = 10$, 9 and 8, with $2n = 9$ most common. The latter number, $2n = 9$, has also been recorded in the related *M. flavescens*. These two species contrast sharply with the basic $x = 6$ found in all other species of the genus except the unrelated *M. pallida*, a form of which has $2n = 8$. The significance of three different chromosome numbers in *M. demissa* has yet to be explained. Plants from sample populations grown in the greenhouse have proved to be autogamous.

Sect. 17. **Conantherae** *Goldblatt & J.C.Manning* in Goldblatt et al. in Bothalia 43: 40 (2013). *Homeria* sect. *Conantherae* [as *Conanthera*] Goldblatt: 427 (1981). Type: *Homeria miniata* (Andrews) Sweet = *Moraea miniata* Andrews

Stem straight or flexuose. *Foliage leaves* several to one. *Flowers* usually fugaceous (not *M. fuscomontana*), members of both whorls well developed and bearing nectar guides; tepal claws short, erect forming a cup enclosing base of filaments; filaments united entirely; anthers parallel and contiguous, stigmatic surfaces emerging between anthers.

201. **Moraea aspera** *Goldblatt* in Novon 8: 374 (1998), as a new name for *Homeria spiralis* L.Bolus: 260 (1931c) [not *Moraea spiralis* Baker (1892)]. Type: South Africa, [Northern Cape], Nieuwoudtville Waterfall, *H.M.L. Bolus s.n.* (BOL 19348], lecto., designated by Goldblatt: 498 (1981); GRA, K, PRE, isolecto.).

Plants 100–200 mm high. *Corm* ± globose, ± 10 mm diam.; tunics of coarse, black fibres. *Stem* flexuose, several-branched, minutely velvety, bearing attenuate, sheathing leaves 30–40 mm long. *Foliage leaves* 3, lowermost basal, remaining cauline, linear, ± falcate, channelled below, flat above and loosely coiled in upper half, 2–4 mm wide. *Rhipidial spathes* attenuate with dry apices, inner 25–50(–60) mm long, outer ± ½ as long. *Flowers* fugaceous, salmon-pink, all tepal limbs with yellow, darkly speckled nectar guides at bases, spreading, claws suberect, forming a shallow cup narrowly windowed between their bases, including base of filament column; outer tepals obovoid-oblong, 16–23 × ± 9 mm, claws ± 3 mm long, densely velvety 1 mm above bases; inner tepals smaller, obovate, 5–6 mm wide. *Filaments* united in a column 6 mm long, inflated above base, then gradually tapering to apex, densely velvety in bulbous part; anthers erect, contiguous, ± 2 mm long, shorter after dehiscence, yellow. *Ovary* ± ellipsoid, 6–7 mm long; style branches short, deeply forked, hidden by the anthers, apices emerging between anthers, crests absent. *Capsules* ± cylindric, 10–13 mm long. *Seeds* unknown.



Distribution of ***Moraea aspera***.

Chromosome number 2*n* = 12. *Flowering time*: August to mid-September.

Distribution and ecology: a narrow endemic restricted the northern end of the Bokkeveld Mtns, north and northeast of Nieuwoudtville in Northern Cape, South Africa; in stony clay soils in renosterveld.

Diagnosis: *Moraea aspera* is readily recognised by the three well-developed foliage leaves, relatively soft textured and loosely coiled distally, together with softly velvety, flexuose stems. Although always salmon-pink, the flowers are similar to those of *M. miniata* in having short, erect claws enclosing the base of the filament column, itself swollen above the base and densely velvety in the lower half. The two species are, however, easy to distinguish from vegetative morphology as *M. miniata* has straight, leathery leaves and a nearly straight, glabrous stem.

202. **Moraea miniata** *Andrews* in The Botanist's Repository 6: t. 404 (1804). *Homeria miniata* (Andrews) Sweet: t. 152 (1826b). Type: South Africa, without precise locality or collector, illustration in Andrews: t. 404 (1804).

Homeria lineata Sweet: t. 178 (1826c). *Moraea lineata* (Sweet) Steud.: 160 (1841). Type: South Africa, without precise locality or collector, illustration in Sweet: t. 178 (1826c).

Moraea gigantea Klatt: 381 (1867). Type: South Africa, [Northern Cape], between Great and Little Riet Rivers, *Burchell 1388* [K, lecto., designated by Goldblatt: 485 (1981)].

Homeria albida L.Bolus: 258 (1931c). Type: South Africa, [Western Cape], between Vanrhynsdorp and Vanrhyns Pass *L. Bolus s.n.* (BOL, holo.; K, iso.).

[*Homeria porrifolia* Sweet: 498 (1830), invalid name, without description. *Moraea porrifolia* Sweet ex Steud.: 160 (1841), invalid name, without description.]

Plants 150–600 mm high. *Corm* 10–25 mm diam., with few to many cormlets round base; tunics of medium-textured to coarse black fibres. *Stem* usually several- to many-branched, slightly flexed above sheaths of foliage and sheathing leaves, bearing attenuate sheathing leaves 30–45(–60) mm long. *Foliage leaves* 2 or 3, linear, channelled, usually exceeding stem, suberect, often trailing distally, (4)8–12(17) mm wide, lowermost basal, others cauline. *Rhipidial spathes* attenuate, dry and brown at apices, inner (30–)40–60 mm long, outer ± ⅔ as long. *Flowers* pink, yellow, occasionally white, tepal limbs with triangular yellow nectar guides dotted with green at bases, claws erect, ± 2 mm long, appressed to filament column, limbs spreading; outer tepals ovoid-ellipsoid,

13–22(–27) × 6–10 mm, claws narrow, inner tepals slightly smaller. *Filaments* united in a column 6–8 mm long, narrow at base, swollen abruptly and then tapering gradually to apex, bulbous part pubescent; anthers ± 2 mm long, shorter after dehiscence, erect, contiguous. *Ovary* narrowly ellipsoid, 5–10 mm long, exserted; style branches short, obscured by anthers with tips emerging between anthers, crests absent. *Capsules* cylindric-ellipsoid, 12–16 mm long. *Seeds* angular-prismatic. *Chromosome number* 2*n* = 12 (2*n* = 18, 24 recorded in weedy plants of pastures and cultivated land). *Flowering time*: July to September(–October).

Distribution and ecology: common along the Atlantic and southern coasts of Western Cape, South Africa, extending as far north as Steinkopf and east into the western and Upper Karoo in Northern Cape, one of the most common and the most widespread species of subg. *Homeria*; on a variety of soils.

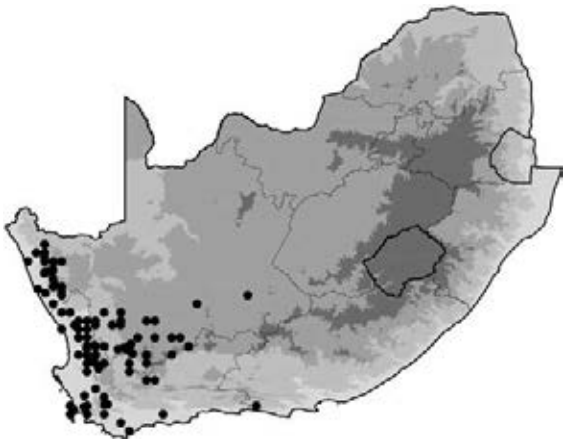
Diagnosis: one of several species of subg. *Homeria* with nearly identical flowers with short erect tepal claws clasping or enclosing the bulbous lower part of the filament column, spreading tepal limbs, and erect, contiguous anthers concealing the style branches, *Moraea miniata* is distinguished by its two, or more usually three, straight, linear leaves and several-branched stem. Flowers vary in colour, most often pink, especially in the south of its range, or yellow, or white in the immediate Vanrhynsdorp area. Plants in the Olifants River Mtns and valleys of the Cederberg are distinctive in their rather small, deep pink to almost orange flowers and shorter stature. Plants from the Upper Karoo are the most robust, reaching up to 600 mm high. *Moraea miniata* has become a serious weed in the southwestern Cape where it is often difficult to distinguish wild from adventive populations, the latter obvious on road verges and in overgrazed pastures. Plants reproduce readily from axillary cormlets and eradication is difficult. Some plants in old fields are obviously sterile, and these produce much larger numbers of cormlets than the wild plants. Causes of sterility appear to be chromosomal abnormalities, such as triploidy and dysploidy.

203. **Moraea pendula** *(Goldblatt) Goldblatt* in Novon 8: 375 (1998). *Homeria pendula* Goldblatt: 488 (1981). Type: South Africa, [Northern Cape], Namaqualand, Kamiesberg, *Goldblatt 4306* (MO, holo.; K, NBG, PRE, S, US, WAG, iso.).

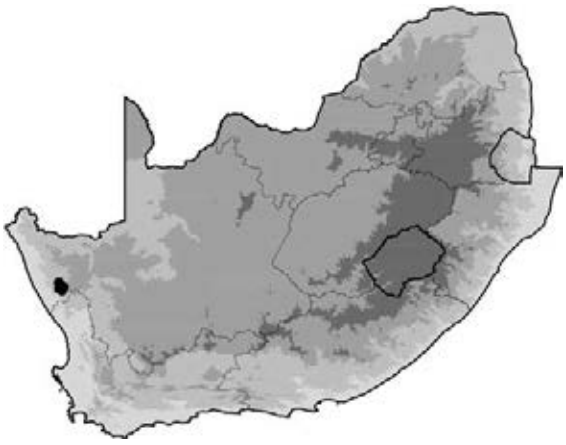
Plants 500–750 mm high. *Corm* ± globose, ± 20 mm diam.; tunics of coarse, wiry black fibres. *Stem* several-branched, branches ascending, flexed below rhipidia, with attenuate sheathing leaves with dry, brown tips. *Foliage leaves* 3 or 4, lowermost basal, remaining cauline, up to 600 mm long, channelled, falcate, bent and trailing distally, up to 20 mm wide. *Rhipidial spathes* attenuate, dry and brown distally, inner 40–50 mm long, outer ± $^{2}/_{3}$ as long. *Flowers* fugaceous, yellow (rarely orange), nodding to pendent, tepal limbs darkly speckled at bases, reflexed when fully open; outer tepals ± lanceolate, 24–28 × 7–8 mm, claws ± 4 mm long, clasping base of filament column, inner tepals slightly smaller. *Filaments* united in a column ± 15 mm long, swollen abruptly above base, tapering to apex, velvety in lower half; anthers 3–6 mm long, collapsing and shorter after anthesis, straight, contiguous, red; pollen orange-red (yellow). *Ovary* ± ovoid, 9–10 mm long; style branches 2.5–3.5 mm long, bifurcate, initially obscured by anthers, later apices extending between or above anthers, crests lacking. *Capsules* ± cylindric to club-shaped, 15–18 mm long. *Seeds* angular-prismatic. *Chromosome number* 2*n* = 12. *Flowering time*: October and November.

Distribution and ecology: locally common and conspicuous but restricted to middle elevations in the Kamiesberg of central Namaqualand in Northern Cape, South Africa; in wet places including streambanks, marshes and seeps, above 900 m.

Diagnosis: one of the tallest species of subg. *Homeria*, standing up to 750 mm, *Moraea pendula* has several, glaucous-grey foliage leaves and bright yellow, nodding to completely pendent flowers that are unusual in having the tepal limbs tightly reflexed against the pedicels. The filaments are fully united in a column abruptly



Distribution of ***Moraea miniata***.



Distribution of ***Moraea pendula***.

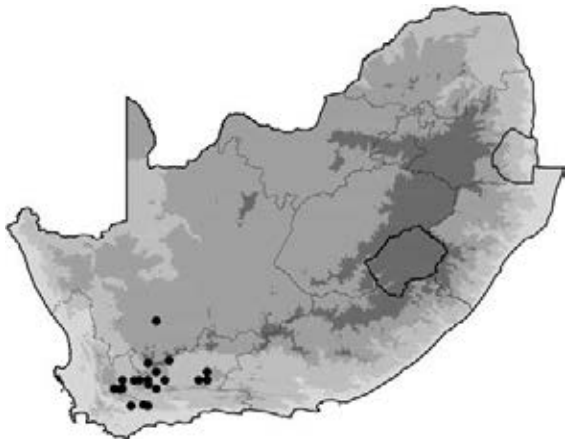
swollen above the base and tapering to a narrow apex, and the tepal claws, ± 4 mm long, clasp the bulbous part of the filament column. Typically the anthers and pollen are orange-red and provide a contrast to the yellow tepals. *Moraea pendula* is evidently closely related to the widespread *M. miniata*, which has smaller, spreading tepals but a similar filament column swollen at the base. Both occur in the Kamiesberg but *M. pendula* blooms later in the year and grows in wetter sites than *M. miniata*.

204. **Moraea karooica** [as *karrooica*] *Goldblatt* in Novon 8: 375 (1998), as a new name for *Homeria tricolor* G.J.Lewis: 266 (1933b) [not *M. tricolor* Andrews]. Type: South Africa, [Western Cape], between Jan de Boers and Bonteberg Karoo, *Compton 3778* (BOL, lecto., designated by Goldblatt: 493 (1981); NBG, isolecto.).

Plants usually small, 150–300 mm high. *Corm* 10–15 mm diam.; tunics of coarse, wiry black fibres. *Stem* usually flexed below each node, usually several-branched, bearing attenuate sheathing leaves 30–60 mm long. *Foliage leaf* usually solitary, basal (rarely 2 or 3, these cauline), linear, erect, often trailing distally, exceeding stem, channelled, 4–7 mm wide. *Rhipidial spathes* attenuate, inner initially 35–70 mm long, elongating in fruit to enclose ripening capsules, outer ± $^1/_2$ as long. *Flowers* salmon-orange, tepal limbs with a dark band near bases surrounding yellow zone, spreading, claws forming a wide cup 6–7 mm deep; outer tepals ± ovate, 18–24 × 7–8 mm, claws 5–6 mm long, ascending, inner tepals slightly smaller, obovate. *Filaments* united in a slender column 7–9 mm long, tapering slightly towards apex from wider base, smooth or sparsely and minutely papillate; anthers erect, contiguous, 3.0–3.5 mm long, after anthesis 2.0–2.5 mm long, yellow; pollen yellow. *Ovary* ± cylindric, 10–12 mm long; style branches short, 1.5–2.0 mm long, obscured by anthers, bifurcate, apices emerging between anthers; crests absent. *Capsules* ± cylindric, 9–15 mm long, usually enclosed by elongated inner spathe. *Chromosome number* 2*n* = 12. *Flowering time*: late September and October; opening early morning and collapsing in late afternoon.

Distribution and ecology: a fairly common, late-flowering species of the western Little Karoo and adjacent Tanqua Basin and western Karoo of South Africa, extending from Williston in the Upper Karoo of Northern Cape to Karoo Poort in the south, and east to Barrydale in the Little Karoo in Western Cape, also local in the Great Karoo; mostly in clay soils in dry renosterveld or karroid scrub.

Diagnosis: broadly resembling the more common *Moraea miniata*, *M. karooica* may differ in leaf number, usually single (rarely two or three) vs. two or three in *M. miniata*, but more fundamentally in the flowers. *Moraea karooica* has ascending tepal claws that together form a shallow cup and a cylindric filament column, whereas in *M. miniata* the short tepal claws clasp the base of the bulbous filament column. *Moraea karooica* may be most closely allied to the rare *M. fenestrata* of the Tanqua Basin, which has a similar habit but consistently



Distribution of ***Moraea karooica***.

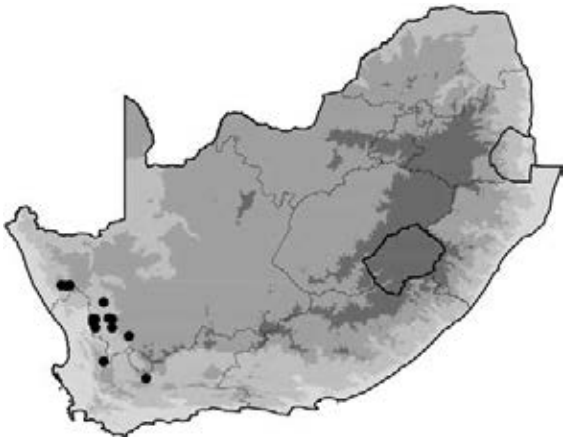
two or more leaves, and tepals conspicuously narrowed at the base, thus usually forming a windowed cup. Populations of *M. karooica* with more than one leaf are from the Koedoes Mtns and Verlatenkloof near Sutherland.

205. **Moraea bifida** *(L.Bolus) Goldblatt* in Novon 8: 374 (1998). *Homeria bifida* L.Bolus: 10 (1920). Type: South Africa, without precise locality or collector, ex Hort. Kirstenbosch, *Page s.n.* (BOL, holo.).

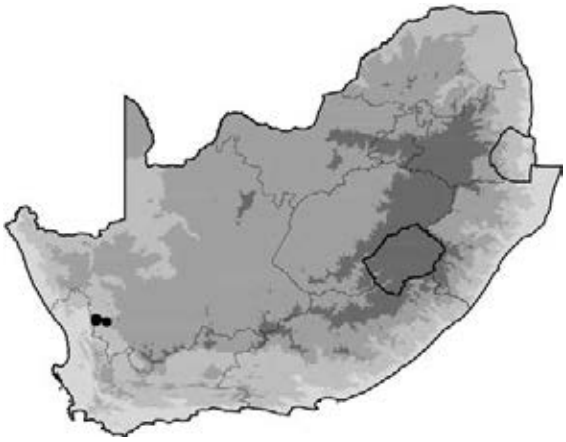
Homeria salmonea L.Bolus: 259 (1931c). Type: South Africa, [Northern Cape], near Nieuwoudtville, *H.M.L. Bolus s.n.* (BOL [19542], lecto., designated by Goldblatt: 495 (1981); K, PRE, isolecto.).

Plants 200–750 mm high. *Corm* 15–20 mm diam.; tunics of coarse, wiry black fibres. *Stem* with long basal internode, much-branched from upper nodes, branches short, flexed below rhipidia, with attenuate sheathing leaves 30–60 mm long. *Foliage leaf* solitary, basal, sheathing lower $^1/_2$ of stem, falcate distally, channelled but often flat distally, glaucous, 15–20 mm wide. *Rhipidial spathes* attenuate, inner 30–40 mm long, outer ± $^2/_3$ as long. *Flowers* fugaceous, pale yellow or pink, all tepal limbs with deep yellow nectar guides at bases usually spotted with green, spreading, claws erect, appressed to base of filament column; outer tepals oblong to narrowly obovate, 16–20 × 9–14 mm, claws narrow, ± 2 mm long, smooth, inner tepals slightly smaller, narrowly elliptic. *Filaments* united in a column 6–8 mm long, usually abruptly swollen above base, tapering in upper $^2/_3$ to narrow apex, smooth or velvety except at base and near apex; anthers initially 2.5–4.0 mm long, collapsing to 1.5–2.0 mm after dehiscence, erect, contiguous. *Ovary* ellipsoid, 7–9 mm long, usually included; style branches ± 1 mm long, deeply forked, apices stigmatic, emerging between anthers, crests lacking. *Capsules* ellipsoid, 10–12 mm long. *Chromosome number* 2*n* = 12, 12 + 4B, 24. *Flowering time*: August and September.

Distribution and ecology: South Africa, occurring in the eastern Kamiesberg in Namaqualand and from



Distribution of ***Moraea bifida***.



Distribution of ***Moraea fragrans***.

Loeriesfontein through the Bokkeveld Plateau and Roggeveld in Northern Cape south to Matjiesfontein in Western Cape; on a range of soils but most often in light clay and sandy ground.

Diagnosis: *Moraea bifida* is recognised by the solitary foliage leaf sheathing the lower half of the stem, short lateral branches borne in the upper half of the stem, and pink or yellow, star-like flowers with short tepal claws and spreading tepal limbs. The filament column is swollen and bulbous just above the narrow base and tapers in the upper third to a narrow apex. The tepal claws, ± 2 mm long, are erect and clasp the bulbous part of the filament column. The flowers are virtually identical to those of the widespread *M. miniata* but the latter is very different vegetatively, having at least two and often three or four foliage leaves, not clasping the stem for any distance. The two species can occasionally be found growing nearby but no intermediates are known and experiments have shown they cannot be crossed. The distinctive vegetative form of *M. bifida* is shared with *M. fragrans* but the flowers are rather different, the latter with tepal claws diverging from the base to form a shallow cup. Hybrids have been found in the wild between these two species in the Nieuwoudtville area where the two are common though confined to different soils. *Moraea bifida* is heteroploid and both diploid and tetraploid populations have been recorded.

206. **Moraea fragrans** *Goldblatt* in Novon 8: 375 (1998), as a new name for *Homeria odorata* L.Bolus: 326 (1932a) [not *M. odorata* G.J.Lewis (1941)]. Type: South Africa, [Northern Cape], Klipkoppies near Nieuwoudtville, *H.M.L. Bolus s.n.* (BOL, lecto., designated by Goldblatt: 496 (1981); K, isolecto.).

Plants 300–450 mm high. *Corm* 10–20 mm diam.; tunics of relatively soft, dark brown fibres. *Stem* straight, with long basal internode, several-branched above, branches short, held close to stem, flexed below rhipidia, bearing attenuate sheathing leaves 20–30 mm long, usually ± dry in upper half. *Foliage leaf* solitary, basal, sheathing lower $^1/_2$ of stem, falcate above, channelled, 12–20 mm wide. *Rhipidial spathes* attenuate, inner 35–40 mm long, outer $^1/_2$–$^2/_3$ as long. *Flowers* fugaceous, pale yellow (pale pink), tepal limbs with dark yellow nectar guides at bases outlined in faint grey-green, outspread, sweetly scented, claws ascending, forming a wide cup including filament column and anthers; outer tepals ± ovate, 23–25 × 9–11 mm, claws ± 8 mm long, inner tepals slightly smaller. *Filaments* united in a column 4–5 mm long, wider at base, tapering above, minutely velvety in lower half; anthers erect, contiguous, 1.5–2.0 mm long, yellow; pollen white. *Ovary* narrowly club-shaped, 6–7 mm long, often lightly dark speckled; style branches short, ± 1 mm long, deeply forked, tips stigmatic and emerging between or arching just above anthers, crests lacking. *Capsules* obovate-truncate, 7–10 mm long. *Chromosome number* 2*n* = 12. *Flowering time*: mid-August and September.

Distribution and ecology: a relatively narrow endemic of the Calvinia District in Northern Cape, South Africa, especially common in the hills east of Nieuwoudtville but also recorded to the east near Calvinia; restricted to heavy red clay soil derived from dolerite.

Diagnosis: in its vegetative form *Moraea fragrans* is nearly identical to *M. bifida,* both with a glaucous, falcate leaf with the lower half sheathing the stem almost to the base of the first branches. The flowers are, however, very different. The flowers of *M. fragrans* are nearly always pale yellow with darker yellow central cup and tepal claws ± 8 mm long, diverging to form a relatively wide cup that includes the stamens. The deep yellow nectar guides are edged with a band of grey-green. In *M. bifida* the tepal claws are short, only ± 2 mm long, erect and clasp the bulbous base of the filament column. Despite their different floral morphology, the two are likely closely related and hybrids have been recorded between them where their ranges come together. Greenhouse studies have shown the hybrids to be sterile.

207. **Moraea fenestrata** *(Goldblatt) Goldblatt* in Novon 8: 375 (1998). *Homeria fenestrata* Goldblatt: 491 (1981). Type: South Africa, [Northern

Cape], Tanqua basin 60 km south of Calvinia, *Goldblatt 3906* (MO, holo.; BR, K, NBG, PRE, S, US, WAG, iso.).

Plants small, 100–150 mm high. *Corm* ± 10 mm diam.; tunics of wiry, black fibres. *Stem* flexuose, bearing foliage leaves at all nodes below spathes, usually branched. *Foliage leaves* 2 to 4, lowermost inserted well above ground, exceeding stem, linear, channelled, upper leaves progressively shorter. *Rhipidial spathes* attenuate, inner 30–35 mm long, outer ± $^1/_2$ as long. *Flowers* fugaceous, pink with yellow cup, rarely uniformly yellow, tepal limbs with yellow nectar guides at bases edged dark pink, spreading, claws ascending, narrow at base and not contiguous, usually forming a wide cup windowed below, faintly scented; outer tepals oblong to narrowly obovate, 15–21 × 6–9 mm, claw ± 3 × < 1 mm, minutely papillate in middle; inner tepals slightly smaller, limbs ovate. *Filaments* united in a cylindric column ± 6 mm long, minutely papillate in lower half; anthers erect, contiguous, 3 mm long, collapsing to 2 mm after dehiscence. *Ovary* ± cylindric, ± 4 mm long, exserted; style branches 1 mm long, bifurcate, hidden by anthers, arms stigmatic apically and emerging between anthers; crests vestigial. *Capsules* and *seeds* not known. *Chromosome number* 2*n* = 12. *Flowering time*: July and early August.

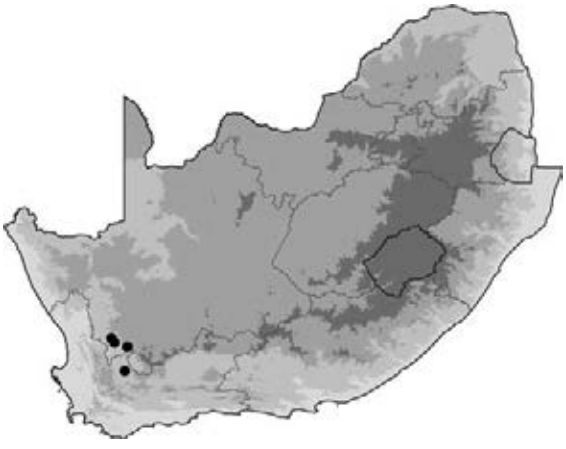
Distribution and ecology: a poorly known species restricted to the arid Tanqua Karoo and the Koedoes Mtns in Western and Northern Cape, South Africa; on clay flats and slopes, flowering erratically depending on rainfall.

Diagnosis: *Moraea fenestrata* is recognised by the flexuose stem, sharply flexed above the sheaths of the two to four leaves, the lowermost of these inserted well above ground level. All nodes of the stem bear foliage leaves except for the terminal which bears the inflorescence. The pink (rarely yellow) flowers have a yellow cup formed by the diverging tepals claws, often so narrow at the base that the edges are gapped, the cup thus windowed near the base. Plants from the Koedoes Mtns lack these windows but in other respects match the type except that some plants have uniformly yellow flowers. The flowers have filaments united in a slender column, only slightly wider toward the base, and contiguous anthers, with the stigmatic tips of the forked style branches extending between the anthers.

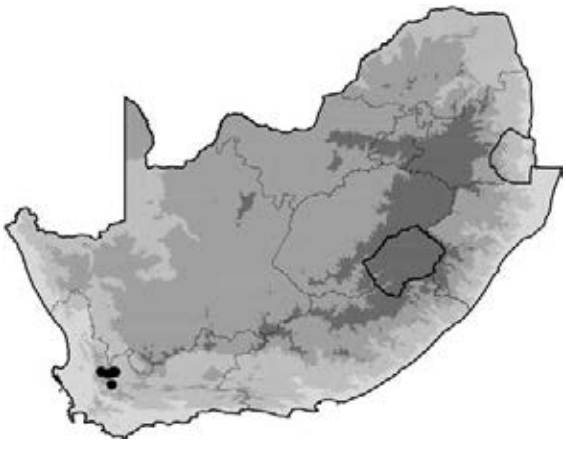
208. **Moraea fuscomontana** *(Goldblatt) Goldblatt* in Novon 8: 375 (1998). *Homeria fuscomontana* Goldblatt: 497 (1981). Type: South Africa, [Western Cape], Cold Bokkeveld, suurvlakte on plateau above Winkelhaaks River, *E. Esterhuysen 33951* (BOL, holo.; K, MO, PRE, S, iso.).

Plants 10–250 mm high. *Corm* 8–10 mm diam.; tunics of dark, wiry fibres. *Stem* erect below, flexed sharply above sheath of foliage leaf, 1- to several-branched, bearing attenuate sheathing leaves 20–30 mm long. *Foliage leaf* solitary, inserted well above ground, linear, channelled, erect below, trailing distally, 2–3 mm wide. *Rhipidial spathes* attenuate, inner initially 25–40 mm long, later elongating to enclose developing capsules, outer 14–25 mm long. *Flowers* long-lived, pale yellow, all tepal limbs with deep yellow nectar guides at bases edged or dotted with green, spreading, claws erect forming narrow cup enclosing lower $^1/_2$ of filament column; outer tepals oblong, 20–22 × ± 8 mm, claws ± 3 mm long, inner tepals ± 20 × 7 mm, ± wedge-shaped, widest in upper $^1/_3$. *Filaments* united in a cylindric column ± 6 mm long, velvety in lower $^2/_3$, wider at base, tapering and smooth above; anthers initially ± 3 mm long, erect, contiguous, collapsing after anthesis, then < 2 mm. *Ovary* cylindric, 4–5 mm long, enclosed; style branches short, ± 1.5 mm long, flat, bilobed, apices emerging between anthers, stigmatic and ciliate at tips. *Capsules* ovoid, ± 8 mm long, included. *Seeds* unknown. *Chromosome number* 2*n* = 12. *Flowering time*: September; flowers open between 10:00 and 11:00 and close in the evenings and fade midmorning two days later.

Distribution and ecology: restricted to the southern Cold Bokkeveld and Swartruggens in interior Western Cape, South Africa; on stony sandstone slopes and flats in dry fynbos vegetation.



Distribution of ***Moraea fenestrata***.



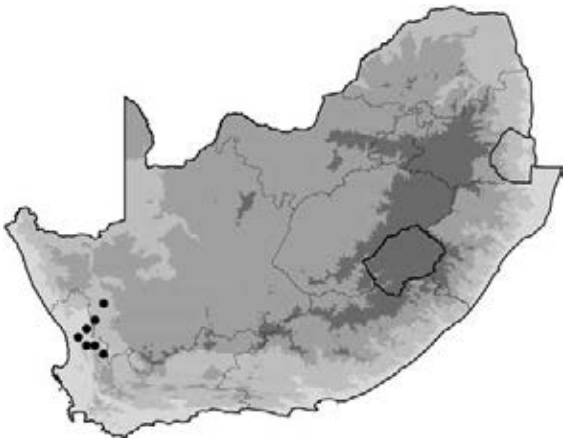
Distribution of ***Moraea fuscomontana***.

Diagnosis: relatively poorly known, *Moraea fuscomontana* has flowers resembling those of *M. miniata* except that the filament column is cylindric rather than bulbous below. This and the solitary foliage leaf and flexuose stem separate it from that species. *Moraea fuscomontana* may be most closely related to salmon-pink-flowered *M. brachygyne*, which also has the rhipidial spathes enclosing the developing capsules, but a longer, prominently papillate filament column ± 8 mm long, held well above the tepals, vs. 6 mm long and velvety below in *M. fuscomontana*. *Moraea fuscomontana* is also easily confused with *M. demissa* and *M. flavescens*, which are similar in size and vegetative morphology but differing in their flowers, especially in having divergent anthers and style branches with short crests.

209. **Moraea brachygyne** *(Schltr.) Goldblatt* in Novon 8: 374 (1998). *Homeria brachygyne* Schltr.: 94 (1900). Type: South Africa, [Western Cape], Bulshoek, Olifants River Valley, *Schlechter 8381* (B, lecto., designated by Goldblatt: 499 (1981); BOL, G, GRA, K, PRE, Z, isolecto.).

Homeria papillosa L.Bolus: 259 (1931c). Type: South Africa, [Western Cape], Vanrhyns Pass, *H.M.L. Bolus s.n.* (BOL [19541], holo.; K, PRE, SAM, iso.).

Plants mostly small, 80–250 mm high. *Corms* 7–10 mm diam.; tunics of coarse, wiry black fibres. *Stem* flexed outward above sheath of foliage leaf above each sheathing leaf, usually branched, sometimes repeatedly, with attenuate sheathing leaves 15–20(–30) mm long at upper nodes. *Foliage leaf* solitary, inserted well above ground, linear, channelled to ± flat, exceeding stem, 2–4 mm wide. *Rhipidial spathes* attenuate, inner 30–50 mm long, outer ± half as long. *Flowers* fugaceous, salmon-pink, all tepal limbs with yellow nectar guides at bases, spreading, claws erect, forming a shallow cup; outer tepals obovate to pandurate, 18–22 × 6–9 mm, claws ± 4 mm long, tapering to narrow base, inner tepals ± as long as outer, 5–6 mm wide. *Filaments* united in a slender, cylindric column 6–8 mm long, long-papillate in lower $^1/_2$; anthers 2.5–3.0 mm long, erect, contiguous, collapsing after anthesis, then ± 2 mm long. *Ovary* ± cylindric, 5–6 mm long, exserted; style branches concealed by anthers, short, bifurcate, stigmatic at tips, apices of style branches emerging between anthers, crests lacking. *Capsules* ellipsoid, 8–10 mm long. *Seeds* angular. *Chromosome number* 2*n* = 12. *Flowering time*: late July to early September.



Distribution of ***Moraea brachygyne***.

Distribution and ecology: restricted to western South Africa, from the Bokkeveld Mtns in Northern Cape through the Olifants River Valley to Citrusdal in Western Cape, with an outlying collection from the Kubiskou Mtns northwest of Loeriesfontein in Northern Cape provisionally assigned to this species; on rocky sandstone slopes often on wet sandstone pavement.

Diagnosis: *Moraea brachygyne* has a solitary, narrow leaf up to 4 mm wide, with the stem sharply flexed above the sheath, and small, salmon-pink flowers with short tepal claws and a slender filament column 6–8 mm long prominently papillate in the lower half. Yellow-flowered *M. fuscomontana* seems closest to *M. brachygyne* but has a shorter filament column ± 6 mm long, velvety in the lower two-thirds. The flowers themselves differ little from those of *M. miniata* except for the cylindric, rather than flask-shaped, filament column, but *M. miniata* is also readily distinguished by its multi-leaved habit.

UNCERTAIN SPECIES

Homeria breyniana (L.) G.J.Lewis in Journal of South African Botany 7: 59 (1941). *Tulipa breyniana* L.: 306 (1753). The name has been applied to *Moraea collina* but the type illustration is not identifiable to species (Goldblatt, 1981) although it is most likely a member of subg. *Homeria*.

REFERENCES

ANDREWS, H.C. 1800a. *Moraea tricolor*. Three-coloured moraea. *The Botanists' Repository* 2: t. 83.

ANDREWS, H.C. 1800b. *Galaxia ovata*. Oval-leaved galaxia. *The Botanist's Repository* 2: t. 94.

ANDREWS, H.C. 1801. *Galaxia grandiflora*. Large-flowered galaxia. *The Botanist's Repository* 3: t. 164.

ANDREWS, H.C. 1804. *Moraea miniata*. Red-lead-coloured moraea. *The Botanist's Repository* 6: t. 404.

ASCHERSON, P.F.A. & GRAEBNER, K.O.R.P.P. 1906. *Synopsis der Mitteleuropäischen Flora* 3. Engelmann, Leipzig.
BAKER, J.G. 1875. *Dietes huttonii*. *Curtis's Botanical Magazine* 101: t. 6174.
BAKER, J.G. 1877 ['1878']. Systema iridearum. *Journal of the Linnean Society, Botany* 16: 61–180.
BAKER, J.G. 1892. *Handbook of the Irideae*. George Bell and Co., London.
BAKER, J.G. 1894. In Decades Kewenses. Decas XI. *Bulletin of Miscellaneous Information Kew* 1894: 391.
BAKER, J.G. 1896. Irideae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 6–171. Reeve & Co, London.
BAKER, J.G. 1897. Addenda. In W.T. Thiselton-Dyer, *Flora capensis* 6: 528–536. Reeve & Co., Ashford, Kent.
BAKER, J.G. 1899. *Moraea sulphurea*. *Curtis's Botanical Magazine* 125: t. 7658.
BAKER, J.G. 1901. Iridaceae. In H. Schinz, Beiträge zur Kenntnis der Afrikanischen Flora (Neue Folge). *Bulletin de l'Herbier Boissier*, sér. 2, 1: 853–868.
BAKER, J.G. 1904a. Iridaceae. In H. Schinz, Beiträge zur Kenntnis der Afrikanischen Flora (XVII). *Vierteljahrsschrift der Naturforschenden Gesellschaft Zürich* 49: 178.
BAKER, J.G. 1904b. Beiträge zur kenntnis der Afrikanischen-Flora. XVI. Iridaceae. *Bulletin de l'Herbier Boissier* sér. 2, 4: 1003–1007.
BAKER, J.G. 1906. II.—Diagnoses Africanae, XVI. Royal Botanic Gardens, Kew. *Bulletin of Miscellaneous Information Kew* 1906: 15–30.
BARNARD, T.T. 1932. *Helixyra torta* (L.Bolus) Barnard. *Iris Year Book* 1932: 52.
BÉGUINOT, A. 1909. Revisione monographica del genere *Romulea* Maratti. *Malpighia* 23: 55–117, 185–239, 275–296.
BLACK, J.M. 1922. Iridaceae. In *Flora of South Australia* 1. Government Printer, North Terrace.
BOLUS, L. 1920. Novitates Africanae. *Annals of the Bolus Herbarium* 3: 1–14.
BOLUS, L. 1927a. Novitates Africanae. *Annals of the Bolus Herbarium* 4: 69–119.
BOLUS, L. 1927b. Plants — new and noteworthy. *South African Gardening and Country Life* 17: 416–418.
BOLUS, L. 1928a. *Homeria cookii*. *Flowering Plants of South Africa* 8: t. 306.
BOLUS, L. 1928b. Plants — new or noteworthy. *South African Gardening and Country Life* 18: 114, 116.
BOLUS, L. 1929a. Plants — new or noteworthy. *South African Gardening and Country Life* 19: 385.
BOLUS, L. 1929b. Plants — new or noteworthy. *South African Gardening and Country Life* 19: 294.
BOLUS, L. 1929c. Plants — new or noteworthy. *South African Gardening and Country Life* 19: 320.
BOLUS, L. 1931a. Novitates Africanae. *Journal of Botany, British and foreign* 69: 10–15.
BOLUS, L. 1931b. Plants — new or noteworthy. *South African Gardening and Country Life* 21: 367, 368.
BOLUS, L. 1931c. Novitates Africanae: New Iridaceae. *Journal of Botany, British and foreign* 69: 258–262.
BOLUS, L. 1931d. *Homeria galpinii* L.Bolus. *Flowering Plants of South* Africa 11: t. 417.
BOLUS, L. 1932a. New South African Iridaceae. *Bulletin of Miscellaneous Information Kew* 1932: 326–330.
BOLUS, L. 1932c. Plants — new or noteworthy. *South African Gardening and Country Life* 22: 275, 276.
BOLUS, L. 1933. Novitates Africanae. *Journal of Botany, British and foreign* 71: 122–125.
BOLUS, L. 1938. *Homeria pillansii* L.Bolus. *Flowering Plants of South Africa* 18: t. 684.
BROWN, N.E. 1928. The South African Iridaceae of Thunberg's herbarium. *Journal of the Linnean Society, Botany* 48: 15–55.
BROWN, N.E. 1929a. The Iridaceae of Burman's Florae capensis prodromus. *Bulletin of Miscellaneous Information Kew* 1929: 129–139.
BROWN, N.E. 1929b. Contributions to a knowledge of the Transvaal Iridaceae. Part I. *Transactions of the Royal Society of South Africa* 17: 341–352.
BROWN, N.E. 1931. XXIX.—Notes upon South African plants. *Bulletin of Miscellaneous Information Kew* 1931: 191–197
CANDOLLE, A.P. de. 1803. Mémoire sur le *Vieusseuxia*, genre de la famille des Iridées. *Annales du Muséum National d'Histoire Naturelle* 2: 136–141.
CAVINILLES, A.J. 1788. Sexta dissertatio botanica 6. Didot, Paris.
CHIOVENDA, E. 1911. Plantae novae vel minus notae e regione aethiopica. *Annali di Botanica* 9: 51–152.
CURTIS, W. 1791. *Iris pavonia*. Peacock-flowered iris. *Curtis's Botanical Magazine* 5: t. 168.
DELAROCHE, D. 1766. *Descriptiones plantarum aliqout novarum*. Verbeek, Leiden.
DE WILDEMAN, E. 1932. *Contributions de la Flore de Katanga*, Suppl. 4.
DIELS, L. 1909. Formationen und Florenelemente im nordwestlichen Kapland. *Botanische Jahrbücher für Systematik* 44: 91–124.
DIETRICH, A.G. 1833. *Species plantarum*, edn. 6, vol. 2. Nauck, Berlin.
DINTER, K. 1923. Index der aus Deutsch-Südwestafrika bis zum Jahre 1917 bekannt geworden Pflanzenarten. XII. *Repertorium specierum novarum regni vegetabilis* 19: 236–240.
DRAPIEZ, P.A.J. 1833. *Encyclographie du règne végétale*, vol. 1. Encyclographique, Brussels.
DRUCE, G.C. 1917. Reports. *Botanical Society Exchange Club of the British Isles* 4 (suppl. 2): 626.
DYKES, W.R. 1913. *The Genus* Iris. Dover, New York.
ECKLON, C.F. 1827. *Topographisches Verzeichniss der Pflanzensammlung von C.F. Ecklon*. Reiseverein, Esslingen.
FOSTER, R.C. 1936. Notes on nomenclature in Iridaceae. *Contributions from the Gray Herbarium* 114: 37–50.
FOSTER, R.C. 1939. Studies in the Iridaceae,—1. *Contributions from the Gray Herbarium* 147: 33–48.
FOSTER, R.C. 1947. Studies in the Iridaceae,—5. *Contributions from the Gray Herbarium* 165: 108.
FRIES, R.E. 1916. Wissenschaftlische Ergebnisse der Schwedischen Rhodesia-Kongo-Expedition 1. *Botanische untersuchungen. 2. Monocotyledones und Sympetalae*. Stockholm, Aftonbladets Druckerei.
GOLDBLATT, P. 1971a. A new species of *Gladiolus* and some nomenclatural changes in Iridaceae. *Journal of South African Botany* 37: 229–236.
GOLDBLATT, P. 1971b ['1972']. *Moraea insolens*. *Flowering Plants of Africa* 41: t. 1639
GOLDBLATT, P. 1971c. Cytological and morphological studies in the southern African Iridaceae. *Journal of South African Botany* 37: 317–460
GOLDBLATT, P. 1973. Contributions to the knowledge of *Moraea* (Iridaceae) in the summer rainfall region of South Africa. *Annals of the Missouri Botanical Garden* 60: 204–259.
GOLDBLATT, P. 1976a ['1977']. The genus *Moraea* in the winter-rainfall region of southern Africa. *Annals of the Missouri Botanical Garden* 63: 657–786.
GOLDBLATT, P. 1976b ['1977']. Evolution, cytology and subgeneric classification in *Moraea* (Iridaceae). *Annals of the Missouri Botanical Garden* 63: 1–23.

GOLDBLATT, P. 1976c ['1977']. *Barnardiella*: A new genus of the Iridaceae and its relationship to *Gynandriris* and *Moraea*. *Annals of the Missouri Botanical Garden* 63: 309–313.
GOLDBLATT, P. 1977. Systematics of *Moraea* (Iridaceae) in tropical Africa. *Annals of the Missouri Botanical Garden* 64: 243–295.
GOLDBLATT, P. 1977b. *Moraea loubseri*. *Flowering Plants of Africa* 44: t. 1724.
GOLDBLATT, P. 1979a. Biology and systematics of *Galaxia* (Iridaceae). *Journal of South African Botany* 45: 385–423.
GOLDBLATT, P. 1979b [1980]. *Roggeveldia*, a new genus of southern African Iridaceae-Irideae. *Annals of the Missouri Botanical Garden* 66: 839–844.
GOLDBLATT, P. 1980a. Redefinition of *Homeria* (Iridaceae) in the light of biosystematic data, with *Rheome* gen. nov. *Botaniska Notiser* 133: 85–95.
GOLDBLATT, P. 1980b. Systematics of *Gynandriris* (Iridaceae), a Mediterranean–southern African disjunct. *Botaniska Notiser* 133: 239–260.
GOLDBLATT, P. 1981. Systematics and biology of *Homeria* (Iridaceae). *Annals of the Missouri Botanical Garden* 68: 413–503.
GOLDBLATT, P. 1982. A synopsis of *Moraea* (Iridaceae) with new taxa, transfers and notes. *Annals of the Missouri Botanical Garden* 69: 351–369.
GOLDBLATT, P. 1984a. *Sessilistigma*, a new genus of Iridaceae–Iridoideae from the south western Cape. *Journal of South African Botany* 50: 149–157.
GOLDBLATT, P. 1984b ['1985']. New species of *Galaxia* (Iridaceae) and notes on cytology and evolution in the genus. *Annals of the Missouri Botanical Garden* 71: 1082–1087.
GOLDBLATT, P. 1986a. The genus *Moraea* in southern Africa. *Annals of Kirstenbosch Botanical Garden* 14.
GOLDBLATT, P. 1986b. Cytology and systematics of the *Moraea fugax* complex (Iridaceae). *Annals of the Missouri Botanical Garden* 73: 140–157.
GOLDBLATT, P. 1986c. Convergent evolution of the *Homeria* flower type in six new species of *Moraea* (Iridaceae) in southern Africa. *Annals of the Missouri Botanical Garden* 73: 102–116.
GOLDBLATT, P. 1987. Systematics of the southern African genus *Hexaglottis* (Iridaceae–Iridoideae). *Annals of the Missouri Botanical Garden* 74: 542–569.
GOLDBLATT, P. 1991, An overview of the systematics, phylogeny and biology of the southern African Iridaceae. *Contributions from the Bolus Herbarium* 13: 1–74.
GOLDBLATT, P. 1992. New species, chromosome cytology and notes on the southern African Iridaceae–Irideae: *Moraea*, *Roggeveldia* and *Homeria*. *South African Journal of Botany* 58: 209–214.
GOLDBLATT, P. 1995. New species of southern African *Moraea* (Iridaceae: Iridoideae), and the reduction of *Rheome*. Novon 5: 262–269.
GOLDBLATT, P. 1998. Reduction of *Barnardiella*, *Galaxia*, *Gynandriris*, *Hexaglottis, Homeria* and *Roggeveldia* in *Moraea* (Iridaceae: Irideae). *Novon* 8: 371–377.
GOLDBLATT, P. & MANNING, J.C. 1997. *Homeria hantamensis*. *Flowering Plants of Africa* 55: t. 2128.
GOLDBLATT, P. & MANNING, J.C. 2000a. New species of *Moraea* (Iridaceae–Iridoideae) from southern Africa. *Novon* 10: 14–22.
GOLDBLATT, P. & MANNING, J.C. 2000b. Cape Plants: A conspectus of the vascular plants of the Cape Region of South Africa. *Strelitzia* 9. National Botanical Institute of South Africa, Cape Town.
GOLDBLATT, P. & MANNING, J.C. 2002. Notes and new species of *Moraea* (Iridaceae: Iridoideae) from the southern African winter-rainfall zone. *Novon* 12: 352–359.
GOLDBLATT, P. & MANNING, J.C. 2004. New species of *Ixia* (Crocoideae) and *Moraea* (Iridoideae), and taxonomic notes on some other African Iridaceae. *Novon* 14: 288–298.
GOLDBLATT, P. & MANNING, J.C. 2009. New species of *Moraea* (Iridaceae: Iridoideae), with range extensions and miscellaneous notes for southern African species. *Bothalia* 39: 1–10.
GOLDBLATT, P. & MANNING, J.C. 2010. *Moraea intermedia* and *M. vuvuzela* (Iridaceae: Iridoideae), two new species from western South Africa, and some nomenclatural changes and range extensions in the genus. *Bothalia* 40: 146–153.
GOLDBLATT, P. & MANNING, J.C. 2012a. Iridaceae. Notes on *Moraea* subg. *Visciramosae* (Iridoideae), including the new species *M. saldanhensis* from western South Africa, recognition of *M. inconspicua* subsp. *namaquensis*, and pollination biology in *M. rivulicola*. *Bothalia* 42: 210–215.
GOLDBLATT, P. & MANNING, J.C. 2012b. The hypervariable *Moraea tripetala* complex (Iridaceae: Iridoideae) — a systematic review. *Bothalia* 42: 111–135.
GOLDBLATT, P. & MANNING, J.C. 2013. Eight new species of *Moraea* (Iridaceae) from southern African with range extensions and morphological notes in the genus. *Bothalia* 43: 153–165.
GOLDBLATT, P. & MANNING, J.C. 2014a. *Moraea orthrosantha* (Iridaceae), a new species from Namaqualand, South Africa. *Bothalia* 44: 4 pp. dx.doi.org/10.4102/abc.v44i1.132
GOLDBLATT, P. & MANNING, J.C. 2014b. Taxonomy of the *Moraea saxicola* complex (Iridaceae: Iridoideae) in arid, western southern Africa with the new species, *M. acocksii, M. geminifolia, M. quartzicola* and *M. teretifolia*. *South African Journal of Botany* 91: 75–83.
GOLDBLATT, P. & MANNING, J.C. 2015. Review of the southern African *Moraea ciliata* complex (Iridaceae: Iridoideae), with three new taxa, *M. flava, M. ciliata* subsp. *carnosa* and subsp. *lutescens*. *South African Journal of Botany* 99: 107–114.
GOLDBLATT, P. & MANNING, J.C. & SCHNITZLER, J. 2013. A revised infrageneric classification and synopsis of the Afro-Eurasian genus *Moraea* Mill. (Iridaceae: Irideae). *Bothalia* 43: 29–41.
GOLDBLATT, P., MANNING, J.C. & LE ROUX, A. 2015. New taxa in *Moraea* subgenera *Moraea* and *Vieusseuxia* (Iridaceae: Irideae) from Western Cape, South Africa. *South African Journal of Botany* 99: 69–74.
GOLDBLATT, P. & OLIVER, E.G.O. 1993. A new species of *Galaxia* (Iridaceae subfamily Iridoideae) from Namaqualand, South Africa. *Novon* 3: 404–407.
HALDA, J.J. 2002. *Moraea jarmilae* J.J.Halda, spec. nov. *Acta Musei Richnoviensis sect. Natur* 9, 1: 69, fig. 79.
HARVEY, W.H. 1868. *Genera of South African Plants*, edn. 2. J.C. Juta, Cape Town.
HERBERT, W. 1844. *Plantia flava* in Lindley, *Edwards's Botanical Register* 30 (misc.): 89.
HOCHSTETTER, C.F. 1844. Nova genera plantarum Africae proponit et describit. Continuatio. *Flora* 27: 17–32.
JACQUIN, N.J. 1776. *Hortus botanicus vindobonensis*. Kaliwoda, Vienna.
JACQUIN, N.J. 1791. *Collectanea*, vol. 3. Kaliwoda, Vienna.
JACQUIN, N.J. 1788–1795 ['1786–1793']. *Icones plantarum rariorum*, vol. 2. C.F. Wappler, Vienna.
JACQUIN, N.J. 1797. *Plantarum rariorum horti caesarei Schoenbrunnensis*, vol. 1. C.F. Wappler, Vienna.

KER GAWLER, J.B. 1802a. *Moraea unguiculata*. Long-clawed moraea. *Curtis's Botanical Magazine* 16: t. 593.
KER GAWLER, J.B. 1802b. *Iris villosa*. Hairy flag. *Curtis's Botanical Magazine* 16: t. 571.
KER GAWLER, J.B. 1803a. *Moraea edulis*. Long-leaved moraea. *Curtis's Botanical Magazine* 17: t. 613.
KER GAWLER, J.B. 1803b. *Moraea tricuspis*. Trident-petalled moraea. *Curtis's Botanical Magazine* 19: t. 696.
KER GAWLER, J.B. 1803c. *Moraea tripetala*. Three petal-like moraea. *Curtis's Botanical Magazine* 19: t. 702.
KER GAWLER, J.B. 1804a. Ensatorum ordo. In J. König & J. Sims, *Annals of Botany* 1: 219–247.
KER GAWLER, J.B. 1804b. *Moraea longiflora*. Long-flowered moraea. *Curtis's Botanical Magazine* 19: t. 712.
KER GAWLER, J.B. 1804c. *Moraea ramosa*. Branching moraea. *Curtis's Botanical Magazine* 20: t. 771.
KER GAWLER, J.B. 1804d. *Moraea papilionacea*. Dwarf moraea. *Curtis's Botanical Magazine* 20: t. 750.
KER GAWLER, J.B. 1804e. *Moraea tricuspis* var. *lutea*. Yellow trident-petaled moraea. *Curtis's Botanical Magazine* 20: t. 772.
KER GAWLER, J.B. 1807. *Moraea tenuis*. Brown-flowered moraea. *Curtis's Botanical Magazine* 26: t. 1047.
KER GAWLER, J.B. 1808. *Moraea collina* (γ). Straw-coloured equal-flowered moraea. *Curtis's Botanical Magazine* 28: t. 1103.
KER GAWLER, J.B. 1809. *Moraea edulis* (γ). Yellow, esculent-rooted moraea. *Curtis's Botanical Magazine* 31: t. 1238.
KER GAWLER, J.B. 1810a. *Moraea crispa* γ. Curled-leaved moraea. *Curtis's Botanical Magazine* 32: t. 1284.
KER GAWLER, J. 1810b. *Moraea spicata*. Flexuose moraea. *Curtis's Botanical Magazine* 32: t. 1283.
KER GAWLER, J. 1812. *Galaxia ovata* (γ.) *purpurea*. Purple-flowered galaxia. *Curtis's Botanical Magazine* 37: t. 1516.
KER GAWLER, J. 1814. *Homeria miniata* (a) *miniata minor*. Lesser equal-flowered Moraea. *Curtis's Botanical Magazine* 39: t. 1612.
KER GAWLER, J.B. 1818. *Moraea lurida*. Mr. Griffin's Moraea. *The Botanical Register* 4: t. 312.
KER GAWLER, J.B. 1827. *Iridearum generum*. De Mat, Brussels.
KILLICK, D.J. 1954. Newly described species. Iridaceae. *Bothalia* 6: 436–438.
KLATT, F.W. 1864. Revisio Iridearum. *Linnaea* 32: 689–784.
KLATT, F.W. 1866. Revisio Iridearum (Conclusio). *Linnaea* 34: 537–689.
KLATT, F.W. 1867. Diagnoses Iridearum novarum. *Linnaea* 35: 381.
KLATT, F.W. 1882. Ergänzungen und Berichtigungen zu Baker's Systema Iridacearum. *Abhandlungen der Naturforschenden Gesellschaft zu Halle* 15: 44–404.
KLATT, F.W. 1885. Determination and description of Cape Irideae. *Transactions of the South African Philosophical Society* 3: 202–205.
KLATT, F.W. 1894 ['1895']. Iridaceae. In Th. Durand & H. Schinz, *Conspectus florae africae* 5: 143–230. Jardin botanique de l'Etat, Bruxelles etc.
LAMARCK, J.B.A.P.M. DE. 1789. *Encyclopédie méthodique. Botanique*, 3. Pancoucke, Paris.
LAMARCK, J.B.A.P.M. DE. 1791. *Tableau Encyclopédie et méthodique. Botanique*, 1. Pancoucke Paris.
LEWIS, G.J. 1933a. Plants — new or noteworthy. *South African Gardening and Country Life* 23: 167–168.
LEWIS, G.J. 1933b. Plants — new or noteworthy. *South African Gardening and Country Life* 23: 255, 266.
LEWIS, G.J. 1938. Eight new Iridaceae from the Cape Province. *Journal of South African Botany* 4: 1–11.
LEWIS, G.J. 1941. Iridaceae. New genera and species and miscellaneous notes. *Journal of South African Botany* 7: 18–59.
LEWIS, G.J. 1945. *Homeria bulbillifera*. In Plantae novae Africanae. *Journal of South African Botany* 11: 117–118.
LEWIS, G.J. 1948. Some changes in nomenclature—V. III. *Journal of South African Botany* 14: 85–89.
LEWIS, G.J. 1949. *Moraea angusta* (Thunb.) Ker and allied species. *Journal of South African Botany* 15: 116–120.
LEWIS, G.J. 1950. Iridaceae. In R.S. Adamson & T.M. Salter, *Flora of the Cape Peninsula*. Juta, Cape Town.
LEWIS, G.J. 1954. Iridaceae. New species and miscellaneous notes. *Annals of the South African Museum* 40: 115–135.
LEWIS, G.J. 1959. South African Iridaceae. A revision of *Hexaglottis*. *Journal of South African Botany* 25: 215–230.
LINK, J.H.F. 1821. *Ennumeratio plantarum horti regii berolinensis, altera* 1. G. Reimer, Berlin.
LINNAEUS, C. 1753. *Species plantarum*. Salvius, Stockholm.
LINNAEUS, C. (fil). 1782 ['1781']. *Supplementum plantarum*. Orphanotropheus, Brunswick.
MANNING, J.C. & GOLDBLATT, P. 2006. New species of Iridaceae from the Hantam-Roggeveld centre of endemism and the Bokkeveld, Northern Cape, South Africa. *Bothalia* 36: 139–145.
MILLER, P. 1758. *Figures of the most beautiful, useful, and uncommon plants described in the Gardener's Dictionary*. P. Miller, London.
MUELLER, F. 1893. In: *Proceedings of the Royal Society of Victoria* 5: 215 (1893)
OBERMEYER, A.A. 1968. *Moraea graminicola*. *Flowering Plants of Africa* 39: t. 1526
OBERMEYER, A.A. 1970a. *Moraea huttonii*. *Flowering Plants of Africa* 40: t. 1581.
OBERMEYER, A.A. 1970b. *Moraea galpinii*. *Flowering Plants of Africa* 40: t. 1582.
PARLATORE, F. 1854. *Nuovi generi et nuovi specie di piante monocotyledoni*. Le Monnier, Florence.
PERSOON, C.H. 1805. *Synopsis plantarum* 1. Cramer, Paris.
PHILLIPS, E.P. 1926. *Memoirs of the Botanical Survey of South Africa* 9: 16.
PHILLIPS, E.P. 1951. *The genera of South African flowering plants* 25.
RAFINESQUE, C. 1838 ['1836']. *Flora Telluriana* 4. Published by author, Philadelphia.
REDOUTÉ, J.P. 1803. *Les Liliacées* 2. Didot Jeune, Paris.
ROEMER, J.J. 1806. *Collecteana*. Gessner, Zurich.
ROEMER, J.J. & SCHULTES, J.A. 1817. *Systema vegetabilium secundum* 1. Cotta, Stuttgart.
SALISBURY, R.A. 1796. *Prodromus stirpium in horto ad Chapel Allerton vigentium*. London.
SALISBURY, R.A. 1805. *The paradisus londinensis*. London.
SALISBURY, R.A. 1812. On the cultivation of rare plants. *Transactions of the Horticultural Society of London* 1: 261–366.
SALTER, T.M., BARKER, W.F. & LEWIS, G.J. 1949. Plantae novae Africanae. *Journal of South African Botany* 15: 35–43.
SCHLECHTER, R. 1898. Decades plantarum novarum austro-africanarum. *Journal of Botany, British and foreign* 36: 373–378.
SCHLECHTER, R. 1900. Plantae schlechterianae novae vel minus cognitae describuntur II. *Botanische Jahrbücher für Systematik* 27: 86–220.
SCHLECHTER, R. 1907. Beiträge zur Kenntnis der Flora von Natal. *Botanische Jahrbücher für Systematik* 40: 89–96.
SCHNEEVOGT, G.V. 1793. *Iris longifolia. Icones plantarum rariorum*. Haarlem.

SCHRANK, F. DE P. DE. 1822. Commentarius in Irideas capenses. *Denkschriften Königlich-Baierischen Botanischen Gesellschaft in Regensburg* 2: 165–224.
SPRENGEL, K. 1820. *Galaxia multiflora* Spreng., *Neue Entdeckungen im ganzen Umfang der Pflanzenkunde* 1: 251
SPRENGEL, K. 1824. *Systema vegetabilium*, edn. 16, vol. 1. Dietrich, Göttingen.
SPRENGEL, K. 1828. *Systema vegetabilium*, edn. 16, vol. 5. Dietrich, Göttingen.
STEUDEL, E.G. 1841. *Nomenclator botanicus*, edn. 2. J.G. Cotta, Stuttgart & Tübingen.
SWEET, R. 1826a. *Hortus britannicus*. Ridgeway, London.
SWEET, R. 1826b. *Homeria miniata*. *British Flower Garden* 2: t. 152.
SWEET, R. 1826c. *Homeria lineata*. *British Flower Garden* 2: t. 178.
SWEET, R. 1830. *Hortus britannicus*, edn. 2. Ridgeway, London.
SWEET, R. 1834. *Moraea tricuspis* var. *ocellata* D.Don. *British Flower Garden* 6.
THUNBERG, C.P. 1782a. *Nova genera plantarum*, vol. 2. J. Edman, Uppsala.
THUNBERG, C.P. 1782b. *Dissertatio de Iride*. J. Edman, Uppsala.
THUNBERG, C.P. 1787. *Dissertatio de* Moraea. J. Edman, Uppsala.
THUNBERG, C.P. 1800. *Prodromus plantarum capensium*. J. Edman, Uppsala.
VAN HAZEN, W. 1759. *Catalogue hollandoise tant des arbes & plantes etrangeres*, etc., edn. 2. Van Damme, Haarlem.
VENTENAT, E.P. 1808. *Decas generum novorum aut parum cognitarum*. E. Dufarb, Paris.
VOIGT, J.O. 1845. *Hortus suburbanus calcuttensis*. Bishop's College Press, Calcutta.
WENDLAND, J.C. 1798. *Botanische Beobachtungen*. Gebrüdern Hahn, Hanover.
WILLDENOW, C.L. 1797. *Species plantarum*, vol. 1. Nauk, Berlin.
WILLDENOW, C.L. 1800. *Species plantarum*, vol. 3. Nauk, Berlin.
WILLDENOW, C.L. 1809. Enumeratio plantarum horti regii berolinenesis. Berlin.
WOOD, J.M. & EVANS, M.S. 1897. New Natal plants. *Journal of Botany, British and foreign* 35: 350–352.

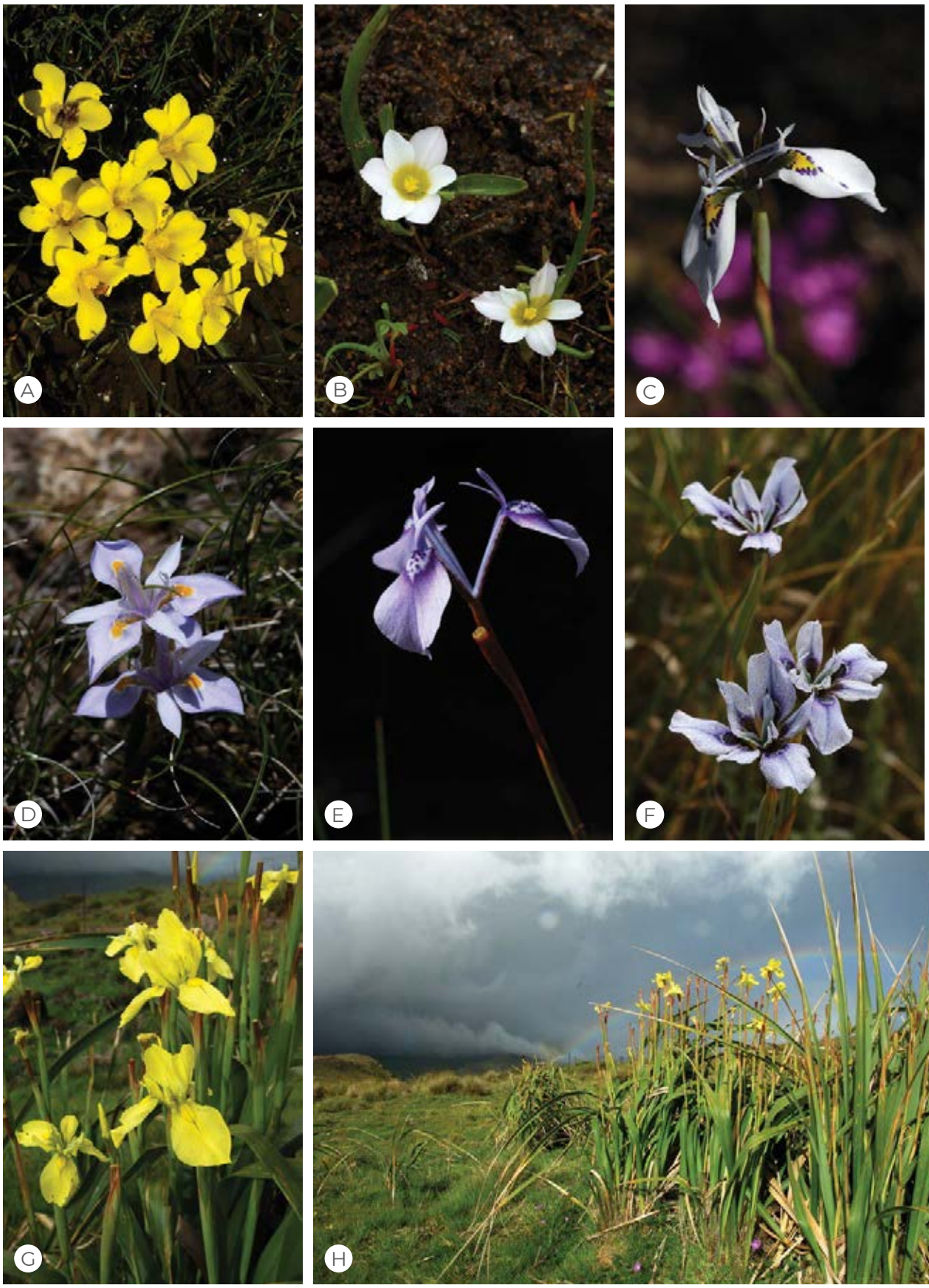


Plate 78. A, ***Moraea alata***, Hermon, WC; B, ***M. albiflora***, Darling, WC; C, ***M. algoensis***, Worcester, WC; D, ***M. alpina***, Rhodes, EC; E, ***M. amabilis***, Nieuwoudtville, NC; F, ***M. amissa***, Malmesbury, WC; G & H, ***M. alticola***, Rhodes, EC.

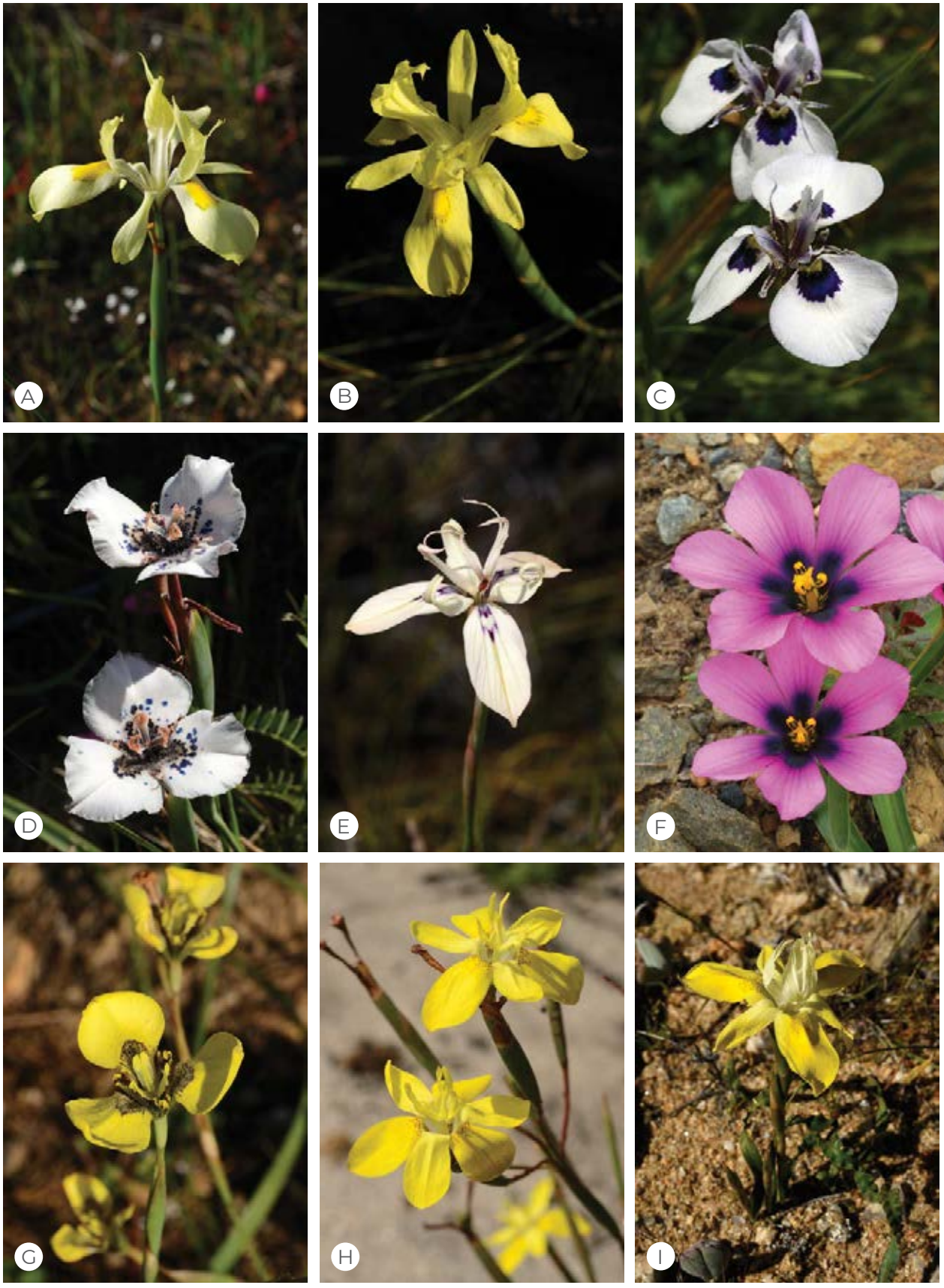


Plate 79. A, ***Moraea angusta***, Hermon, WC; B, ***M. anomala***, Stellenbosch, WC; C, ***M. aristata***, Cape Town, WC; D, ***M. atropunctata***, Bot River, WC; E, ***M. barkerae***, Ceres, WC; F, ***M. barnardiella***, Villiersdorp, WC; G, ***M. bellendenii***, Stellenbosch, WC; H, ***M. bituminosa***, Cape Peninsula, WC; I, ***M. bolusii***, Steinkopf, NC.

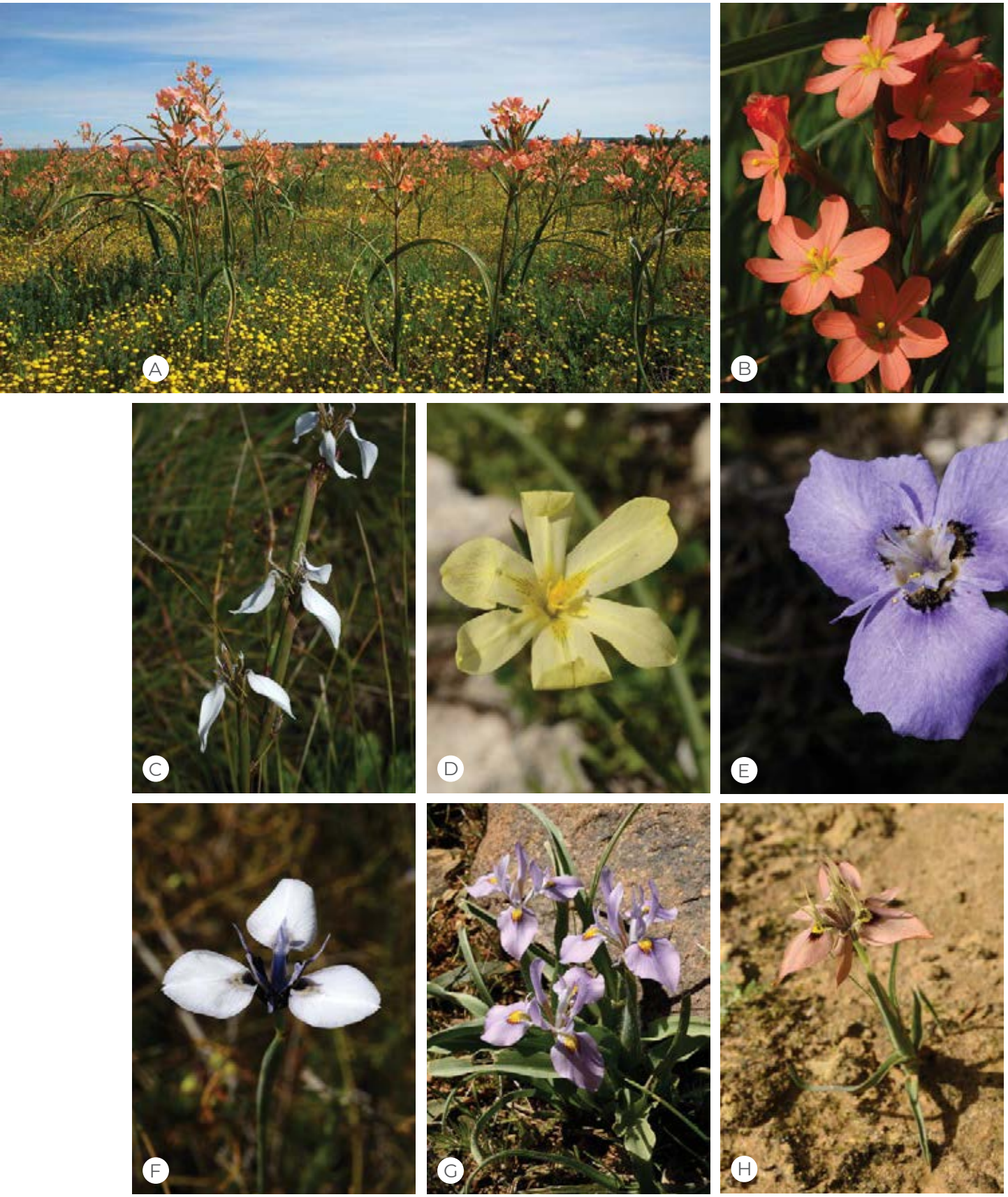


Plate 80. A & B, ***Moraea bifida***, Nieuwoudtville, NC; C, ***M. brevistyla*** subsp. ***papillosa***, Witsieshoek, FS; D, ***M. bulbillifera*** subsp. ***bulbillifera***, Bredasdorp, WC; E, ***M. calcicola***, Saldanha, WC; F, ***M. caeca***, Wolseley, WC; G, ***M. ciliata*** subsp. ***ciliata***, Sutherland, NC; H, ***M. ciliata*** subsp. ***cuprina***, Koekenaap, WC.

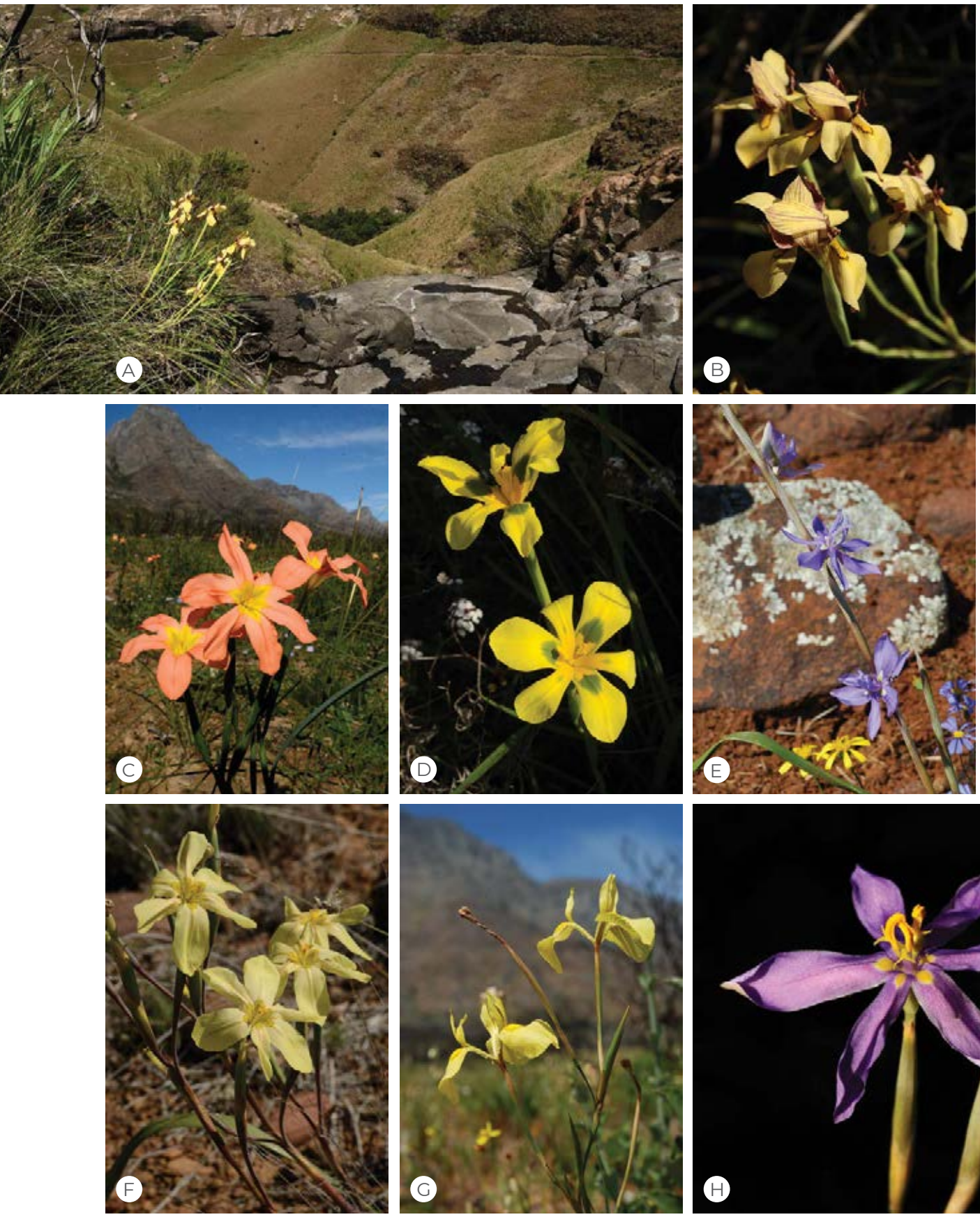


Plate 81. A & B, ***Moraea carnea***, Witsieshoek, KZN; C, ***M. collina***, Hermon, WC; D, ***M. comptonii***, Caledon, WC; E, ***M. contorta***, Calvinia, NC; F, ***M. cookii***, Merweville, WC; G, ***M. cooperi***, Hermon, WC; H, ***M. crispa***, Swartruggens, WC.

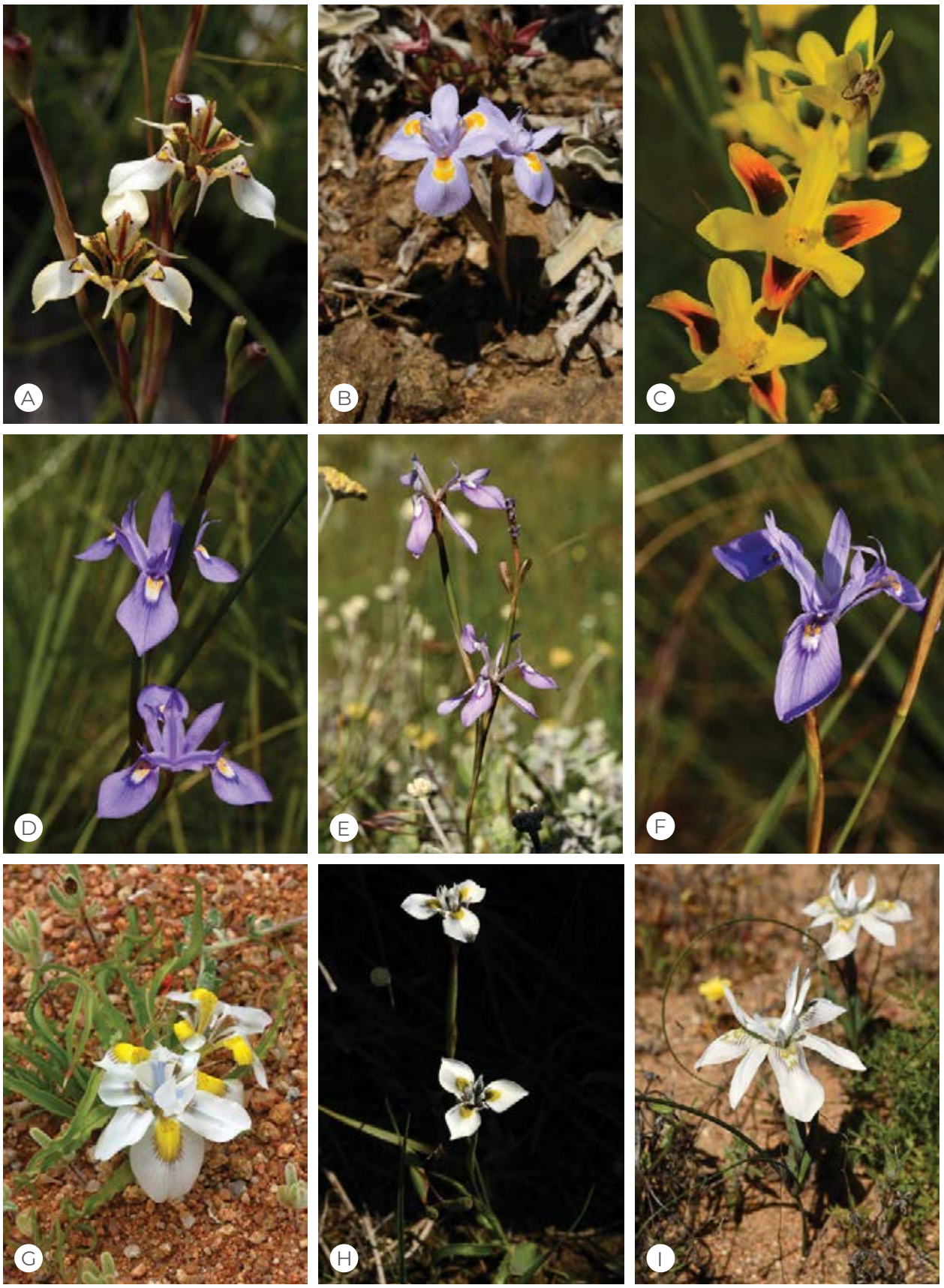


Plate 82. A, ***Moraea deltoidea***, Kogelberg, WC; B, ***M. dracomontana***, Sani Pass, KZN; C, ***M. elegans***, Napier, WC; D, ***M. elliotii***, Lydenburg, MP; E, ***M. elliotii***, Somerset East, EC; F, ***M. elliotii***, Lydenburg, MP; G, ***M. falcifolia***, Garies, NC; H, ***M. fergusoniae***, Napier, WC; I, ***M. filicaulis***, Springbok, NC.

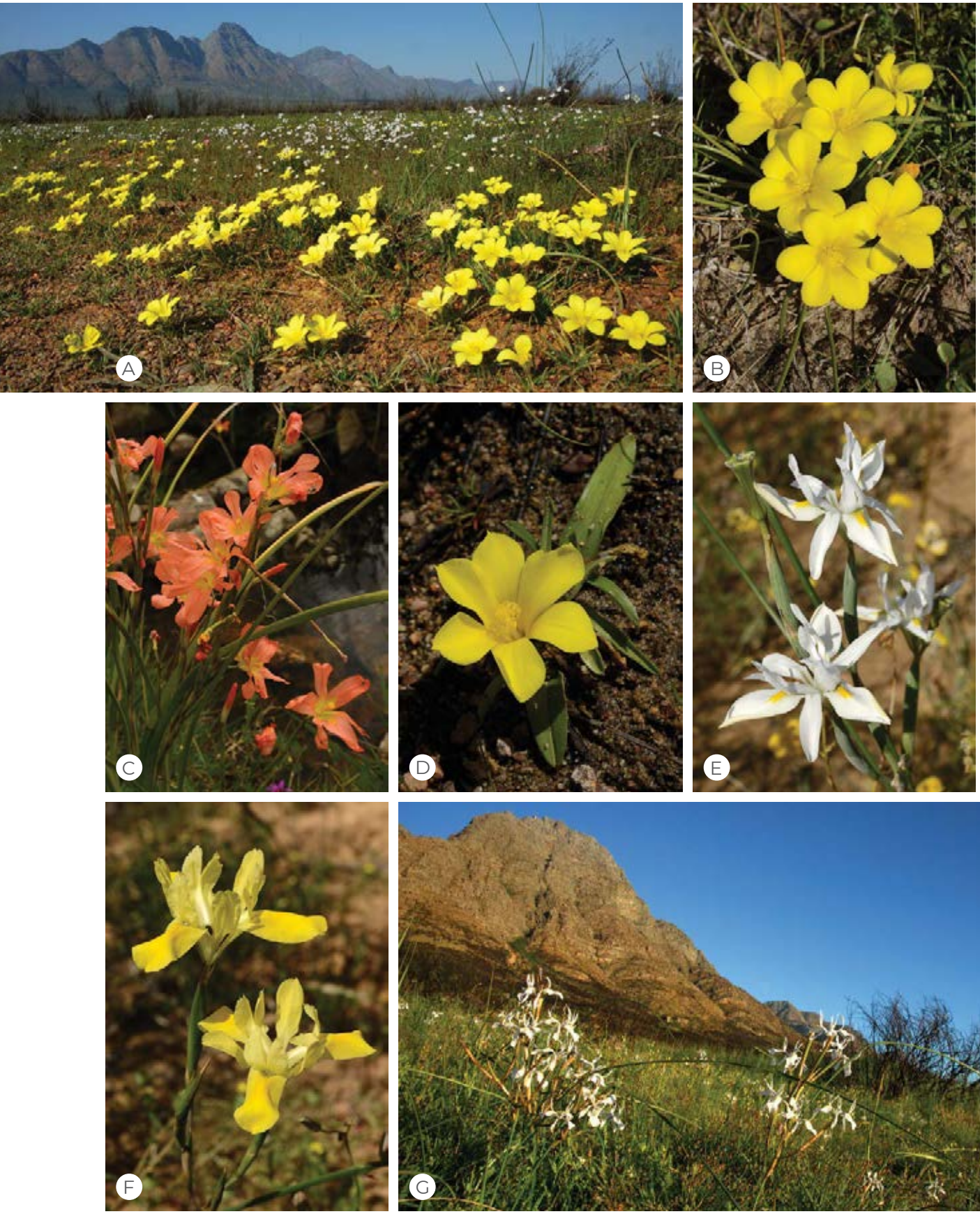


Plate 83. A, ***Moraea fugacissima***, Hermon, WC; B, ***M. fugacissima***, Botha, WC; C, ***M. flaccida***, Tulbagh, WC; D, ***M. galaxia***, Hermon, WC; E, ***M. fugax***, Clanwilliam, WC; F, ***M. fugax***, Klawer, WC; G, ***M. fugax***, Hermon, WC.



Plate 84. A, ***Moraea galpinii***, Sabie, MP; B, ***M. gawleri***, Worcester, WC; C, ***M. gawleri***, Wuppertal, WC; D, ***M. gigandra***, Porterville, WC; E, ***M. grandis***, Nieuwoudtville, NC; F, ***M. helicoidea***, Worcester; G, ***M. herrei***, Springbok, NC; H, ***M. huttonii***, East London, EC; I, ***M. inclinata***, Witsieshoek, FS.

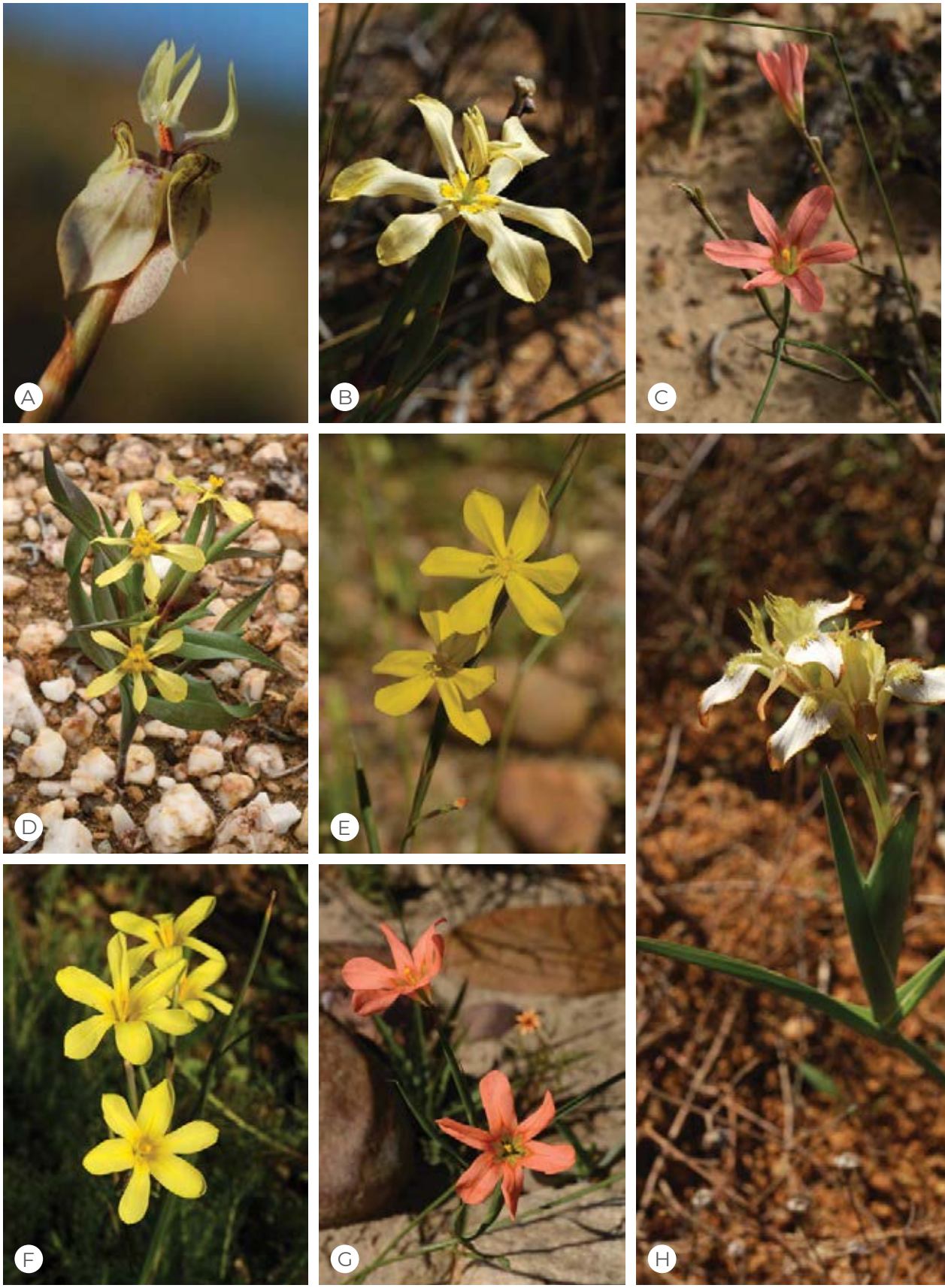


Plate 85. A, ***Moraea inconspicua*** subsp. ***namaquensis***, Springbok, NC; B, ***M. intermedia***, Springbok, NC; C, ***M. karooica***, Worcester, WC; D, ***M. knersvlaktensis***, Vanrhynsdorp, WC; E, ***M. lewisiae*** subsp. ***lewisiae***, Tulbagh, WC; F, ***M. longistyla***, Goudini, WC; G, ***M. longistyla***, Worcester, WC; H , ***M. longipes***, Bitterfontein, NC.



Plate 86. A, ***Moraea loubseri***, Langebaan, WC; B, ***M. lugubris***, Darling, WC; C, ***M. lutea***, Sutherland, NC; D, ***M. macrocarpa***, Clanwilliam, WC; E, ***M. miniata***, Clanwilliam, WC; F, ***M. miniata***, Vanrhynsdorp, WC; G, ***M. marlothii***, Sutherland, NC; H, ***M. minor***, Clanwilliam, WC.

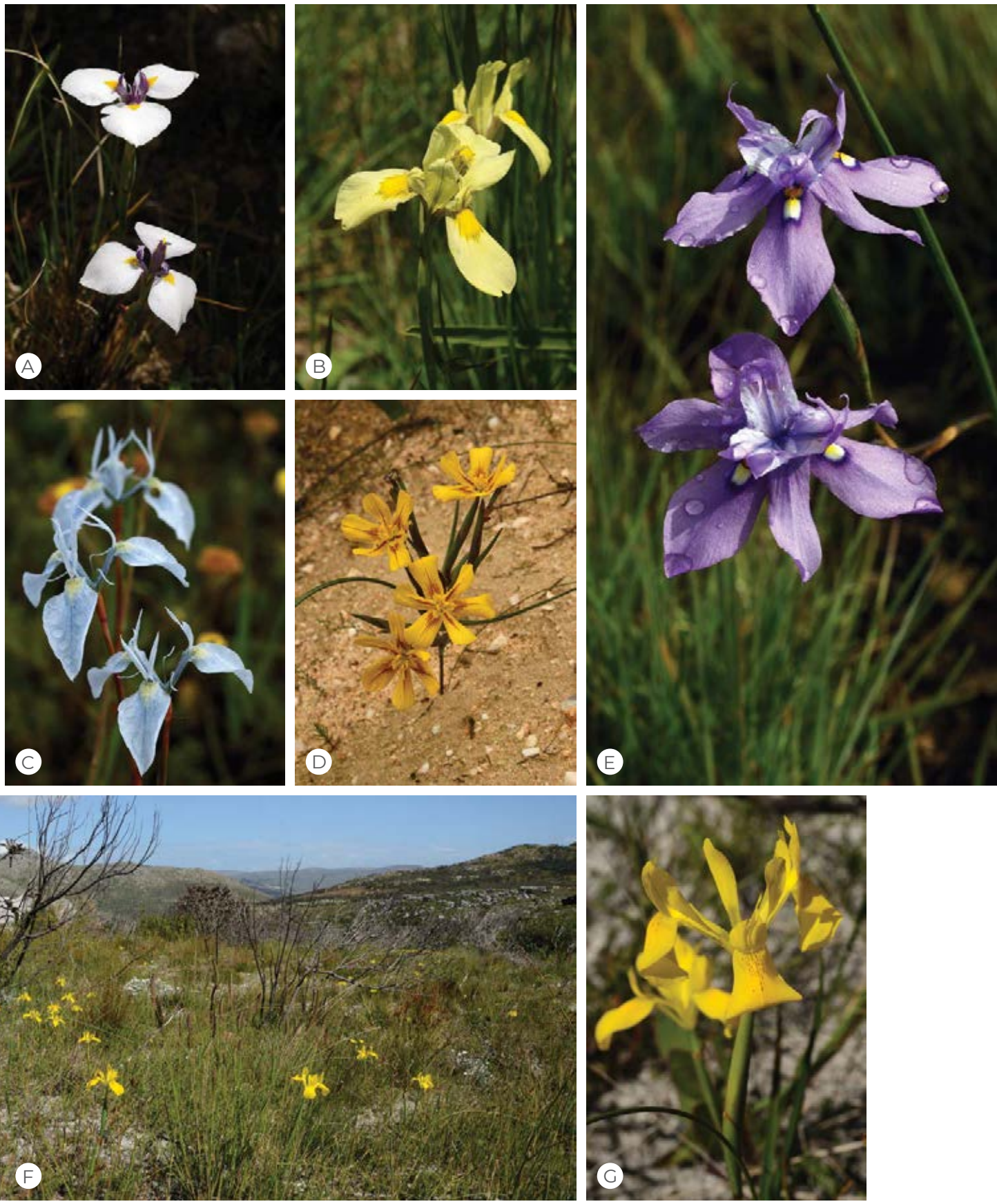


Plate 87. A, ***Moraea modesta***, Sani Pass, KZN; B, ***M. muddii***, Sabie, MP; C, ***M. mutila***, Darling, WC; D, ***M. nana***, Clanwilliam, WC; E, ***M. natalensis***, Lydenburg, MP; F & G, ***M. neglecta***, Cape Peninsula, WC.

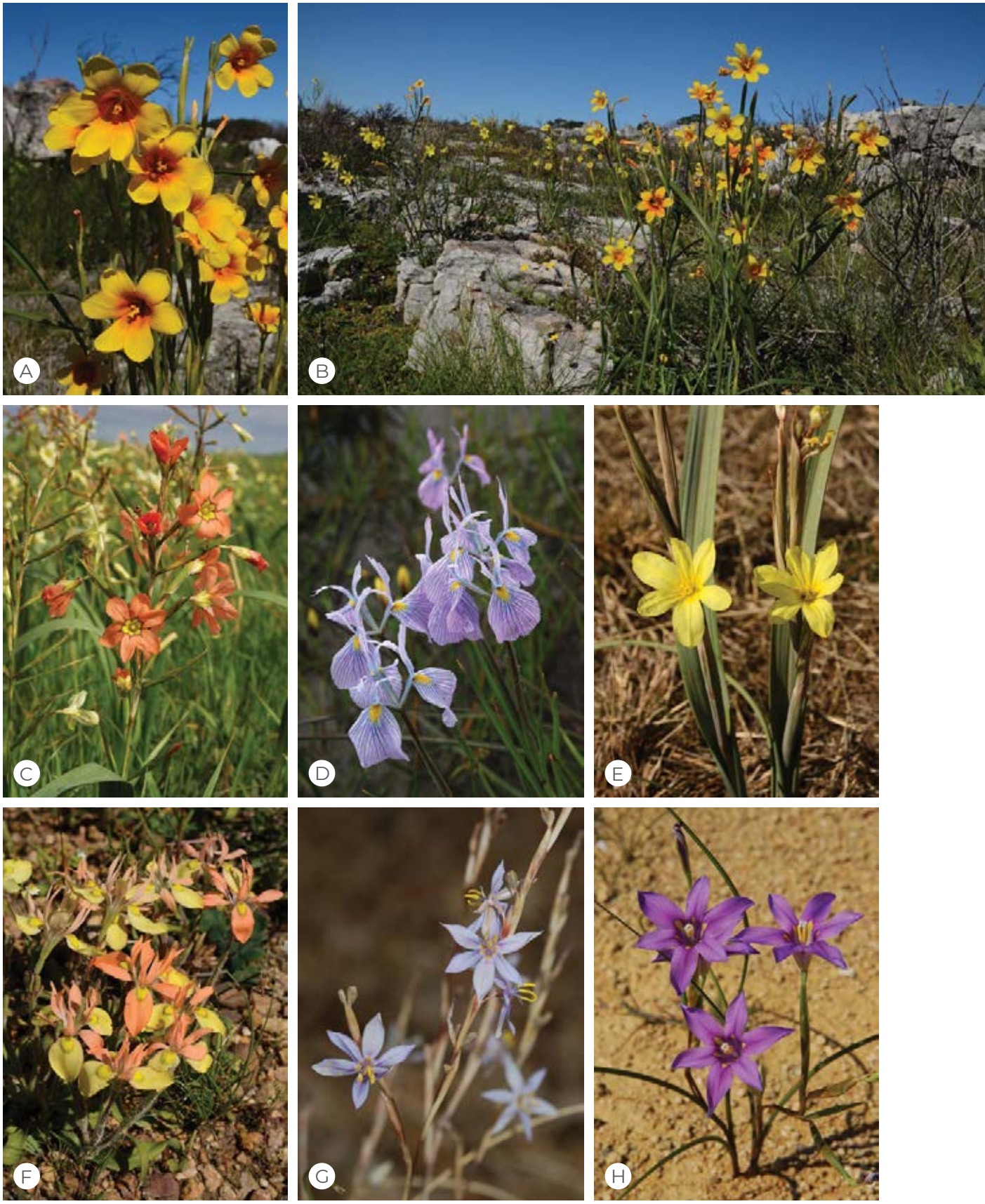


Plate 88. A & B, ***Moraea ochroleuca***, Simonstown, WC; C, ***M. odorata***, Nieuwoudtville, NC; D, ***M. ogamana***, Hermon, WC; E, ***M. pallida***, Bloemfontein, FS; F, ***M. papilionacea***, Hermon WC; G, ***M. pearsonii***, Karoopoort, WC; H, ***M. polyanthos***, Ashton, WC.

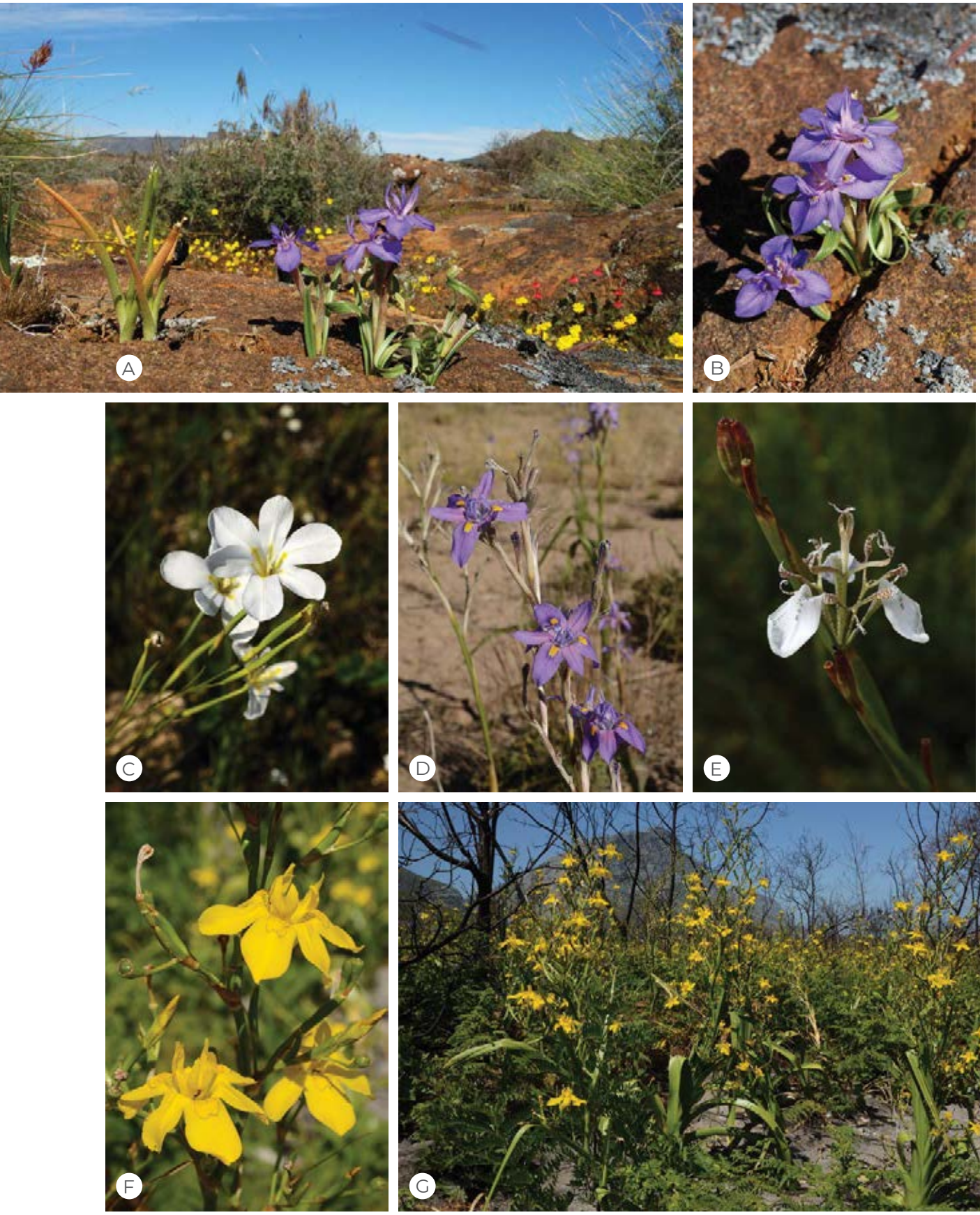


Plate 89. A & B, ***Moraea pritzellii***, Calvinia, NC; C, ***M. polyanthos***, Bredasdorp, WC; D, ***M. polystachya***, Beaufort West, WC; E, ***M. pubiflora***, Lydenburg, MP; F & G, ***M. ramosissima***, Betty's Bay, WC.

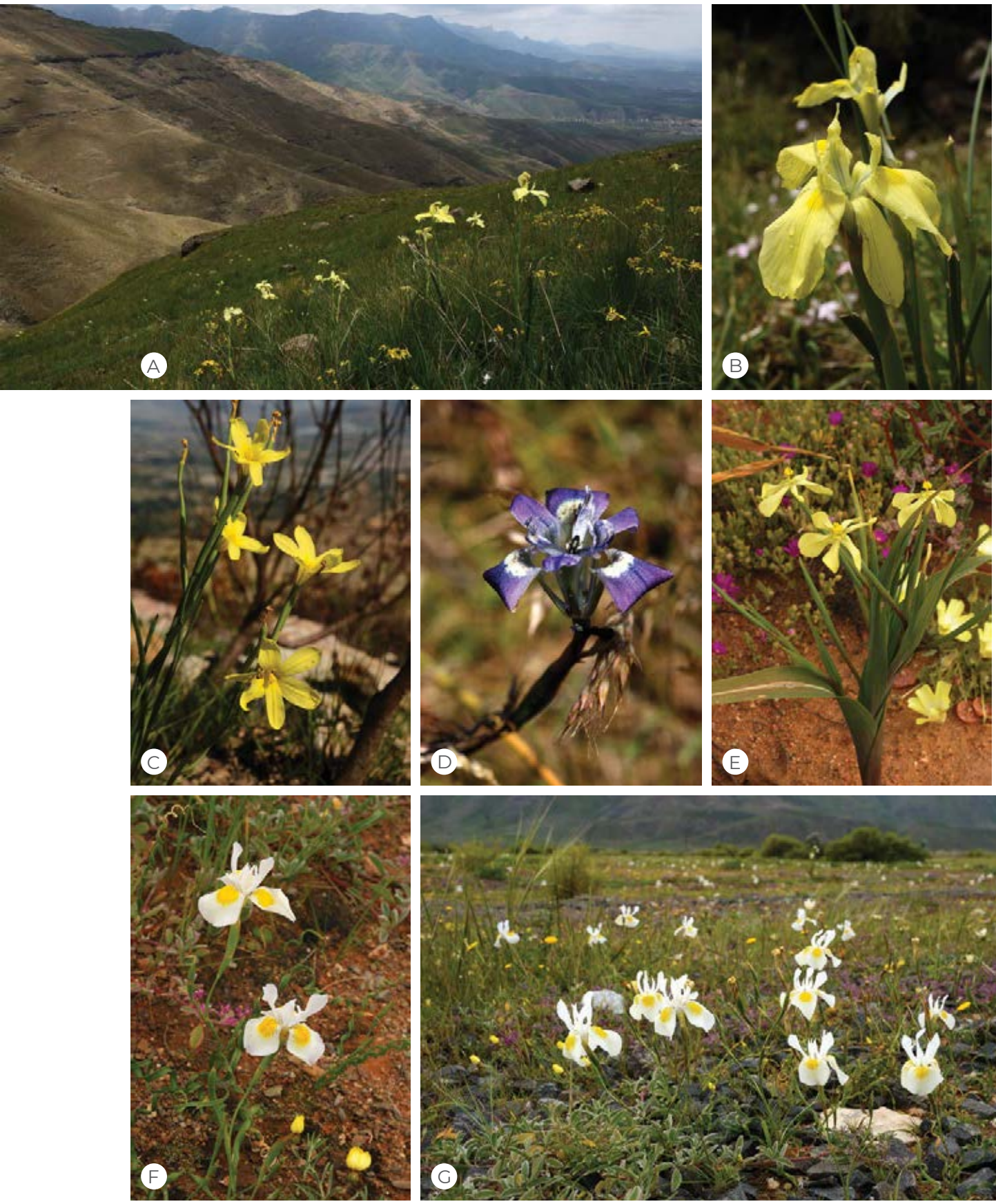


Plate 90. A & B, ***Moraea robusta***, Witsieshoek, FS; C, ***M. pyrophila***, Du Toit's Kloof, WC; D, ***M. saldanhensis***, Saldanha, WC; E, ***M. schlechteri***, Okiep, NC; F & G, ***M. serpentina***, Vanrhynsdorp, WC.

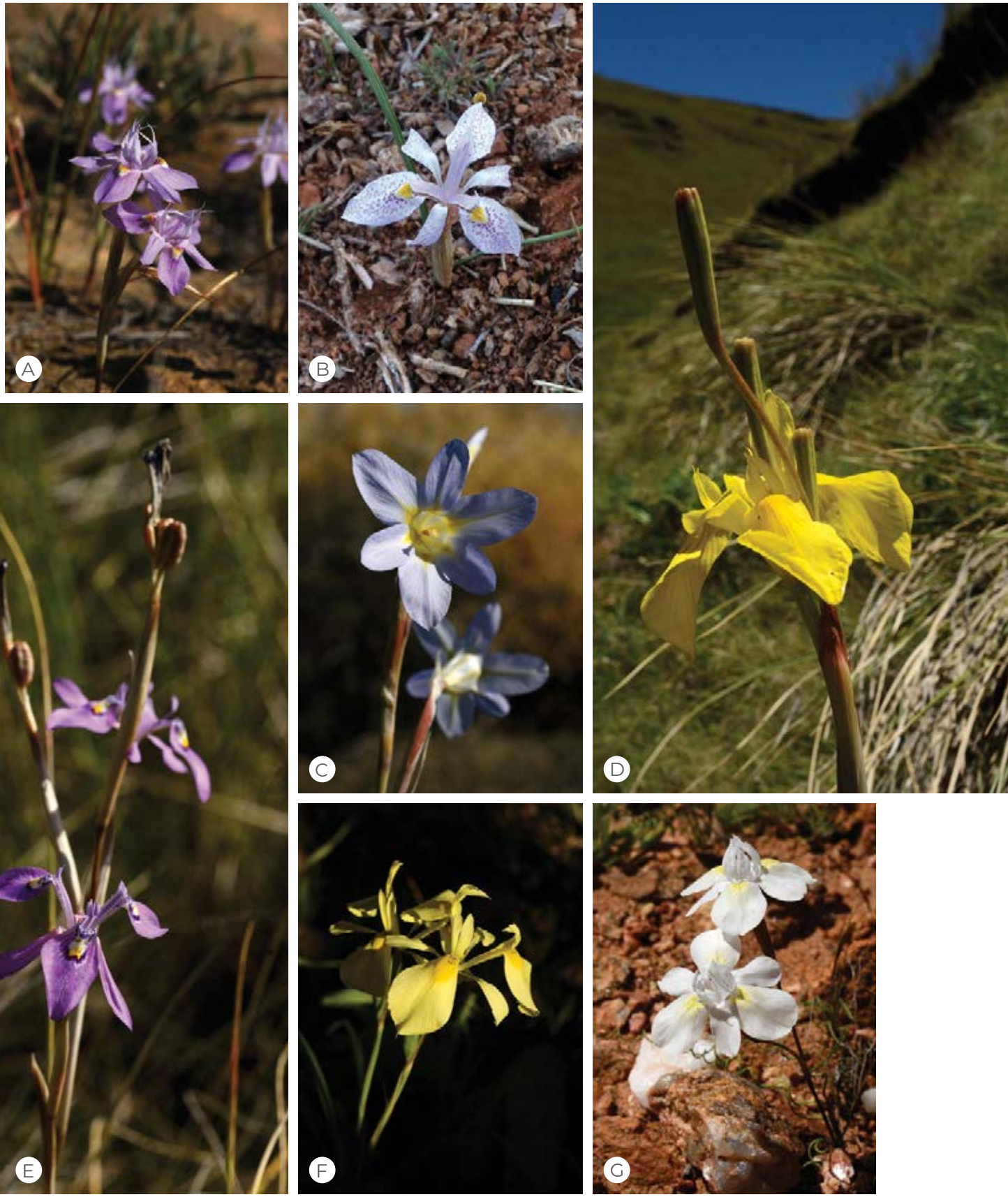


Plate 91. A, ***Moraea setifolia***, Worcester, WC; B, ***M. simulans***, Bloemfontein, FS (photograph: D. Clarke); C, ***M. speciosa***, Tanqua Karoo, WC; D, ***M. spathulata***, Rhodes, EC; E, ***M. stricta***, New Bethesda, EC; F, ***M. thomasiae***, Koo, WC; G, ***M. tortilis***, Steinkopf, NC.



Plate 92. A, ***Moraea tricolor***, Darling, WC; B, ***M. trifida***, Witsieshoek, FS; C, ***M. tripetala*** subsp. ***tripetala***, Napier, WC; D, ***M. tripetala*** subsp. ***violacea***, Koo, WC; E, ***M. tulbaghensis***, Hermon, WC; F, ***M. tulbaghensis***, Malmesbury, WC; G, ***M. umbellata***, Piketberg, WC; H, ***M. vallisbelli***, Nieuwoudtville, NC.

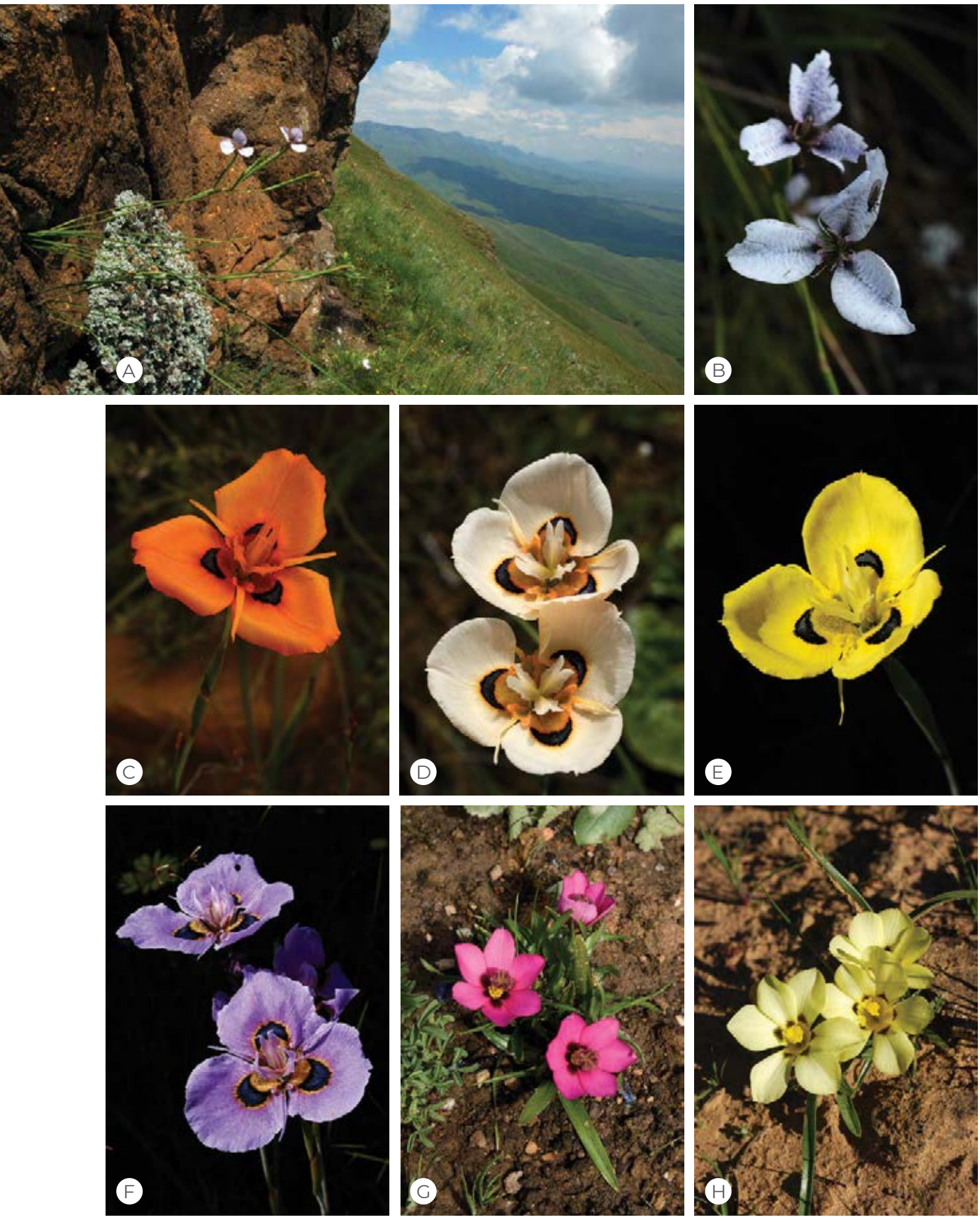


Plate 93. A & B, ***Moraea vigilans***, Witsieshoek, FS; C–E, ***M. villosa*** subsp. ***elandsmontana***, Hermon, WC; F, ***M. villosa*** subsp. ***villosa***, Hermon, WC; G, ***M. versicolor***, Hermon, WC; H, ***M. vuvuzela***, Worcester, WC

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Accepted names are in **bold** type and synonyms in *italics*.

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This is the first complete taxonomic treatment for Iridaceae in southern Africa (including Botswana, Lesotho, Namibia, South Africa and Eswatini) since the publication of J.G. Baker's account in *Flora capensis* (1896). It treats a total of 1 210 species in 36 genera, classified in the four subfamilies **Aristeoideae** (*Aristea* 46 spp.), **Nivenioideae** (*Nivenia* 11 spp., *Klattia* 3 spp. and *Witsenia* 1 sp.), **Crocoideae** tribe Tritoniopsideae (*Tritoniopsis* 23 spp.), tribe Watsonieae (*Watsonia* 53 spp., *Pillansia* 1 sp., *Thereianthus* 11 spp., *Micranthus* 7 spp., *Codonorhiza* 7 spp., *Schizorhiza* 1 sp., *Lapeirousia* 27 spp. and *Afrosolen* 11 spp.) and tribe Ixieae subtribes Gladiolinae (*Gladiolus* 169 spp.), Melasphaerulinae (*Melasphaerula* 1 sp.), Freesiinae (*Xenoscapa* 3 spp., *Freesia* 16 spp., *Crocosmia* 7 spp. and *Devia* 1 sp.), Hesperanthinae (*Geissorhiza* 104 spp. and *Hesperantha* 87 spp.), Tritoniinae (*Babiana* 93 spp., *Chasmanthe* 3 spp., *Sparaxis* 16 spp., *Duthiastrum* 1 sp., *Dierama* 37 spp., *Tritonia* 30 spp. and *Ixia* 100 spp.), subtribe Radinosiphoninae (*Radinosiphon* 2 spp.) and Crocinae (*Romulea* 84 spp., *Afrocrocus* 1 sp. and *Syringodea*. 7 spp.), and Iridoideae (*Dietes* 5 spp., *Bobartia* 17 spp., *Ferraria* 15 spp. and *Moraea* 209 spp.). A revised, phylogeny-based tribal and subtribal classification is presented here for Crocoideae, correlating with corm ontogeny and seed characteristics. Keys are provided to subfamilies, tribes and genera (and in the case of larger genera to subgenera or sections) as well as to species and infraspececific taxa. Each species is fully described with complete nomenclature, geographic range and a distribution map. Genera are illustrated with line drawings, and nearly half of the species are illustrated with colour photographs. Four new species are described, **Bobartia vlokii** *Goldblatt & J.C.Manning*, **Geissorhiza adriaanii** *Goldblatt & J.C.Manning*, **Hesperantha mtamvunae** *Goldblatt & J.C.Manning* and **Romulea fuscomontana** *Goldblatt & J.C.Manning*, and a number of names are synonymised.



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